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PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1868.



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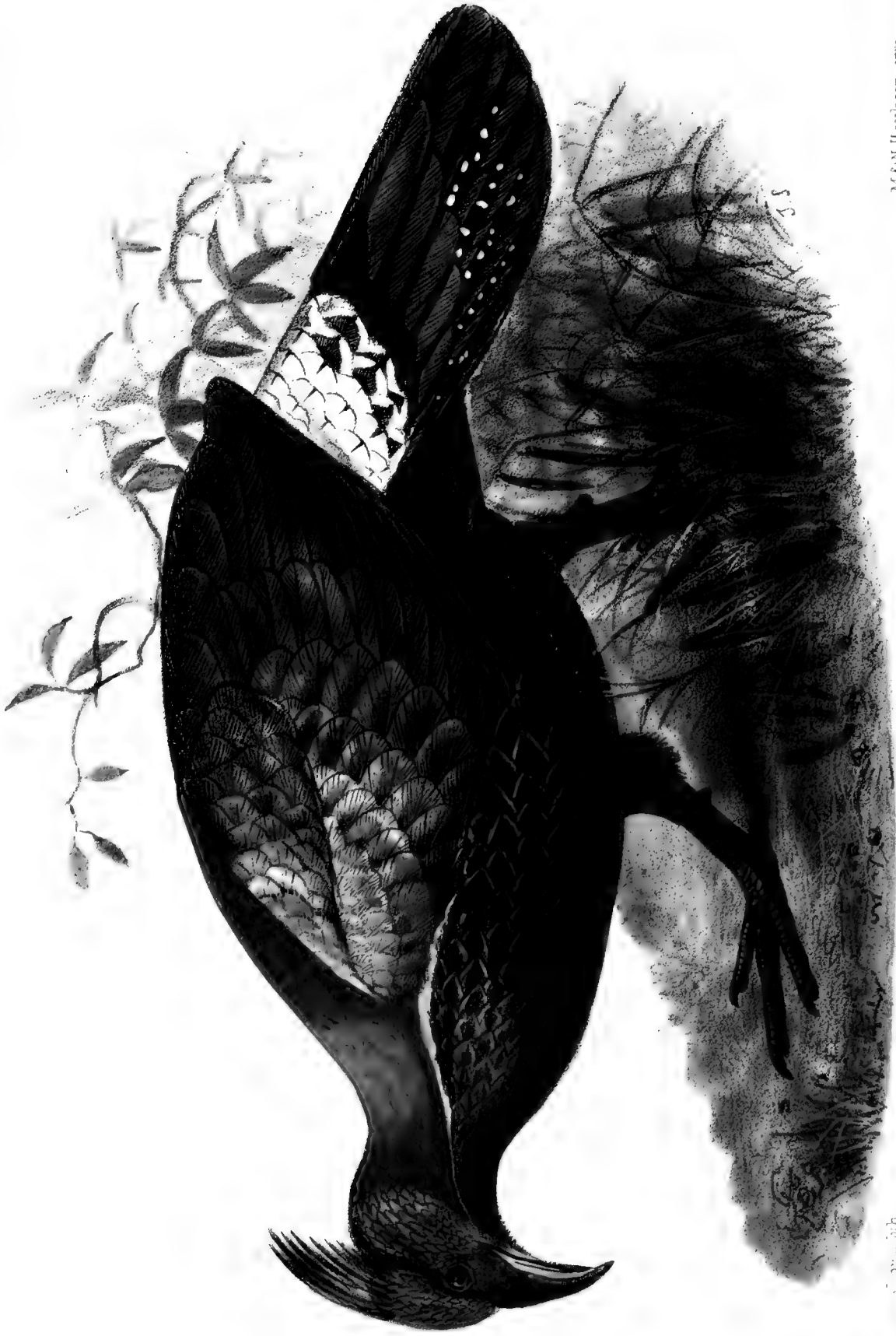
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PROCEEDINGS
OF THE
SCIENTIFIC MEETINGS
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ZOOLOGICAL SOCIETY OF LONDON.

January 9, 1868.

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

Mr. P. L. Sclater exhibited a drawing (Plate I.) of a new species of Impeyan, lately named by M. Albert Geoffroy St.-Hilaire *Lophophorus l'huysi**, taken from the original specimen which had been recently purchased by the Trustees of the British Museum. This skin had been transmitted to France by M. Dabry, French Consul at Hankow, and was stated by its describer to have been obtained in Northern China. But, according to information Mr. Sclater had received from the British Consul at Hankow through Mr. J. J. Stone, the collection of which this bird formed a part had been really formed by one of the French Missionary priests resident at Llassa in Tibet, and its natural habitat was probably some portion of the northern slope of the great Himalayan range, where it would represent the *Lophophorus refulgens* of the southern facies of the same range.

Mr. Sclater gave the following short diagnoses of the two species:—

L. refulgens: *cristæ plumis spatulatis*: *cauda unicolore rufocastanea*: ex mont. Himalayan. facie merid.

L. l'huysi: *cristæ plumis integris*: *cauda æneo-viridi, albo stellata*: ex mont. Himalayan. facie boreali.

* Bull. Soc. Accl. sér. 2, t. iii. p. 223 (1866).

Mr. W. K. Parker, F.R.S., read a memoir on the osteology of the Kagu (*Rhinochetus jubatus*). The conclusion arrived at by Mr. Parker, from an examination of the osseous structure of this bird, was that the Kagu constituted the type of a distinct family belonging to Prof. Huxley's order Geranomorphæ, and was most nearly allied to *Psophia* and *Eurypyga*.

This paper will be published in the Society's 'Transactions.'

Professor Newton exhibited the humerus of a large species of Pelican from the lower peat of the Cambridgeshire Fens.

Though in size exceeding the corresponding bone in *Pelecanus onocrotalus*, the condition of the extremities showed the specimen to have been that of a young bird—a fact which rendered it not unlikely that the species was an inhabitant of the locality in which the bone was found. The specimen had been submitted to the inspection of M. Alphonse Milne-Edwards by Mr. H. Seeley, of the Woodwardian Museum at Cambridge (to which it belonged), and was about to be figured and described by the gentleman first named.

The following papers were read:—

1. Notes on Australian Zoology. By GERARD KREFFT, F.L.S., C.M.Z.S., Curator and Secretary of the Australian Museum at Sydney, New South Wales.

It has recently been stated* that the Short-tailed Wallaby of Western Australia (*Halmaturus brachyurus*) is the common species found in South-eastern Victoria; but having received one of these short-tailed specimens, shot at the Bass River in Victoria, from Professor McCoy, I find it to be identical with the Tasmanian *Halmaturus billardieri*. Skull, limbs, and tail are in two specimens, the one from Tasmania, the other from Victoria, exactly alike; but the colour of the fur of the Victorian species is somewhat lighter.

That this Wallaby should have been confounded with *H. brachyurus* is difficult to conceive, as the western species resembles in the shape of its skull and dentition the *Bettongia* much more than the Wallabies. In the whole group we never find so short a tail or hind foot as in *H. brachyurus*; and looking at the small incisor teeth, both above and below, the short lower jaw, the broad zygoma, and the strong and powerful premolar, it becomes apparent at once that this animal could not easily be mistaken for the *H. billardieri*, the latter having a long head, elongate tarsi, broad incisors (as large again as those of the western specimen), and a long and narrow zygomatic arch. Our best authorities, as Gilbert, Masters, and Waterhouse, state that *H. brachyurus* is peculiar to the west coast.

Again Prof. McCoy errs when he supposes that the western Tortoise (*Chelodina oblonga*) is found in the northern rivers of Victoria.

* Prof. McCoy, "On the Recent Zoology and Palæontology of Victoria," 'Intercolonial Exhibition Essays,' 1866-67, No. 7. Melbourne: Blundell and Co.

It is a true western species; and the specific name of *longicollis* would be much better adapted to it: the Tortoise known so well as *C. longicollis* can shelter its head under the shell; whereas *C. oblonga* cannot do this, and there is scarcely a margin left to protect the head or neck.

We are told by the same authority that "the Batrachia of Victoria, with the exception of the Common Green Frog (*Ranhyla*?, McCoy; *Hyla aurea*, White), are rarely seen or heard, that the true *Hylæ* inhabit lofty gum-trees, and that the Swamp-Frogs of the genus *Limnodynastes* burrow into the sand during the day."

I need only refer to Dr. Günther's paper on the "Geographical Distribution of the Batrachians," to bear witness to the fact that this country is overrun with frogs, that they produce a deafening noise, which is frequently mistaken by those newly arrived for the song of birds and chirping of insects, and that after dark, when the dew is on the grass or after a shower of rain, the ground (even close to a city) is covered with many species of these animals. Most *Hylæ* retire under the bark of trees during the day, and come forth only after dark, when they make themselves sufficiently heard, and can easily be seen, by the light of a candle, hopping about in all directions. *Hyla aurea* has not the habit of *Rana*, as is stated by the same authority. No true *Rana* is found basking in the noonday sun miles away from water; but I have frequently observed *H. aurea* in such positions. As to Frogs burrowing into the sand during the day, this is simply against their nature.

As I am now speaking about reptiles, I wish to put myself right with my friend Dr. Günther, who gives the habitat of *Pseudechis australis* as "North-eastern Australia." In August 1857 I caught on the Murray a red-brown Snake with bright-yellow belly, which had the scales in 17 rows, anal bifid, ventrals 199, subcaudals 34 : $\frac{23}{23}$. Six years afterwards I received from Port Denison a similar specimen differing only in the subcaudals, which always vary in this genus (being 31 : $\frac{26}{26}$). Another point to be corrected is, that I have referred the common *Diemennia* met with in the vicinity of Sydney to *D. psammophis*. I have used this name because it was this southern and western species which Schlegel first described and figured as *Elaps psammophis*. The head (see Schlegel's *Abbildungen*, t. 46. f. 14) is decidedly that of the common *Diemennia* found in New South Wales, the snake to which Dr. Günther and Dr. Gray apply Schlegel's designation being found in Queensland only. I am quite willing to adopt the name of *D. reticulata* for the southern species, if it is desirable to do so, though Schlegel's name of *D. psammophis* was applied first to the reptile which has generally gone under the name of *D. reticulata*.

Before concluding, I wish to make a few remarks with regard to the *Myrmecobius fasciatus*, of which I have twice had an opportunity of examining females. This animal is supposed to have as many as eight nipples; and one observer, and a good one, states that he has actually seen seven young on the nipples. Now in both speci-

mens which I have had before me only four nipples could be traced, and in one of these, in the Australian Museum Collection (in spirits), all four nipples are drawn, showing that four is probably the greatest number of young produced. I have examined the region of the pouch, which is represented by a skin-fold, with a powerful glass, but not a vestige of the remaining nipples could I discover. My specimen is full-grown; and if the other nipples were present, traces should be found of them, though ever so small. In young females of *Phascogale penicillata* the nipples are scarcely discernible to the naked eye, but are clearly shown as soon as a good lens is used.

2. On a Collection of Birds from the Pelew Islands.

By DR. G. HARTLAUB, F.M.Z.S., and O. FINSCH.

(Plates II. & III.)

The Polynesian collectors of M. Johann Cæsar Godeffroy of Hamburg, to whose zealous efforts we owe already so many valuable materials and so much useful information concerning the zoology of the Pacific Islands, have of late sent a second collection from the Pelew group, an almost unknown locality, of which the geographical position between Mindanao and the Western Carolines is certainly a most interesting one. This second collection contains thirty-five species, but amongst them are neither rapacious birds nor parrots! Besides a number of widely distributed Indo- and Polynesian species, as *Carpophaga pacifica*, *Rallus pectoralis*, *Ortygometra quadristrigata*, *Tringa acuminata*, *Charadrius fulvus*, *Ardea sacra*, *Anas superciliosa*, *Sterna lunata*, *Gygis alba*, *Carbo melanoleucus*, &c., there are three well-known members of the avifauna of the Caroline and Marianne Islands,—*Halcyon albicilla*, *Myzomela rubratra*, and *Calornis kittlitzii*. For *Rallina fasciata* and *Nycticorax goisagi* the Philippines are the transitional station. For *Porphyrio melanotus*, a very common Australian and New-Zealand species, the Pelew Islands are a new habitat. As a very curious fact we must consider the occurrence of *Fuligula cristata*, a Duck widely distributed over the continents of Europe and Asia, but as yet not known from any of the Indian or Polynesian Islands.

1. COLLOCALIA VANICORENSIS, Quoy.

2. HALCYON ALBICILLA, Less.

Three specimens, not quite adult, all having the crown and mantle with a greenish gloss.

3. HALCYON REICHENBACHII, Hartl. (*H. cinnamomina*, Reich. f. 3490, 3491).

One specimen, somewhat smaller than those figured by Reichenbach: the colour is quite the same. There remains a good deal of



uth

M&N Hanhart imp

PSAMMATIHA ANN.E.



M & N Hanhart imp

TEPHRAS FINSCHI.

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uncertainty about this species, which may possibly turn out to be a younger state of *H. cinnamomina*, Sw., Reichenbach's indication of the habitat of his *H. cinnamomina*, the Marquesas Islands, being more than doubtful. The measurements of our specimen are:—Long. tot. $7\frac{3}{4}$ " , rostr. $6\frac{1}{2}$ " , alæ $3'' 3'''$, caudæ $2'' 1'''$, tars. $6\frac{1}{2}$ " . In the middle of the rufous crown there are a number of dark greenish spots.

4. MYZOMELA RUBRATRA, Less.

Jun. av. *Obscure atro-fuscescens, remigibus et rectricibus fusco-nigricantibus, marginibus externis olivaceo-flavescentibus; sin-cipite, gulæ et genarum plumis obsolete scarlatino limbatis; pectore, abdomine, tergo, uropygio et tectricibus caudæ superioribus distinctius rubris.*

Long. alæ $2'' 6'''$, caudæ $1'' 8\frac{1}{2}'''$, rostr. $6'''$, tars. $9'''$.

The dimensions of the adult bird from the Pelews are exactly the same as those of the Caroline specimens.

PSAMATHIA, n. gen.

Char. gen.—Rostrum *elongatum, rectum, gracile, subulatum, compressiusculum, carinatum, subemarginatum, culmine dimidio apicali subarcuato, gonyde apice vix conspicue adscendente; naribus in fossa majore positis, linearibus; vibrissis vix ullis. Alæ breviusculæ, caudæ basin parum superantes, subrotundatæ, remige primo subspurio, pollicari, quarto longissimo, secundo et tertio subæquilongis. Cauda rotundata, longiuscula, rectricibus decem, subangustatis, mollibus. Tarsus subelongatus, caligatus. Pedes parvi; ungues debiles; digitus internus externo brevior. Ptilosis tergi et uropygii mollis, laxa, subelongata.*

5. PSAMATHIA ANNÆ, n. sp. (Plate II.)

Supra flavescenti-olivacea; remigibus et rectricibus fuscis, dorsi colore marginatis; subalaribus flavis; subtus flava, olivaceo adumbrata; gula purius flava; linea superciliari brevi, parum conspicua, flavida; mandibula flava, maxilla brunnea; pedibus pallide flavidis.

Long. $6\frac{1}{2}$ " , rostr. $8'''$, alæ $2'' 9'''$, caudæ $2'' 2'''$, tars. $13\frac{1}{2}'''$.

The generic position of this new form is in the *Calamoherpe* group: the feet are the same as in *Calamoherpe*; but the beak is weaker and slenderer, and the wings are very different. *Calamoherpe* has the first quill quite spurious, the third is the longest, and the second and sixth are subequal. In *Calamoherpe* there are twelve tail-feathers; in *Psamathia* I can find only ten. *Tatara* is a very different form, with scutellated tarsi, a very different structure of the plumage, a much more elongated beak, and a twelve-feathered tail. *Tatara syrinx* is a typical *Calamoherpe*. In the structure of the wing of *Psamathia* there seems to be a great resemblance to the genus *Arundinax* of Blyth, a form with which it is not in my power to compare it.

TEPHRAS, Hartl., n. gen.

Char. gen.—Rostrum *mediocre, rectum, acutum, integerrimum, apice subcompresso, carinatum, culmine apicem versus subarcuato; vibrissis vix conspicuis. Alæ mediocres, caudæ basin superantes, rotundatæ vel subtruncatæ; remige primo et quarto, secundo et tertio subæqualibus. Cauda mediocris, subæqualis, reatricibus debilibus, angustatis, apicem versus subacuminatis. Tarsus mediocris, scutellatus; pedes parvi; digitus externus vix longior interno; ungues parvi, debiles. Ptilosis mollis.*

6. TEPHRAS FINSCHII, Hartl., n. sp. (Pl. III.)

Supra obsolete fusca, subtus pallide cinerascens; cauda et alis intensius fuscis; subalaribus, subcaudalibus et hypochondriis magis brunnescentibus; rostro et pedibus nigricantibus.

Long. $5\frac{1}{4}$ " , rostr. 6" , alæ 2" 4" , caudæ $1\frac{3}{4}$ " , tars. 9" .

Tephras is a new form of the *Zosteropine* group. It differs from *Zosterops* in its differently formed beak, in the tail (which is rotundate in *Tephras*, emarginate in *Zosterops*), in the different form of the tail-feathers, in the less-pointed wing, and in the want of an eye-ring. There are some other genera with which *Tephras* agrees in many points, such as the West-African genus *Parinia*, and the Indian genera *Myzornis* and *Fuhina*; but it is decidedly different from these, as well as from other more or less allied forms. One specimen in good condition.

I have named this interesting new bird after my dear friend and coadjutor Otto Finsch, a young ornithologist whose well-known merits do not need any further eulogium.

7. RECTES TENEBROSUS, n. sp.

Av. jun. *Fuliginosus, subtus pallidior, subrufescens; capite nigricanti-fusco, pileo obscuriore; rostro fusco, basi pallidior; pedibus plumbeis. Ptilosis mollis, laxa, sericea. Iris flava.*

Long. 8" , rostr. 9" , alæ 3" 7" , caudæ 2" 3" , tars. 1" .

One specimen, not quite adult, and perhaps not quite typical.

8. RHIPIDURA LEPIDA, n. sp.

Notæo toto abdomineque læte ferrugineis; subalaribus rufis; mento, gula fasciaque lata pectorali albis; macula gutturali magna rotundata nigra; reatricibus fuscis, apice latissime rufis; remigibus fuscis, minoribus dilute rufo limbatis; rostro et pedibus nigricantibus. Iris nigra.

Long. $6\frac{3}{4}$ " , rostr. 5" , alæ 3" , caudæ 3" 1" , tars. 11" .

One adult specimen of this species, allied to *Rhipidura torrida* of Wallace, but certainly different.

9. MYIAGRA ERYTHROPS, n. sp.

Supra plumbea, subfuscescens, alis distinctius fuscescentibus; fronte et gastræo dilute rufis; subcaudalibus albis; subalari-

bus albido et nigricante variegatis; cauda fusciscente; rostro et pedibus nigris. Iris nigra.

Long. $4\frac{3}{4}$ " , rostr. 6" , alæ $2\frac{1}{2}$ " , caudæ 1" 10" , tars. 9" .

A fine typical species, perhaps not quite adult, or a female. One specimen in good condition.

10. CALORNIS KITTLITZII, Finsch et Hartl. Beitr. z. F. Centr. Polyn. p. 109.

Jun. av. *Supra fuliginoso-nigricans, nitore metallico vix ullo; gastræi plumis fuliginosis, late albido marginatis; jugulo striato; abdomine medio distinctius albicante; rostro et pedibus nigris; cauda et alis dorso concoloribus.*

Long. alæ 4" 10" , caudæ 3" 3" , rostr. $9\frac{1}{3}$ " , tars. 13" (ad.).

Seems to be very common; many specimens.

11. PTILINOPUS PELEWENSIS, n. sp.

Supra læte viridis, remigibus majoribus nigris, apice et margine externo late viridibus, minoribus intensius viridibus, limbo externo tenuissime flavo; rectricibus mediis viridibus, reliquis pogonio interno nigris, externo viridibus, omnibus apice late flavis; pileo circumscripte violacescenti-roseo, limbo marginali flavo, fronte pallidiore; capite reliquo colloque dilute flavo-virentibus; juguli plumis macula lata violacea transversim notatis; ventre medio saturate aurantiaco; crisso subflavo; subcaudalibus basi albis, medio flavis, apice late roseo-violacescentibus, limbo apicali tenuissime flavido; rostro plumbeo; pedibus pallidis.

Long. circa $9\frac{1}{2}$ " , rostr. 6" , alæ 5" 2" , caudæ $2\frac{1}{2}$ " , tars. 10" .

One adult specimen in good condition. Nearly allied to *Ptilinopus roseicapillus*, Less., from the Marianne Islands. But this latter species differs from it in having a distinct rose-red spot at the rictus, in the white throat, in the greyish-green colour of the head and neck, the whitish tips of the guttural plumes (which are without any purplish mark), in the red spots on the underbreast, the orange under tail-coverts, &c. &c. Another allied species is *Ptilinopus fasciatus*; but in this the hypogastrium and crissum are dark yellow, the purplish spot is on the underbreast, the under tail-coverts are of a reddish orange, the head, neck, and breast are whitish grey.

12. CARPOPHAGA PACIFICA, Gm.

Exactly like specimens from the Navigator group.

13. MEGAPODIUS SENEX, Hartl.

14. RALLINA FASCIATA, Raffl.

Av. jun. *Capite, collo et pectore dorso concoloribus, fuscis; plumis nonnullis castaneis in fronte et occipite conspicuis; gastræo obsolete fasciato; alis sicut in adulto.*

The hitherto known localities for this species are Sumatra, the Philippines, and the Pelew Islands.

15. RALLUS PECTORALIS, Less.

16. ORTYGOMETRA QUADRISTRIGATA, Horsf.

Av. jun. *Supra obscure olivaceo-fusca, cauda uropygioque obscurioribus; loris obscuris, striis laterum capitis albis minus distinctis; mento et gula albidis; abdomine medio albedo; gastræo reliquo obsolete et pallide brunnescente; crisso, cruribus et subcaudalibus fulvis; rostro corneo-flavescente; pedibus corneo-grisescenscentibus.*

Long. alæ 3'' 7''', rostr. 9''', caudæ 2'', tars. 16'''.

17. PORPHYRIO MELANOTUS, Temm.

A small local variety of the well-known Australian bird.

Long. rostr. 15-18''', alæ 8''-8'' 5''', tars. 2'' 9'''-3'', dig. med. 2'' 10'''-3''.

“Beak red; eyes and legs yellow.”

18. NUMENIUS PHÆOPUS, Lath.

No material differences from Javan specimens. The stripes on throat, breast, and neck are a little narrower, and more like those in *N. borealis*.

19. ACTITIS HYPOLEUCA, L.

20. TRINGA MINUTA, Leisl. = *T. albescens*, Gould.

Exactly like an Australian specimen in winter dress.

“Bill black; eyes yellow; legs blue.”

21. TRINGA ACUMINATA, Horsf.

Limnocinclus acuminatus, Gould, Handb. Austr. ii. p. 254.

One specimen in summer plumage.

22. STREPSILAS INTERPRES, L.

23. CHARADRIUS FULVUS, Gm.

Six specimens, all alike in colour.

“Eye, bill, and feet black.”

24. ARDEA SACRA, Gm.

A fine adult specimen, of a dark slate-colour, with a very narrow snow-white gular stripe. A young bird, like that from the Mate-lotas.

25. NYCTICORAX GOISAGI, Temm.

One specimen, exactly like the posterior figure on plate 25 of ‘Fauna Japonica.’

26. ANAS SUPERCILIOSA, Gm.

Two specimens. The colour of the superciliary stripes, chin, throat, and sides of head are a little more rufescent than in a New-Zealand specimen in the Bremen collection.

27. *FULIGULA CRISTATA*, Ray.

One specimen, a young male, not different from the European bird. As mentioned above, the occurrence of this essentially continental species in the Pelew Islands is certainly a very curious fact.

28. *PUFFINUS OPISTHOMELAS*, Coues.

The under tail-coverts are uniformly black on both webs, without the light colour of the tips.

Long. tot. circa 13'', alæ 7'' 3''', caudæ 3'' 2''', tars. 16''', dig. med. 16''', rostr. 12''''.

29. *STERNA LUNATA*, Peale.30. *GYGIS ALBA* (Sparrm.).

Six specimens.

31. *ANOUS STOLIDUS* (L.).32. *PHAËTON CANDIDUS*, Gr. (*flavirostris*, Br.).33. *DYSPORUS PISCATOR* (L.).34. *DYSPORUS SULA* (L.).35. *CARBO MELANOLEUCUS*, Gray.

One adult specimen, not different from the adult Australian bird. "Eye and beak yellow; legs black." Five nestlings.

Pull. *Lanugine nigricante obtectus; collo nudo nigricante; capite, gula dimidioque basali mandibulæ sordide aurantiaco-brunnescentibus; rostro nigro.*

3. On a Collection of Fishes from Madagascar. By Lieut.-Colonel R. L. PLAYFAIR, F.Z.S., H.B.M. Consul-General in Algeria.

I have lately received from my friend M. Alfred Grandidier a small collection of Fishes made by him in Madagascar, with a request that I would send them, after identification, to the Museum of Natural History at Paris.

M. Grandidier is well known in France as an intelligent and adventurous oriental traveller. For the last three years he has been travelling amongst the islands on the east coast of Africa, particularly in Madagascar; and after a hurried visit to his native country, he has returned to complete his explorations in that interesting island.

In forwarding these fishes to me he states, "Of the four dried skins, I caught the two largest (*Lethrinus ramak* and *Otolithus argenteus*) in the sea at Cape St. Mary; the two smaller ones (*Mugil smithii* and *Chromis niloticus*) were found in a river at Pointe à Larrée,

opposite to the little colony of St. Mary's Island. All the others, preserved in alcohol, were taken by me some miles up the river Mouroundava, on the west coast. Some of them live in salt as well as in fresh water."

Most of these fishes have been already described in the 'Fishes of Zanzibar : ' two only are new.

1. *AMBASSIS PRODUCTUS*, Guich. Cat. Poiss. Madag. Mém. Soc. Imp. Sc. Nat. Cherbourg, t. xii. p. 2.

Hab. Mouroundava River.

2. *DULES FUSCUS*, Cuv. & Val.

3. *THERAPON SERVUS*, Bl.

4. *SCATOPHAGUS TETRACANTHUS*, Lacép.

5. *DREPANE PUNCTATA*, Gm.

6. *CHRYSOPHRYS HASTA*.

Sparus hasta, Bl. Schn. p. 275.

Coius datnia, Buch. Ham. Fishes of Ganges, p. 88, pl. 9. f. 29.

Chrysophrys longispinis, Cuv. & Val. vi. p. 116; Schleg. Faun. Japon. Poiss. p. 68, pl. 32.

C. berda, Cuv. & Val. *l. c.* p. 113.

C. calamara, Cant. Mal. Fish. p. 48 (not C. & V.).

C. hasta, Günth. Fish. i. p. 490.

Hab. Mouroundava River; Bay of Bengal; Chinese and Japanese Seas.

7. *LETHRINUS RAMAK*, Forsk.

8. *SYNANCEA VERRUCOSA*, Schn.

9. *OTOLITHUS ARGENTEA*, K. & v. H.

10. *NAUCRATES DUCTOR*, L.

11. *EQUULA DUSSUMIERI*, Cuv. & Val. x. p. 77, pl. 283; Cuv. Règne An. Ill. Poiss. pl. 62. f. 1 (bad); Günth. Fish. ii. p. 500.

Hab. Mouroundava River; East-Indian Seas.

12. *GOBIOUS GRANDIDIERII*, sp. n.

D. 6 $\frac{1}{9}$. A. $\frac{1}{8}$. P. 20. L. lat. 35-36.

Eight longitudinal series of scales between the second dorsal and anal fins. The height of the body is contained five times and one-third in the total length; the length of the head of adults four times, and of smaller specimens thrice and a half in the same. Both the breadth and the length of the head are considerably greater than its height. Snout produced, more than four times the length of the diameter of the eye, rounded. Cleft of mouth oblique; lower jaw prominent. Eyes small, one-tenth of the length of the head; the space between them is less than twice their longitudinal diameter.

Cheeks swollen, with five or six longitudinal lines of minute pores. Head entirely naked, with the exception of a few small scales on the superior portion of the operculum. Teeth in jaws in villiform bands, with an inner series of larger ones, and an outer row of canines. First dorsal lower than body; the spine and all the rays flexible; the first and second rays somewhat produced. Longest ray of second dorsal (the last) shorter than the first of the anterior dorsal. Caudal rounded, rather longer than the length of head to posterior limb of præoperculum. Anal with the rays very much branched. None of the pectoral rays silk-like. Scales largest on the sides of body and tail, smallest on the belly and nape and around the root of pectorals, each is imbedded in a membranous base. Colour uniform brown; a black spot, smaller than the eye, at the base of the anterior dorsal, between the spine and the first ray; both dorsals with more or less distinct longitudinal rows of darker spots; ventrals and anal minutely punctulated with brown. Length $15\frac{3}{4}$ inches. Two specimens were obtained.

Hab. Mouroundava River.

13. PERIOPHTHALMUS KÆLREUTERI, C. & V.

The most interesting specimen in this collection is a new species of *Xiphogadus*. Unfortunately it is in a very bad state of preservation, having been partially digested in the stomach of another fish. Half of the lower jaw is wanting, and the ventral region is so much destroyed that it is impossible to ascertain the nature of the ventral fins; the other organs, however, are tolerably perfect.

14. XIPHOGADUS MADAGASCARIENSIS, sp. n.

D. 122. A. 96?

Body exceedingly elongate, the greatest height is contained fifty-four times in the total length, and the length of the head seventeen times in the same. Snout obtusely conical, shorter than the diameter of the eye, projecting beyond the cleft of the mouth. Tentacles none. Width of interorbital space rather more than half the diameter of the eye. Upper jaw with rather feeble canines, those in the lower jaw somewhat stronger. Dorsal commencing above the anterior margin of orbit and extending almost as far as the caudal fin; the anterior rays are longest, the first being thrice and a half the height of the body. The anal appears to commence below the twenty-seventh dorsal ray; it is lower than the dorsal, and extends slightly behind it. Caudal short, not much longer than the height of the body. Colour uniform brown. Length $11\frac{1}{2}$ inches.

Hab. Mouroundava River.

15. MUGIL SMITHII.

Mugil microlepis, Smith, Ill. Zool. S. Afr. Pisc. pl. 28. f. 2 (not Rüpp. or Bleek.).

M. smithii, Günth. Fish. iii. p. 447.

Hab. Mouroundava River, on the west coast of Madagascar;

River at Pointe à Larrée, on the east coast; rivers and fresh waters of the Cape of Good Hope.

16. GERRES LINEOLATUS, Günth.
17. CHROMIS NILOTICUS, Hasselq.
18. ARIUS FALCARIUS, Richards.
19. LUTODEIRA CHANOS, Forsk.
20. ELOPS MACHNATA, Forsk.
21. ELOPS CYPRINOIDES, Gm.
22. ANGUILLA JOHANNÆ, Günth.

4. Further Descriptions of New Species of Shells collected at Mauritius by Geoffrey Nevill, Esq. By HENRY ADAMS, F.L.S.

(Plate IV.)

STOMATIA VARIEGATA, H. Ad. (Pl. IV. fig. 1.)

S. testa subrimata, ovato-oblonga, convexa, transversim costata, costis subdistantibus, interstitiis longitudinaliter striatis, rubra, albo variegata; spira prominula, apice acuto, sutura distincta; anfr. 3½, convexis; apertura ovali, labio calloso, labro supra ultimum anfractuum paulum ascendente.

Long. 9, lat. 7 mill.

Hab. Mauritius.

DISCUS VORTICELLA, H. Ad. (Pl. IV. figs. 2, 2a.)

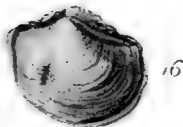
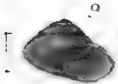
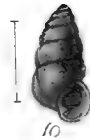
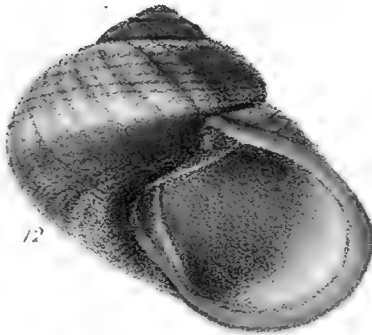
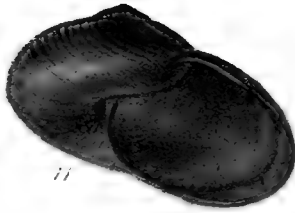
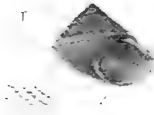
D. testa aperte umbilicata, subdiscoidea, tenui, oblique confertissime costulato-striata, fulva; spira vix elevata, sutura distincta; anfr. 4½, convexis, ultimo antice non descendente, superne subdepresso; umbilico perspectivo, ⅓ diametri fere æquante; apertura obliqua, rotundato-lunari; perist. simplici, recto, marginibus conniventibus, columellari vix dilatato, dextro subsinuato.

Diam. maj. 2¼, min. 2, alt. ¾ mill.

Hab. Bamboo, Mauritius.

NANINA (ROTULA) CERNICA, H. Ad. (Pl. IV. fig. 3.)

N. testa imperforata, trochiformi-depressa, tenuissima, membranacea, oblique longitudinaliter striata, lineis spiralibus minutis decussata, corneo-lutescente; spira depresso-conica, apice obtusulo, sutura leviter impressa; anfr. 4, planatis, ultimo descendente, acute carinato, basi convexo; apertura diagonali,





angulato-ovali; perist. simplici, acuto, recto, marginibus callo tenuissimo junctis, columellari arcuato.

Diam. maj. 10, min. 8, alt. 8 mill.

Hab. Mauritius.

This species is closely allied to *N. philyrina*, Morel., and *N. imperfecta*, Desh., which latter species has also been met with by Mr. Nevill at Mauritius.

PUPA (PUPILLA) EXIGUA, H. Ad. (Pl. IV. fig. 4.)

P. testa profunde rimata, ovato-cylindrica, tenui, levissime striata, sericea, fusco-cornea; spira convexa, apice obtuso; anfr. 5, convexis, ultimo circa rimam obtuse angulato, pone aperturam angustiore, bisulcato; apertura truncato-ovata, verticali, lamina 2 parietalibus, dextra prominente, sinistra remota; perist. expansiusculo, margine dextro sinuato, plicis 2 intrantibus munito.

Long. $1\frac{1}{2}$, diam. $\frac{3}{4}$ mill.

Hab. Bamboo, Mauritius.

GIBBUS (GIBBULINA) MONDRAINI, H. Ad. (Pl. IV. fig. 5.)

G. testa profunde arcuato-rimata, subcylindrica, solidiuscula, peroblique flexuoso-costata, sordide flavida; spira apice acuminato; anfr. 7, convexiusculis, ultimo antice ascendente, basi rotundato; apertura verticali, truncato-ovali, dente parietali pliciformi prope angulum munita; perist. subincrassato, expanso, reflexiusculo, marginibus callo junctis, dextro subsinuato.

Long. 20, diam. 10 mill.; ap. 8 mill. longa, 5 mill. lata.

Hab. Mauritius.

This species appears to be recognized at Mauritius under the name of *mondraini*, which it is therefore desirable to retain.

GIBBUS (GIBBULINA) BARCLAYI, H. Ad. (Pl. IV. fig. 6.)

G. testa profunde rimata, cylindrica, solidiuscula, costulis obliquis subremotis sculpta, flavida; spira cylindrica, in conum obtusum terminata, sutura distincta; anfr. 7, convexiusculis, ultimo antice vix ascendente, basi compresso; apertura subverticali, ovali, dente parietali mediocri prope angulum coarctata; perist. continuo, incrassato, superne subsinuato, adnato, undique expanso, subreflexo.

Long. 17, diam. 7 mill.

Hab. Mauritius.

GIBBUS (GIBBULINA) PRODUCTUS, H. Ad. (Pl. IV. fig. 7.)

G. testa rimata, cylindracea, tenui, suboblique confertim costulata, sordide flava; spira cylindrica, apice convexo-conico, sutura distincta; anfr. 8, planiusculis, ultimo basi subcompresso; plica columellari profunda; apertura subobliqua, oblonga, dente parietali valido prope angulum coarctata; perist.

incrassato, expansiusculo, marginibus callo crasso junctis, dextro subsinuato.

Long. 15, diam. 4 mill. ; ap. 4 mill. longa, 3 lata.

Hab. Mauritius.

This species was received with the name *palangula* attached to it. But the true *palangula* is, according to M. Morelet, who has had an opportunity of seeing that species in Férussac's collection, the same as *teres*, Pfr. I have therefore considered it necessary to describe it as new.

Fam. GALEOMMIDÆ.

Genus THYREOPSIS, H. Ad.

Testa æquivalvis, æquilateralis, trigono-ovata, aperta; margine dorsali convexo, ad umbones subacuto. Cardo edentulus, ligamento interno sub umbonibus instructus.

THYREOPSIS CORALLIOPHILA, H. Ad. (Pl. IV. figs. 8, 8a.)

T. testa solidiuscula, subpurpurea, ad margines pallidiorè; superficie valvarum concentricè striata, marginibus dorsalibus paulum elevatis, rugosis; umbonibus parvis, levibus, approximatis.

Long. 10, alt. 4 mill.

Hab. Mauritius.

In this singular genus the valves are always widely separated; and when they most nearly approach one another, the shell may be likened to a depressed *Emarginula* cut through the centre lengthways. It appears to have more affinity with *Libratula*, Pease, than with *Galeomma*, but differs so much from the former as to render it desirable to constitute a new genus to receive it. Mr. Nevill informs me that it was found alive by his friend Dr. Power on a coral-reef at Mauritius, and that the animal could barely enter the shell. It would appear to be parasitic upon the coral, which is also probably the case with *Libratula*, as Mr. Pease states that he found that genus living on coral. In *Libratula* the animal does not extend beyond the shell.

Note.—In a former paper read by me on new species of Mauritian Shells, some observations on the animals by Mr. G. Nevill were appended to the descriptions, in which the expression “mantle” should correctly have been written “foot,” and “foot” should have been “sole of foot.”

5. Descriptions of some New Species of Land and Marine Shells. By HENRY ADAMS, F.L.S.

(Plate IV.)

MACROCHLAMYS TENUICULA, H. Ad. (Pl. IV. fig. 9.)

M. testa aperte perforata, turbinata, tenui, sublavigata, levissime spiraliter striatula, rufo-cornea, diaphana, nitida; spira con-

vexo-conoidea, apice obtuso, sutura marginata; anfr. $4\frac{1}{2}$, convexiusculis, ultimo non descendente, periphæria obsolete angulato, basi convexo; apertura obliqua, subrotundato-lunari; perist. recto, marginibus conniventibus, columellari ad perforationem reflexo.

Diam. maj. 6, min. $5\frac{1}{2}$, alt. $4\frac{1}{2}$ mill.

Hab. Sattara, Bombay (Coll. F. Layard).

GLESSULA FUSCA, H. Ad. (Pl. IV. figs. 10, 10a.)

G. testa oblongo-turrita, solidiuscula, lævigata, obscure striata, nitida, fusco-cornea; spira turrita, apice obtusiusculo, sutura impressa, crenulata; anfr. 7, convexiusculis, ultimo $\frac{3}{8}$ testæ paulo superante; apertura parum obliqua, ovali; columella callosa, valde arcuata, oblique truncata; perist. recto, obtuso, albido marginato, marginibus callo tenui junctis.

Long. $8\frac{1}{2}$, diam. 4 mill.

Hab. Sattara, Bombay (Coll. F. Layard).

VITRINA ANGASI, H. Ad. (Pl. IV. fig. 11.)

V. testa imperforata, subdepressa, periphæria auriformi, tenui, superne plicato-striata, non nitente, rufo-fulva, subtus lævigata, nitida, olivacea; spira paulum elevata, sutura distincta, vix albo marginata; anfr. 4, convexiusculis, ultimo magno, ad periphæriam compresso; apertura valde obliqua, ovali, intus leviter margaritacea; perist. simplici, amplo, anguste membranaceo marginato, brevissime inflexo, marginibus conniventibus, dextro extrorsum valde dilatato, columellari arcuato.

Diam. maj. 33, min. 26, alt. 20 mill.

Hab. Capengo, West Africa (Coll. H. Adams).

This fine species most nearly approaches *V. flemingii*, Pfr., from India; but the aperture is more ample and depressed, the right margin more dilated, the last whorl more compressed at the periphery, the spiral lines on the whorls are absent, and the colour of the upper portion is red-brown instead of olivaceous. It differs from the other large African species, *V. soveryana*, Pfr., in the last whorl being less angulate, in the spire being considerably more raised, and in the aperture being less oblong.

NANINA (XESTA) SULCIFERA, Barcl. MS. (Pl. IV. fig. 12.)

N. testa imperforata, semigloboso-conoidea, solida, spiraliter sulcis distantibus, et longitudinaliter striis obliquis confertis sculpta, fulvo-rubida; spira conoidea, apice acutiusculo, sutura leviter impressa; anfr. 5, convexiusculis, ultimo antice deflexo, magno, inflato, basi subconvexo; apertura valde obliqua, ovali; perist. simplici, incrassato, marginibus conniventibus, callo tenui junctis, columellari dilatato, excavato.

Diam. maj. 40, min. 32, alt. 30 mill.

Hab. Montagne-au-Riz, Mauritius (Coll. Barclay).

"This interesting species has not, to my knowledge, been found alive, and would appear to be extinct. Fragments of the shell were

first discovered by myself, several years since, among large boulders of blue basalt, about halfway up the Montagne-au-Riz, on the left-hand side of the road to Moka; and subsequently I found a few perfect specimens in the same locality, but all more or less bleached by exposure. During the remainder of my residence at Mauritius no other specimen was met with; but since my return to England, the one figured, which is in better condition than those I collected, was obtained on the same spot by E. Dupont, jun., Esq., and sent to me."—*D. Barclay*.

GIBBUS (GIBBULINA) CLAVULUS, H. Ad. (Pl. IV. fig. 13.)

G. testa profunde rimata, ovata, tenuiuscula, oblique flexuoso costellata; spira attenuata, apice acuminato, sutura distincta; anfr. 7-8, convexiusculis, ultimo ad peripheriam angulato, basi subplanato, antice vix ascendente; apertura subverticali, ovali, dente parietali valido prope angulum coarctata; perist. continuo, soluto, subincrassato, undique late expanso.

Long. 18, diam. 8 mill.

Hab. Mauritius (*Coll. Barclay*).

This species, I am informed, has been long known at Mauritius under the name of *clavulus*, which name I therefore with much pleasure retain for it.

PALAINA COXI, H. Ad. (Pl. IV. fig. 14.)

P. testa sinistrorsa, subperforata, ovata, costulis compressis, subdistantibus sculpta, albida; spira convexo-conica, apice obtusiusculo, corneo; anfr. 6, convexis, ultimo angustiore, paulum ascendente; apertura subverticali, circulari; perist. duplici, externo valde expanso, breviter interrupto.

Long. 3, diam. 1 mill.

Hab. Norfolk Island (*Coll. J. C. Cox*).

DIPLOMMATINA MINUTA, H. Ad. (Pl. IV. fig. 15.)

D. testa dextrorsa, rimata, fusiformi-ovata, costulis debilibus confertis obliquis sculpta, pallide rufo-fusca; spira elongata, apice obtusiusculo; anfr. 7, convexis, antepenultimo tumidiore, ultimo antice paulum ascendente; apertura subverticali, truncato-rotundata, plica columellari conspicua; perist. duplici, interno porrecto, expansiusculo, externo subreflexo, marginibus callo expanso junctis, columellari sinuato, basi angulato.

Long. 2, diam. $1\frac{3}{4}$ mill.

Hab. —? (*Coll. H. Adams*).

Fam. ANATINIDÆ.

Genus PELOPIA, H. Ad.

Testa inæquivalvis, subovata, ventricosa, clausa, superficie valvarum scabra, umbonibus integris. Cardo sub umbonibus apophysibus duabus, horizontalibus, antice curvatis munitus; carti-

lago interna, ossiculo magno curvato instructa; ligamentum subinternum. Impressiones musculares conspicuæ, posterior magna, rotundata; linea pallialis sinuata.

This genus has much the appearance externally of *Ixartia*, Leach (*Rupicola*, Fleur. de Bellv., not Brisson). The hinge is most like that of *Periploma*, the ossicle being very large and strong; but the ligamental processes, although prominent, are without the strengthening ribs present in that genus, from which it also differs in the beaks not being fissured. From the distorted appearance of the shell, its habitat is probably in sponges or crevices of rocks.

PELOPIA BREVIFRONS, H. Ad. (Pl. IV. figs. 16, 16a.)

P. testa solida, albida, inæquilaterali, irregulariter concentrice et rugose plicata; latere antico brevior, rotundato, latere postico angulato, margine superiore rectiusculo, inferiore arcuato; sinu palliali lato, brevi.

Long. 14, alt. 13, lat. 8 mill.

Hab. — ? (Coll. H. Adams).

DESCRIPTION OF PLATE IV.

- Fig. 1. *Stomatia variegata*, p. 12.
 2, 2a. *Discus vorticella*, p. 12.
 3. *Nanina (Rotula) cernica*, p. 12.
 4. *Pupa (Pupilla) exigua*, p. 13.
 5. *Gibbus (Gibbulina) mondraini*, p. 13.
 6. — (*Gibbulina*) *barclayi*, p. 13.
 7. — (*Gibbulina*) *productus*, p. 13.
 8, 8a. *Thyreopsis coralliophila*, p. 14.
 9. *Macrochlamys tenuicula*, p. 14.
 10, 10a. *Glessula fusca*, p. 15.
 11. *Vitrina angasi*, p. 15.
 12. *Nanina (Xesta) sulcifera*, p. 15.
 13. *Gibbus (Gibbulina) clavulus*, p. 16.
 14. *Palaina coxi*, p. 16.
 15. *Diplommatina minuta*, p. 16.
 16, 16a. *Pelopia brevifrons*, p. 17.

6. Synopsis of the Species of Pigs (*Suidæ*) in the British Museum. By Dr. J. GRAY, F.R.S., V.P.Z.S., F.L.S.

The distribution of Swine into species and the species into genera and families is attended with considerable difficulty; this probably arises from three peculiarities of the group:—

1. That most of the wild or presumed wild species are easily reduced to a domestic or semidomestic condition.

2. That the domestic breeds return to their wild condition, even in countries situated far away from their native habitats, and that, under favourable circumstances, the newly enfranchised animals are able to hold their own against the native and colonial cultivators.

3. That the domestic, and possibly the wild species have a great facility in breeding together, having fertile offspring.

There are very few countries that have, or are presumed to have, a native race of Pigs, where some of the kinds are not kept in a more or less domestic state. This is even the case where the animal is regarded with disgust and never eaten as food, except by the lowest class of the inhabitants, as in India.

“Wild Hogs abound in Dukhun, and the male attains to a very great size. I am not satisfied that there is any specific difference between the European and Asiatic Wild Hogs. Every village abounds in hogs. The Village Hog is of the same colour as the wild animal, mostly a rusty black, and the only variations are slate-black or slate-brown; but it is not above two-thirds of the size of the latter. Tail never curled or spirally twisted. They dispute with the *Pariah dogs* the possession of the offal matter thrown out of the houses, and are the public scavengers.”—*Sykes, P. Z. S.* 1831, p. 11.

“The Indian Wild Hog differs considerably from the German; the head of the former is longer and more pointed, and the plane of the forehead straight, while it is concave in the European; the ears of the former are small and pointed, in the latter larger and not so erect. The Indian is altogether a more active-looking animal. The German has a stronger and heavier appearance. The same differences are perceptible in the domesticated individuals of the two countries.”—*Sykes, l. c.* p. 30.

In some of the islands of the Pacific the woods are stocked with wild swine that are the produce of the litter of one breeding sow that has been introduced.

As an instance of the facility and rapidity with which the Pig may be completely naturalized and become a pest, one may mention New Zealand, where some of the pigs introduced by the colonists have escaped and their offspring have spread themselves over the country, and are now a pest to the colonial farmer and breeder of sheep, destroying the crops of the former, and following the ewes and eating the lambs as they are dropped on the sheep-walk. A reward of so much per head is paid for all the pigs that are destroyed in several parts of that colony.

I have attempted to arrange the genera of Suidæ in natural groups. All the genera are well defined, and, I believe, distinct. The only doubtful one is my genus *Centuriosus*, which was established on an animal which is as yet only known in a domesticated state, and one that breeds with facility with the Domestic Pig of Europe, and the mules are fertile.

The species of Pigs have been very much misunderstood. Pigs belonging to very distinct genera have been considered varieties of the same species, or only domestic varieties of the Common Hog. The genera and species have been gradually unravelled.

As an example, I may here observe that Desmarest regards *Sus porcus* (*Potamochoærus porcus*) as only a domestic variety of *Sus scrofa*.

Fischer considers *Sus koiropotamus* (*Potamochoærus larvatus*) a synonym of *Sus larvatus*, the type of the genus *Phacochoærus*.

Fitzinger, in his Essay on the *Setifera*, in the 'Sitzungsberichte, of the Vienna Academy for 1864, has brought together what has been written on the subject, and has given a useful synopsis of the species as characterized by their external characters.

Unfortunately we have not any good works on the Domestic Pig, or clear history of the origin of several of the most approved breeds, some of which are most probably the result of the interbreeding of several varieties.

Desmarest, in his 'Mammifères,' gives a list of the domestic varieties divided into subvarieties (see Mamm. p. 390).

Youall ('Pig,' 1860) and Richardson ('On the Pigs and their Origin,' 1847) have written on the English breeds*.

Little information respecting the species of the family is to be obtained from travellers; they are generally satisfied with stating that a wild boar was observed, sometimes adding that it afforded good sport, and rarely make any observations respecting the domestic pigs. They often include under the name of "*wild boar*" species of different genera, as the French naturalists do under the name of *sanglier*. The skins of pigs are rarely preserved, except by professional collectors; and they only collect the wild specimens; so that the specimens in Museums are limited in number and kinds, and afford very imperfect materials for the systematic zoologist.

The domestic animals of the different countries inhabited by man, and especially the effect of the climate or local circumstances on those that have been introduced from other countries, have yet to be studied. There is no subject which naturalists living in a different country have so entirely neglected, because they have supposed that everything respecting it is known, while the truth is no animals are so imperfectly known or understood. Take, for instance, the Horse, which is so completely naturalized in North and South America, and so locally distributed in Africa—abundant, prosperous, and high-bred in some parts, very rare and, when present, greatly deteriorated in others, even in the same latitudes. It is the same with the Pig. Indeed these large animals, common to a great part of the inhabited world, are less known than the species of the rats, mice, squirrels, bats, and such small and comparatively unimportant animals, as far as man is concerned, who generally classes them with vermin.

Suborder II. SETIFERA.

Toes in pairs; the hinder pair shorter; the outer ones on the hind feet sometimes wanting. Stomach simple. Skin thick, with bristles. Nose conical, truncated at the end, enclosing a couple of supplementary bones between the intermaxillary and nasals, used

* Since this was written, I have been informed by Mr. Darwin that Hermann von Nathusius of Prussia has written on the Races of Pigs (1860), and published the figures of a number of skulls (1864); but I have not been able to see these works; they are not in the Museum Library, nor in those of the Zoological, Royal, and Linnean Societies.

in turning up the ground. The scrotum posterior, only slightly prominent, just under the vent.

Setifera, Illiger.

Pachydermata fissipedes, Latr. Règ. Anim. 1830, p. 596.

Setigera, Fitz. Sitz. Akad. Wiss. 1864.

Pachyderma paridigitata, Cuvier, Oss. Foss.; Burmeister, 1840-1845.

Ungulata isodactyla seu *artiodactyla*, Owen, Odont.

“The progressive increase of size in the molar teeth as they are situated further back in the mouth may also be noticed as a family characteristic, which, with the complication of the crown and development of the teeth, reaches its maximum in the Phacochæres.”—*Owen, Odont.* 544.

SYNOPSIS OF THE FAMILIES AND GENERA.

I. *The premolars permanent, forming one series with the molars.*

Fam. 1. SUIDÆ.

Teeth 44 or 40:—Cutting-teeth $\frac{3-3}{3-3}$; canines triangular, upper recurved; premolars $\frac{4-4}{4-4}$ or $\frac{3-3}{3-3}$; molars $\frac{3-3}{3-3}$, hinder largest. Tail elongate, rarely absent. Teats 10, rarely 8. Toes 4.4; the hinder on each foot shorter, smaller.

Hab. Europe, Asia, and Africa; naturalized in America and the Pacific Islands.

A. TYPICAL SWINE (SUINA). Cutting-teeth 6/6; intermaxillary short; diastema between the cutting-teeth and grinders short; canines thick, spread out; the sheaths of the upper canines spreading out and then bent up at the end; premolars $\frac{4-4}{4-4}$; molars $\frac{3-3}{3-3}$.

a. WILD SWINE. Face elongate. The ears erect, moderate, hairy. Colour uniform or grizzled; young yellow, streaked. Skull elongated; facial line straight; forehead convex.

1. SUS. Ears ovate, hairy. Tail moderate, tufted at the end. Skull—nose convex, rounded and smooth on the sides above; concavity on the cheeks reaching to the edge of the orbit. Male with a ridge across the upper part of the base of the sheath of the canines.

2. PORCULA. Ears ovate, hairy. Tail rudimentary. Skull—nose tapering, rather thickened on the edge in front of the orbit. Canines small, spreading; upper not recurved, without any ridge on the sheath.

3. POTAMOCHÆRUS. Ears elongate, tapering, acute, and pencilled at the tips. Tail thick, high up on the haunches. Skull—nose

flattened above and rather thickened on the upper edge; concavity of the cheeks separated from the orbit by a broad ridge. Males with the upper edge of the nose warty in front, and with a large process from the upper part of the sheath of the canine tooth. Females with only a ridge across the base of the sheath of the canines.

6. DOMESTICATED SWINE. The ears more or less dependent, often very large. Colour black, white, or variegated; young like parents. Skull short; facial line sunken; forehead and top of nose flat; nose margined on the sides.
4. SCROFA. Face smooth or nearly so. Skull—sheath of upper canine with a longitudinal ridge at the base.
5. CENTURIOSUS. Face strongly concentrically wrinkled. Skull—sheath of upper canine with a large rounded tubercle at the base.
- B. ABNORMAL SWINE (BABIRUSSINA). Cutting-teeth 4/6; intermaxilla and maxilla in front, forming a large diastema between the cutting-teeth and grinders; canines erect, parallel; the sheaths of the upper canines bent up from the base, and closely applied to the side of the jaw; premolars $\frac{3-3}{3-3}$, the front ones early deciduous.

6. BABIRUSSA.

Fam. 2. DICOTYLIDÆ.

Teeth 38:—Cutting-teeth $\frac{2-2}{3-3}$, the outer lower small; canines, upper bent downwards; grinders $\frac{6-6}{6-6}$. Back with a gland. Tail none. Teats 2. Toes 4.3; the outer hinder toes absent.

Hab. America.

1. NOTOPHORUS. Side of face in front of the orbit dilated, spread out.
2. DICOTYLES. Side of the face in front of the orbit flattened.

II. *The premolars deciduous, their place being occupied by the development of the molars.*

Fam. 3. PHACOCÆRIDÆ.

Teeth variable:—Grinders 6/6; premolars $\frac{3-3}{3-3}$, early deciduous; canines subcylindrical, upper very large, recurved; the last molar very large, convex, divided into many conical cusps. Toes 4.4; two hinder on each foot small, shorter.

Hab. Africa.

1. PHACOCÆRUS.

I. *The premolars permanent, forming with the molars a continuous series of teeth.*

Fam. 1. SUIDÆ.

Head pointed. Snout blunt, slender. Ears large. Body compressed. Legs slender. Skin covered with close bristly hairs. Grinders tubercular, with a few separate roots. Canines prismatic, triangular; upper recurved from the base. Teeth 44 or 40:—Cutting-teeth $\frac{3-3}{3-3}$; premolars $\frac{4-4}{4-4}$ or $\frac{2-2}{2-2}$. Tail elongate, rarely absent. Teats 10 or rarely 8. Young of wild races striped on the sides.

Suina, Gray, Ann. Phil. 1825; List Mamm. B. M. 284; Bonap. Prod. 5; Giebel, Säugth. 221.

Setigera, Fitz. Sitz. Akad. des Wiss. 1864, p. 383.

Suidæ, Owen, Odont. i. 543.

Suideæ, Lesson, N. Tab. R. A. 1842, p. 160.

Suidæ, § 3, Schinz, Syst. Verz. ii. 344.

The change in the dentition of the Pig is represented by De Blainville, 'Ostéographie, Onguligrades, *Sus*, t. 8, and by Owen, 'Odont.' 554, t. 140. Buffon (Hist. Nat. v. 110) erroneously says that the milk-teeth of the Pig are not changed and remain permanent. At page 181 he quotes (Aristotle, Des Animaux, lib. 2. chap. 1) further that the Pigs never loose any of their teeth. The crown of the grinders are many-lobed, especially the hinder one, which is larger than the rest.

A. TYPICAL SWINE (SUINA). *Cutting-teeth* $\frac{6}{6}$ (the outer upper rarely deciduous); *intermaxilla* short; *diastema* between the cutting-teeth and grinders short; *canines* thick, spreading out on sides of head; *sheath of upper canine* spreading out and bent up at the end; *premolars* $\frac{4-4}{4-4}$.

The depression in the skull behind the hinder nasal opening is without any pits on the sides behind.

a. WILD SWINE. *The ears* erect, hairy. *Colour of fur* uniform or more or less grizzled. *Young* yellow, streaked. *Skull* elongate; *facial line* straight; *forehead* convex.

1. *Sus*.

Face conical, simple, or with two or three small warts on each cheek. Ears ovate, hairy. Tail moderate, tufted at the end. Skull elongate; the forehead and upper part of nose rounded on the sides; upper part of the intermaxillary bone smooth; nose very long, tapering, convex, rounded and smooth on the sides above; concavity on the cheek deep, continued nearly to the orbit behind. Canines well developed, of upper jaw recurved; the sheath of the upper canine (of the males at least) with a longitudinal ridge across the upper part of the base.

Hab. Europe, Asia, and the Malay Islands.

Sus, Linn.; Gray, P. Z. S. 1852, p. 130; Owen, Odont. p. 534, t. 140. f. 1; Fitz. Sitz. Akad. der Wiss. 1864, p. 384; F. Cuv. Dent. Mamm. p. 208, t. 85.

The head and skull lengthened absolutely, and as compared with its width, as the animal increases in age, and especially as it reaches adult and old age. The nasal bones of the skull elongated as the animal increases in age. In the young they seldom extend beyond a line even with the larger foramen on the side of the face; but in the adult they are generally much produced behind it (P. Z. S. 1852, p. 131).

The descriptions and the figures of the two jaws in F. Cuvier's 'Dent. Mamm.' p. 208, do not agree; he says there are 14 grinders in each jaw, and divides them into 6 false molars and 8 molars in the upper, and 2 false and 6 molars in the lower; the 2 is perhaps a mistake for 8. The front lower premolar is far from the canine and second premolar; three upper and four lower premolars compressed; the last grinder elongate, longer than broad.

Fitzinger, in his monograph, divides the Pigs thus, according to the presence or absence of warts on the face:—

Warts none:—*Sus leucomystax*, *S. timorensis*, *S. vittatus*, *S. barbatus*, *S. cristatus*, *S. sennaariensis*.

Warts small, under eyes:—*S. scrofa*.

Warts three—one large, on the mandible, covered with long bristles, and a small one under the eye, and the other above the canines:—*S. verrucosus*, *S. celebensis*.

The Pigs may be divided geographically:—Europe, *S. scrofa*; Asia Minor, *S. libycus*; India, *S. cristatus*, *S. andamanensis*; Africa, *S. sennaariensis*; Malay Islands, *S. verrucosus*, *S. celebensis*, *S. barbatus*, *S. vittatus*, *S. timorensis*; Japan and Formosa, *S. leucomystax*.

† *Head moderate, with three small warts, and one at the back angle of lower jaw. Skull with the lower jaw above half as long again as the height at the occiput; concavity in front of orbit deep, and narrow behind. Nape erect.*

1. *SUS VERRUCOSUS.*

B.M.

Ears moderate, nakedish. Fur with scattered bristles; yellowish or blackish brown, beneath yellowish white; bristles above the mandibular wart white. Warts three:—one on the cheek, large, covered with long bristles; another below the eye, smaller; a third above the canine teeth, small.

Sus verrucosus, Boie, MS.; S. Müller, Verhand. i. 42. p. 175, t. 28 (adult), t. 32. f. 1–4 (skull); Gerrard, Cat. Bones, B. M. 278.

S. scrofa, var., Giebel, Säugeth. p. 225.

Hab. Java; Borneo; Ceram.

B.M.

The skulls in the British Museum are:—

No. 712c. An adult skull from Java. Length 16 inches, height

at occiput $8\frac{3}{4}$ inches (see Müller, Verh. t. 32. f. 3, 4). Nose rather broad behind, tapering from the orbits, more compressed in front; concavity on cheek very deep; forehead convex; zygomatic arch very large, swollen, convex externally. The side of the lower jaw much swollen and prominent. The nose of this skull is much wider than that of the skull from Ceram (712*d*).

No. 1362*a*. An adult skull, without cutting-teeth and canines, and rather broken on the nose, received from Mr. Wallace as the skull of *S. vittatus* from Borneo, is very similar to no. 712*c* from Java, $14\frac{1}{2}$ inches long, $8\frac{3}{4}$ inches high at the occiput. The forehead not quite so convex; but in almost all other respects they agree, except that the sides of the lower jaw are not so much swollen and convex. These skulls are known from those of *S. vittatus* by the concavity in the front of the orbit being very deep, ovate, and narrow behind, instead of broad and square (that is, ending in a nearly straight line).

Three other adult skulls, apparently belonging to the same species, were received without any habitat (but probably from Java or some other Dutch colony) from the Utrecht Museum. One is 15 inches long, $9\frac{1}{2}$ inches high at the occiput; the second 16 inches long, $9\frac{3}{4}$ inches high at the occiput; the third, length 15, height at the occiput $8\frac{1}{2}$ inches.

Var. *ceramica*. No. 712*d*. Skull, adult. A Wild Boar from Ceram, collected by Mr. Wallace. Length 15 inches, height at occiput 8 inches. Nose tapering, very narrow, compressed and deeply concave on each side in front of the orbits; the zygomatic arch large, swollen, and convex externally; the crest on the sheath of the upper canine is narrow and short.

No. 712*f*. An adult skull, obtained from the Utrecht Museum, named "*Sus larvatus*," without any habitat, which is very like 712*d* from Ceram, but considerably larger, being $16\frac{1}{2}$ inches long and $8\frac{3}{4}$ inches high; the nose is broader and rather wider in front over the canines; the crest on the hinder part of the sheath of the upper canine is similar, smaller, but thicker.

In both skulls the crest on the canine is much shorter and less marked, and the sides of the lower jaw are swollen, but not so swollen and convex as in 712*c* from Java.

The specimen from Ceram (712*d*) differs from all the others in the nose being much narrower, more compressed, and apparently longer compared with the length of the brain-case.

Otherwise the four skulls from the Utrecht Museum and the one from Java (712*c*) are all very much alike.

Mr. Blyth considers his *Sus ceylonensis* (Journ. Asiat. Soc. Beng. xx. 173; *Sus zeylanensis*, Blyth, MS. fotogr.) a variety of *S. barbatus*, which he says has been introduced from Borneo to Ceylon. Judging from the photograph of the skull, which has *Sus zeylanensis* written on it, it is much shorter and thicker than the skull of *S. barbatus*. The photograph is much more like that of *Sus verrucosus*.

†† *Head moderate, and without warts. Skull with the lower jaw about half as long again as high at the occiput; concavity on cheek in front of the orbit wide behind.*

a. *Skull—concavity on cheek in front of the orbit deep behind, and separated from the orbit by a well-marked ridge.*

2. *SUS CELEBENSIS.*

B.M.

Black-brown above and below; bristles on upper mandibular wart white. Ears moderate, nakedish; fur with scattered bristles. "Head with three warts: the wart on the upper jaw large; the one under the eye and the other over the canine-teeth very small, indistinct."

Sus celebensis, S. Müller, Verhandl. i. pp. 172, 177, t. 28* (animal and skull); Gerrard, Cat. Bones, B. M. 278.

Sus verrucosus, β , Wagner, Schreb. Säugeth. Suppl. iv. 299.

Sus scrofa, var., Giebel, Säugeth. 235.

Hab. Celebes (*S. Müller*).

B.M.

Skull rather more than half as long again as high; concavity on the cheek in front of the orbit very deep behind, separated from the orbit by a high narrow ridge; sheath of upper canine with large light crest-like ridges (see Müller, Verh. t. 28*. f. 2, 3).

3. *SUS VITTATUS.*

B.M.

Yellowish or brown black, with a white streak from the end of the nose to the angle of the mandible. Ears moderate, nakedish; fur with scattered bristles. Head without any warts. Skull short; concavity in front of orbit broad and deep, near the orbit, separated from the orbit by a broad ridge.

Sus vittatus, Boie, MS.; S. Müller, Verhandl. i. 42. 172, 173, t. 29 (animal), t. 32. f. 5 (skull); Blainv. Ostéogr. Onguligr. t. 5 (skull); P. Z. S. 1860, pp. 442, 443; Gerrard, Cat. Bones, B. M. 277.

Sus scrofa, var., Giebel, Säugeth. 225.

Hab. Java; Borneo; Amboyna; Macassar; Banka.

A skeleton (712 e) of a Pig, received from the Zoological Society under the name of the Javan Pig (*Sus verrucosus*), seems to belong to this species; but the concavity in front of the eye is scarcely as deep as usual, perhaps arising from its having been long in confinement.

No. 1362 c. Skull of an adult male of *Sus vittatus* from Amboyna, from Mr. Wallace. Nose rather wide before in front of the orbit, and then with parallel sides; concavity in front of orbit deep and large, separated from the front of the orbit by a narrow raised convex edge. Canines thick; crest at base strong. Length $12\frac{1}{2}$, height at occiput 8 inches. The processes of the sheaths of the upper canines are curved back, sharp-edged above, and straight and truncated at the end.

No. 1362 d. Skull of adult, very like 1362 c, also from Amboyna,

from Mr. Wallace's collection. Length 12, height $8\frac{1}{2}$ inches. The concavity in the front of the orbit is deeper, and the ridge separating it from the cavity of the orbit more marked. The process of the sheath of the upper canine is similar, but rather larger, the upper edge is sharp-edged at the end, longer, more ovate, convex, and rugose.

No. 1362 *h*. Skull of an old male from Batchian, from Mr. Wallace's collection. Length 13, height at occiput $8\frac{1}{4}$ inches. Very like 1362 *d* from Amboyna; but the forehead is narrower and flatter, and the nose broader, being rather wider in front over the canines than in front of orbits; the concavity in front of the orbit similar and deep, and with well-marked outer orbital ridges. The process of the sheath of the upper canine is shorter, thicker, blunter, with a rounded end, and without any distinctly sharp crested front edge.

No. 1362 *b*. Skull of an adult, with well-worn grinders, a "Wild Boar from Java," from Mr. Wallace's collection. Length $13\frac{1}{2}$, height $8\frac{1}{2}$ inches. Very similar to *S. vittatus* from Amboyna (1362 *c* and 1362 *d*); but the nose of the skull is rather broader, especially in front, and the sheath of the upper canine is only furnished with a well-marked ridge behind. The concavity on the cheeks is very deep and wide in front, but not so well marked and deep on the hinder edge, where it is separated from the orbit by a wide flattish space.

No. 1362 *f*. Skull of an animal developing the hinder molar; the concavity in front of the orbit not so deep and well marked, as usual behind; zygomatic arch and lower jaw swollen on the sides; the ridge of the sheath of the canine slight and sharp-edged. From the Utrecht Museum; probably from Java or some of the Dutch colonies. Length 13, height 7 inches.

No. 1362 *g*. A skull of an adult, received from the Utrecht Museum without any habitat, but most probably from Java, is very like the preceding; it is $12\frac{1}{4}$ inches long and $7\frac{3}{4}$ inches high at the occiput.

4. *SUS LEUCOMYSTAX*. Japanese Pig.

B.M.

Blackish brown; fur dense, bristly; streak on lower jaw and underside of body white. Ears rather large, densely pilose. Head without any wart.

Sus leucomystax, Temm. Fauna Japon. Mamm. 6, t. 20; Fitzinger, Setigera, 387; Swinhoe, P. Z. S. 1865, p. 466.

Sus scrofa, var., Giebel, Säugeth. 226.

Sus taiwanus, Swinhoe, P. Z. S. 1864, p. 382, 1866, p. 419.

Porcula taiwana, Swinhoe, P. Z. S. 1862, p. 360, 1864, p. 381.

Hab. Japan; Formosa (*Swinhoe*); Nagasaki (*Swinhoe*).

Mr. Swinhoe gave an account of the habits of the Pig in Formosa (P. Z. S. 1862, p. 361). It is a *Sus*, and not a *Porcula*.

Mr. Swinhoe (P. Z. S. 1862, p. 36) thinks this is a Wild Pig, the original stock of the Chinese Domestic Pig.

Mr. Blyth says this is the animal from which the Chinese Domestic Pig is supposed to be derived. There are three animals in

the Zoological Gardens (Feb. 1867) which appear to be a domestic race from Formosa, although not much altered save in colouring from the wild animals (Blyth, Land and Water, Feb. 16, 1867, p. 84).

Mr. Fraser has just received from the island of Formosa, per the 'Maitland,' one Boar and one Sow of a red variety, and one Sow in pig, black variety, of a new species of Pig (*Sus taëvanus*, Swinhoe, Proc. Zool. Soc. Lond.) supposed to be the wild origin of the well-known Chinese Pig (Dec. 1867).

5. *SUS CRISTATUS.*

B.M.

Bristles of forehead, occiput, and back elongate, forming a mane; cheeks with a beard. Yellowish brown, black-varied; beneath dirty white. Nose and extremity brownish. Ears moderate, nakedish, covered with scattered bristles. Head without any warts. Hoofs white.

Sus scrofa, Elliot, Madras Journ. x. 216, 1839, 1; Adams, P. Z. S. 1860, p. 531.

S. scrofa, var. *indicus*, Horsfield, Cat. Mamm. M. E. I. C. 193; Blainv. Ostéogr. t. 5.

Sus indicus, Gray, List Mamm. B. M. 185, 1840; Horsfield, P. Z. S. 1852, p. 130, 1856, p. 406; Cantor, Journ. Asiat. Soc. xv. 261; Schinz, Syn. Mamm. ii. 350; Blainv. Ostéogr. Onguligr. t. 5 (skull); P. Z. S. 1848, p. 73, 1850, p. 158, 1852, p. 130, 1860, p. 181; Gerard, Cat. Bones, B. M. 277.

Sus bengalensis, Blyth, Journ. A. S. Bengal, xxix. 304.

Sus cristatus, Wagner, Münch. gel. Anzeig. lx. 535, 1839; Fitz. Sitz. Akad. d. Wiss. xix. 417, 1864, p. 389.

Sus aper, Hodgson, J. A. S. Beng. x. 911.

Sus affinis, Gray, Cat. Osteol. B. M. 71, 1847.

Sus scrofa, var. *isonotus*, Hodgson, Icon. B. M. t. 216.

Hab. India; Malabar (*Blainv.*); Nepal, Tarai and mountains (*Hodgson*); Banks of Punjab (*Adams*); Penang, Singapore, and Lanedy Island (*Fitzinger*).

Mr. Bryan Hodgson describes two varieties (see Journ. A. S. Bengal, i. pp. 245 & 911) as inhabiting the Tarai and mountains of Nepal:—1. *aipomus*: tusk large; forequarters high. 2. *isonotus*: tusk small; back nearly horizontal. There is a figure of the latter variety in his drawings in the British Museum (t. 216): the nape and back are much crested.

716 *u.* Skull of adult male. Length 15, height $9\frac{1}{2}$ inches. "Marquis." Nepal; B. H. Hodgson, Esq.

716 *p.* Skull of adult male. Length 14, height $8\frac{3}{4}$ inches. Marked "Bilmareeah, *S. indicus*."

716 *k.* Skull of adult male. Length $15\frac{1}{2}$, height $9\frac{1}{4}$ inches. Marked "*Sus babirusa*." Malabar (see *Blainv. Ostéogr. t. .*).

716 *n.* Skull of adult male. Length $14\frac{1}{2}$, height $8\frac{3}{4}$ inches.

716 *g.* Skull of adult male. Length 14, height 9 inches. "Marquis." Nepal; B. H. Hodgson.

716 *o.* Skull of adult male. Length $15\frac{1}{2}$, height $9\frac{1}{4}$ inches. India; Sir John Boileau.

716 *f*. Skull of adult male. Length 15, height $8\frac{1}{2}$ inches. Nepal; B. H. Hodgson, Esq.

716 *b*. Skull of adult male. Length 13, height $8\frac{3}{4}$ inches. India; General Hardwicke.

716 *y*. Skull of adult male. Length 14, height 9 inches. India; G. H. Money, Esq.

716 *x*. Skull of adult male, broken. India Museum, Zoological Society.

716 *l*. Skull of adult male. Length 13, height 9 inches. Nepal; Tarai; Professor Oldham.

716 *e*. Skull of adult male. Length $13\frac{1}{2}$, height 8 inches. "Wild Boar of the plains." Nepal; B. H. Hodgson, Esq. Forehead nearly flat.

716 *d*. Skull of adult male. Length 14, height $8\frac{3}{4}$ inches. "Wild Boar of the Plains." Nepal; B. H. Hodgson.

716 *n*. Skull of adult female. Length $14\frac{3}{4}$, height $8\frac{1}{2}$ inches. India; Professor Oldham.

716 *v*. Skull of nearly adult female. Length $12\frac{1}{2}$, height $7\frac{1}{2}$ inches. Neilgherries. *Sus affinis*, Gray, Cat. Osteol. 71, 1847.

716 *c*. Skull of young male? Length 13, height $7\frac{1}{4}$ inches. Tarai, Nepal; B. H. Hodgson, Esq.

716 *w*. Skull of young male. Length 10, height $6\frac{3}{4}$ inches. Tarai, Nepal; B. H. Hodgson, Esq. *Sus bengalensis*, Blyth (type).

716 *m*. Skull of young female. Length $10\frac{1}{4}$, height $7\frac{1}{2}$ inches. Tarai, Nepal; Dr. Oldham.

716 *g*. Skull of young female. Length , height inches. Nepal; B. H. Hodgson. Nose much narrower and contracted behind in front of the orbit, perhaps the character of the female sex. The skulls of female exotic Pigs are very rare in collections.

This series of skulls differ in the depth of the concavity on the hinder part of the cheeks in front of the orbit. It is very deep, and with a well-defined wide ridge behind in 716 *o*, 716 *v*, and 716 *k*. It is less marked in the others, in different degrees of distinctness and depth.

In the skulls of the younger animals the concavity is very shallow behind, and gradually shelving off to the orbit, as in 716 *c*, 716 *w*, 716 *m*, 716 *g*, 716 *x*. It is one of these skulls (716 *w*) that Mr. Blyth marked as like his type of *S. bengalensis*.

The skull of this species is like that of *Sus verrucosus* from the Malay Islands; but all the skulls differ from the skulls of *S. verrucosus* in the flatness of the zygomatic arch, compared with the thick swollen form of the zygoma in all the skulls of that species. The sides of the lower jaw are convex and swollen, but not so much so as the lower jaw of *S. verrucosus*.

b. Concavity on the cheeks of the skull in front of the orbit shallow behind, only separated from the orbit by a narrow ridge.

6. *SUS TIMORENSIS.*

Yellowish or blackish brown, generally with a white streak from

the nose to the angle of the jaw. Ears moderate, nakedish; fur with scattered bristles, maned. "Head without any warts." Skull (young)—the concavity in front of the orbit shallow behind, and only separated from the orbit by a slight ridge.

Sus timorensis, S. Müller, Verhand. i. 42, 173, 178, t. 31. f. 1-3; Gerrard, Cat. Bones, B. M. 278.

Sus vittatus, β , Wagner, Schreb. Säugeth. Suppl. iv.

Sus scrofa, var., Giebel, Säugeth. 225.

Sus, sp., from *Dampier Straits*, Selater, List of Vert. Animals, Zool. Soc. ed. 3. 37. n. 235.

Hab. Timor and Rottie.

Like *S. vittatus*, but smaller.

1501 *a*. A skull of a young animal, very like the one figured by Müller (Verhand. t. 32. f. 2, 3); it is marked "young female *Babirussa*," from Mr. Wallace's collection. It is certainly not a *Babirussa*, having six upper cutting-teeth and short intermaxillaries, but is more probably a young female of the preceding. It has the concavity in front of the orbit shallow, and only separated from the orbit by a narrow ridge.

1501 *c*. Skull with the last grinder being developed (on one side only), perhaps young male? Inscribed "a Wild Pig, Makassar." Length $10\frac{1}{2}$, height at occiput 6 inches. Nose broad behind, tapering in front from orbit; concavity in front of orbit large, not deep, and extending close up to the edge of the cavity; the hinder suture of the parietal bone is produced and angular behind.

1501 *b*. A rather larger skull, also developing the last molar, and probably a young male. A Wild Pig, Ternate, from Mr. Wallace's collection. Length $12\frac{1}{2}$, height $5\frac{1}{2}$ inches. It is very similar to the above in all particulars, particularly in the shallowness of the concavity in front of the orbits, and in the crest-like form of the ridge behind the base of the sheath of the upper canines; hinder suture of the parietal produced and rounded behind.

The shallowness of the concavity on the cheeks of these specimens may depend on the youth of the animal, as it is to be found in the skull of the young *Sus indicus*. It is not always a character of youth, as it is found shallow and shelving off behind in the skull of the very old *Sus andamanensis* and *S. scrofa*.

There is the skin and skeleton (1501 *d*) of a "Wild Pig from Dampier Straits, in the Eastern archipelago," that was brought to the Museum by Mr. Swinhoe. It does not appear to differ from *S. timorensis* of S. Müller; and the skull is very like the skull from Ternate (1501 *b*). A specimen was living in the Society's Gardens.

Mr. Bartlett thinks that it is "a domestic Pig running wild, because he has seen two specimens of them, both of which had white markings about the legs in a very irregular manner and other characters of the domestic Pig."

7. *SUS ANDAMANENSIS*. Andaman Pig.

The concavity of the cheeks in front of the orbit deeply concave,

shallower behind, shelving off to the orbit, and only separated from the orbit by a narrow ridge; in the male the sheaths of the upper canines with a well-marked ridge; the concavity in front of the orbit very wide; in the female the concavity narrower, and sheaths of the canines not developed.

Sus andamanensis, Blyth, photogr. MS.; Sclater, List of Vert. Anim. Zool. Soc. ed. 3. 37.

Hab. Andaman Islands.

B.M.

Living in the Gardens of the Society. Also a hybrid between the female Andaman Pig and the male Wild Pig from Dampier Straits.

A skull of an adult male in the British Museum, without lower jaw (no. 1497 *a*). The four front upper cutting-teeth very large, entire, square; the hinder lateral one very small, early deciduous. Lower cutting-teeth six, subequal, close together; upper canines very large, recurved, with a deep central ridge on the upper edge; concavity in front of the orbits very wide and deep; sheath produced, with a well-marked longitudinal crest on the upper reflexed edges.

A complete skull of an adult female (no. 1497 *b*), very similar to preceding, but concavity in front of the orbit narrower behind. Upper canine small, compressed, without any developed sheath; no ridge above its root. Lower canines very large, subtrigonal, with the first two rooted; premolar on the hinder part of its base separated a short distance from the second premolar. Upper cutting-teeth three, the first very large; the second on the right side, and both the hinder one have fallen out, and the cavity left is filled up.

The skull of this species is more nearly allied to the *Babirussa* than any others of the Pigs (*Sus*), the front of the canines being rather more produced than in other species, but not nearly so much so as in *Babirussa*; and the two hinder upper cutting-teeth are very small and often deciduous. In the skull of the adult male, for example, they are very small, but the pits they filled are present; in the adult female, they and the pits they filled are entirely obliterated. By a curious coincidence the second upper cutting-teeth on the right side of the jaws of the skulls of both the male and female animals are wanting, and the pits they filled are obliterated; but this may be only an accidental circumstance, as the tooth on the other side is well developed.

8. *SUS SCROFA*.

Ears large, densely hairy. Fur blackish brown, densely bristly. Wart under the eye small. Skull elongate, slender; the concavity on the cheeks in front of the orbits wide, shallow behind, shelving towards, and only separated from the orbit by a narrow ridge.

Sus aper, Brisson; Gray, P. Z. S. 1852, p. 130, 1856, p. 406.

Sus scrofa, Linn.; Giebel, Säugeth. 225; P. Z. S. 1856, p. 158, 1858, p. 531, 1860, pp. 183, 448; Blainv. Ostéogr. Onguligr. t. 1. f. 4-6; Fitz. Setigera, 384.

Sus setosus aper, Bodd. Elench. Anim. i. 157.

S. scrofa aper, Erxl. Syst. R. A. i. 176.

S. fasciatus, Gray, List Mamm. B. M. 184.

S. scrofa fasciatus, Schreb. S. 322 (jun.).

S. scrofa ferus, Gmel. Syst. Nat. 217; Gray, P. Z. S. 1862, p. 13, f. 1, 2, 3 (skull and palate); Blainv. Ostéogr. t. 4 (skull, ♂).

Sanglier, Buffon, H. N. v. 176, t. 24. f. 1 (skull).

Hab. Europe.

Var. Domesticated. Head short, slender. Ears erect, pointed. Limbs short, slender. Hair of body rather crisp, ferruginous or blackish brown. *Junior fasciatus*.

Cochon turc, F. Cuvier, Diet. Sci. Nat. ix. 512.

Cochon turc ou de Mongolitz, Desm. Mamm. 391.

Sus scrofa domestica turcica, Fisher, Syn. 422.

? *Sus scrofa*, var. (Maltese Pig), Sclater, P. Z. S. 1862, p. 139.

Hab. Europe; Turkey; Hungary; Borneo; Vienna.

Skull of adult (713 *c*). Length 14, height 9 inches. With diseased teeth and alveoli. From the Zoological Gardens; probably from Germany. The concavity on the cheeks wide, shallow behind, and gradually shelving off to the orbit. The sheaths of the upper canines with a well-marked elevated ridge behind.

Skull of adult (713 *m*). Length 15, height 8 inches. From Germany.

Skull of adult (713 *f*). Length 15, height $7\frac{1}{2}$ inches. From the Museum of the Zoological Society.

Skull of adult (713 *j*). Length 14, height $7\frac{3}{4}$ inches. Germany, from Dr. Günther.

Skull developing the last molar (713 *u*). Length 13, height $6\frac{1}{2}$ inches. Germany, from Mr. Gerrard.

A skin and skeleton of a Wild Boar from Barbary (*Sus scrofa barbarus*, Sclater, P. Z. S. 1860, p. 443), received from the Zoological Gardens. Skull 712 *j* does not differ from the skull of the Wild Boar from Germany.

713 *k* and 713 *i*. Two skulls of young animals from the Zoological Society.

713 *g*. Skull of a nearly adult animal; purchased of a dealer.

9. SUS LIBYCUS.

Animal — ?

? *Sus scrofa*, Tristram, Nat. Hist. of Bible, p. 84.

Hab. Asia Minor (*Xantus*). Skull in the British Museum, presented by Sir Charles Fellows.

Skull of adult (713 *a*). Length $14\frac{1}{2}$, height $8\frac{1}{4}$ inches. The concavity on the cheeks in front of the orbits very broad and very shallow, with a broad concavity in the middle; the hinder part moderately deep, separated from the orbit by a rather narrow well-marked prominent ridge. Nose narrow, and compressed over the lateral foramen. The sheath of the canine with only a slight ridge behind it.

The skull is very distinct from all the skulls of the Wild Boars from Germany in the British Museum.

The Wild Boar of the Holy Land, described by Mr. Tristram, may be the same. He observes:—

“Abundant in the wooded hills and maritime plains alike. Swarms in all the thickets by the Jordan and Dead Sea, and in the forest-country east of Jordan. Extends even to the bare wilderness of Judæa, and almost into the desert, where there is no cover, and where its only food is the roots of the desert bulbs.”—*Tristram, P. Z. S.* 1866, p. 84.

10. *SUS SENNAARENSIS.*

Fur dense, bristly, dull olive-black and yellow-varied. Ears moderate, densely pilose. Head without any warts.

Sus sennaarensis, Fitz. Sitz, Akad. d. Wiss. xix. 365, 1864; *Setigera*, 388.

Sus larvatus, Fitz. Sitz. Akad. d. Wiss. x. 362.

? *Sus scrofa* (Egypt), Blainv. Ostéogr. t. 5 (skull).

? *Cochon des Nègres*, Buffon, H. N. Quad. v. 123.

Hab. North Africa; Sennaar; Kordofan; Sudan. Called “Quadruck” by the Arabs.

Dr. Murie says he has often seen and eaten the true Wild Boar of the genus *Sus* in Africa, as well as the *Potamochoærus* on the west coast. I have never seen any or the skull of one.

††† *Head very long, slender, without warts. The skull elongate, more than twice as long as high; concavity in front of the orbit deep. Cheeks bearded. Eusus.*

11. *SUS BARBATUS.*

B.M.

Back covered with ochraceous, sides and beneath with black bristles; nose, extremities, and tuft at end of tail blackish. Skull much compressed, very long, slender. Ears moderate, nakedish. Fur with scattered bristles. Head very long, slender; sides of the jaws covered with crisp hairs; crown and occiput covered with short hairs. Head without any warts.

Sus barbatus, S. Müller, Van der Hoeven, Tijdschr. 1839, v. 149; Verhandl. i. 42, 173, 179, t. 30, 31; Gerrard, Cat. Bones B. M. 278; Fitzinger, *Setigera*, 392.

Sus scrofa, var., Giebel, Säugeth. 225.

Hab. Borneo. Called “Wite Warken.”

712 a. Skull of adult, from Borneo, presented by J. Brooke, Esq. Length from end of nasal to occipital crest 19 inches, $9\frac{1}{2}$ high at occiput. Exactly like the figure in Müller's ‘Verhand.’ t. 31. f. 45.

712. Skull of young animal changing its teeth, from Borneo. Capt. Sir E. Belcher. Length $11\frac{1}{2}$ inches, 5 inches high at occiput. Nose very slender, attenuated; nose from the orbit double the length of the distance from the front of the orbit to the occiput; the zygomatic arch flat, thin.

2. PORCULA.

Head conical, moderate. Ears small, erect, hairy. Cheeks without any tubercles. Tail very short, rudimentary. Cutting-teeth $\frac{6}{6}$, two upper front largest, the lateral lower small; intermaxillary moderate, not produced; canines small, scarcely elevated above the other teeth, the upper one rather spread out, but not reflexed; premolars $\frac{4-4}{4-4}$.

Porcula, Hodgson; Gerrard, Cat. Bones B. M. 278, 1852; Fitz. Sitz. Akad. d. Wiss. 1864, p. 404.

The skull chiefly differs from *Sus* in being shorter and much smaller. The number and form of the teeth and of the intermaxillaries are the same as in *Sus*.

* *Back and nape maned.*

1. PORCULA PAPUENSIS. The Bene. B.M.

Ears moderate, erect, nakedish; internally white. Fur very bristly above, with scattered bristles beneath; bristles of nape and back longer, forming a black mane; brown and reddish above, black and white beneath.

Young. Dark brown, with five fulvous streaks.

Ben, Forrest, Voy. 97, t. 2, 3.

Sus papuensis, Lesson & Garn. Bull. Sci. Nat. vii. 96, 80; Duperrey, Voy. Coquille, Zool. i. t. 8; Gray, List Mamm. B. M. 185; P. Z. S. 1858, p. 107.

Porcula papuensis, Fitz. Sitz. Akad. d. Wiss. 1864, p. 23.

Papuan Hog, Low, Breeds of Domestic Anim. ii. 1.

Sus scrofa, var., Giebel, Säugeth. 226.

Hab. New Guinea. Called 'Ben' or 'Bene.'

Lesson and Garnot described the skull as having only five grinders on each side of each jaw; but this animal was probably not full-grown. Canines not longer than the other teeth. Tail very short.

** *Back and nape without any mane.*

2. PORCULA SALVIANIA. B.M.

Fur very bristly above, nakedish beneath; black-brown, grey- or yellowish-washed. Ears naked. Back without any crest.

Porcula salviana, Hodgson, Journ. Asiat. Soc. xvi. 423, 593, t. 12, 13, xvii. 480, t. 27; Horsfield, P. Z. S. 1853, p. 191; Fitz. Sitz. Akad. d. Wissen. 1864, p. 25.

Porcula salviana, Gerrard, Cat. Bones, 278; Gray, P. Z. S. 1856, p. 406, Mamm. Pl. xxxvii.

Sus scrofa, var., Giebel, Säugeth. 226.

Pygmy Hog of the Saul Forests, Hodgson.

Hab. Nepal; Sikkim; Saul Forests in Tarai.

Skull from the Saul Forests. Presented to the Museum (1077 a)

by B. H. Hodgson, Esq. It is that of an animal developing the last molar. In form the skull is very like that of *Sus*, but shorter; the forehead is convex; the nose tapers in front of the orbit, is rather swollen and wide over the deeply concave cheeks; the concavity is deepest in the middle of the cheeks, and it is only separated from the orbit by the narrow edge of the orbit. The canines are small, the upper ones not recurved.

3. POTAMOCHÆRUS.

Face elongate, with a bony protuberance on each side, halfway between the nose and eyes. Ears elongate, suddenly tapering, and ending in a pencil of hairs. Tail thick, elongate, high up on the rump. Skull elongate; brain-case swollen; nose nearly of the same width the whole length, rounded above, with a rather thickened upper margin, and a deep concavity on the cheeks extending nearly to the front of the orbit, and partly over and nearly covering the malar process that supports the zygomatic arch.

Male. Swollen, and often warty on the sides in front. Sheath of the canine with a large broad process on the upper side of its base.

Female. Side of the nose simple, and the sheath of the canine with a well-marked ridge across the upper part of its base.

Teats four. Young four at a birth, with longitudinal stripes.

Koiropotamus, Gray, List Mamm. B. M. 185.

Choiropotamus, Gray, Ann. & Mag. N. H. 1852.

Potamochoerus, Gray, Ann. & Mag. N. H. xv. 66; Sclater, P. Z. S. 1860, p. 301; Fitz. Sitz. Akad. d. Wiss. 1864, p. 19.

Phascochoerus, sp., Jardine.

Phacochoerus, sp., Lesson in Tabl. R. A. 1841, p. 162.

1. POTAMOCHÆRUS AFRICANUS. Bosch Vark. B.M.

Ears densely hairy; internally white, with black edge and tuft. Fur black. Head and back whitish or yellowish; forehead and back black-varied; large spot beneath the eyes black.

Skull: male. The lateral tubercular ridge prominent, and elevated above the upper surface of the nose; lateral process on the base of the sheath of the upper canine broad, compressed, reaching to the level of the upper surface of the nose. Female with transverse ridge at the base of the sheath of the upper canine.

African wild boar, Daniel, African Scenery, t. 22.

Sus africanus, Schreb. Säugeth. i. 327; P. Z. S. 1852, p. 131; Blainv. in Laur. et Bazin, Anat. Phys. t. 11. f. 9 (teeth); Blainv. Ostéogr. t. 8. f. 1; Gray, Griffith, A. K. t.; Reichenb. Naturg. d. Pachyd. t. 33. f. 129.

Sus larvatus, F. Cuv. Mém. Mus. vii. 447, t. 22; A. Smith, S. A. Quart. Journ. 90; Blainv. Ostéogr. Onguligr. t. (skull).

Sus koiropotamus, Desmoul. Dict. Class. H. N. vii. t. 1; P. Z. S. 1852, p. 131.

Choiropotamus africanus, Gray, Cat. Mamm. B. M. 185.

C. larvatus, Gray, Ann. & Mag. N. H. 1852.

Phacochærus koiropotamus, Lesson, N. Tab. R. A. 162, 1841.

Sus koiropotamus, Desmoulins, Dict. Class. H. N. t. 7, ♀.

Sus choiropotamus, Reichenb. Naturg. d. Pachyd. t. 33. f. 48.

Potamochoærus larvatus, Gray, Ann. & Mag. N. H. xv. 66; Fitz. Sitz. Akad. d. Wissen. 1864, p. 19.

P. africanus, Gray, P. Z. S. 1852, p. 131, 1858, p. 58, 1860, p. 443; Gerrard, Cat. Bones, B. M. 279; Kirk, P. Z. S. 1864, p. 656.

Phascochoærus larvatus, Jardine, Nat. Libr. 232, t. 28.

Sanglier à masque, Sganzin, Mém. Strasb. iii. 1, t. 1.

Female. Skull with only a ridge across the base of the sheath of the upper canines.

Sus capensis, Gray; Gerrard, Cat. of Bones B. M. 277 (skull).

Hab. South Africa, called "Bosch Vark;" Central Africa; Zambesi delta, called "Njulvi" (*Kirk*).

"Scarcely any two specimens of this species exhibit the same colour; some are brownish black variegated with white, and others are almost entirely of a light reddish brown or rufous tint without the white variations; indeed such are the varieties that it is scarcely possible to say what are the most prevailing colours."—*A. Smith*, *S. A. Quart. Journ.* p. 90.

1. In the British Museum there is a skeleton (1364 *b*) of a specimen that lived several years in the Zoological Gardens. In the skull the malar process is very broad, reaching nearly to the level of the top of the nose; it is thin on each edge, and thickened near the outer hinder edge by a strong angular keel.

2. A skull (1364 *a*) that was purchased of Mr. Argent in 1851 as coming from South Africa. It has the process of the sheath of the canines nearly as long as the preceding (1364 *b*); but it is not so broad from side to side, and the outer surface is evenly rounded, without any keel. This skull very nearly resembles the one figured by De Blainville as that of *Sus larvatus* (*Ostéograph.* t. 5), and the skull figured by M. F. Cuvier (*Mém. Mus.*).

3. A skull from the Museum of Dr. de Jeude, probably from the Cape of Good Hope (1364 *c*).

The front of the lower jaw behind the canine is more dilated and swollen in *P. larvatus* (1364 *b*) than in the lower jaws of the two other skulls; but they all differ from each other more or less in this respect.

4. A skull without its lower jaw (715 *a*), was brought home by Captain Alexander from his Expedition to Damara, and presented to the British Museum. It is recorded in Mr. Gerrard's 'Catalogue of the Bones in the British Museum' as *Sus capensis* (p. 277). It is the skull of an adult animal, with the crown of the grinders much worn. It is probably the skull of a female, as it agrees with all the characters of *Potamochoærus*, but it has only a well-marked ridge across the upper part of the base of the sheath of the upper canine, and the upper margin of the nose is not dilated nor swollen.

2. POTAMOCHÆRUS PORCUS. Red River-Hog. B.M.

Ears densely hairy; edges of ears and pencil white. Fur red-brown, beneath greyish white. Head and ears black; whiskers on the cheek, streak over and below the eyes, and dorsal mane white.

Skull.—Male, the prominence of the canine flat-topped and not raised above the surface of the nose; the lateral process of the sheath of the upper canine narrow at the base, dilated above, short, not reaching to the level of the upper surface of the nose. Female, with only a ridge across the base of the sheath of the upper canine.

Porcus guineensis, Marcgr. Bras. 230, fig. (good).

“*Cochon de guinée*, Buffon, H. N. v. 146.”

Guinea Pig, Brown, Jam. 487.

Sus porcus, Linn. S. N. 1032.

Porc de guinée, Desm. Mamm. 391; Enc. Méth. t. 39. f. 1 (from Marcg.).

Sus scrofa, var. *porcus*, Fischer, Syn. 423.

Sus guineensis, Brisson, R. A. 109.

Sus africanus, Smith; Griffith, A. K. (not Desm.).

Sus penicillatus, Schinz, Monogr. d. Säugeth. t. 10; Rev. Zool. 1848, p. 152; Gray, P. Z. S. 1852, p. 132.

Choiropotamus pictus, Gray, Ann. & Mag. N. H. x. 280, 281.

Painted Pig of the Camaroons, Illustr. London News, fig., 1852.

Sus pictus, Wagner, Schreb. Säugeth. Supp. v. 302, 800.

Potamochoærus albifrons, Du Chaillu, Proc. Boston N. H. S. vii. 301, 1861; Travels, p. 422, t. 62; Gray, P. Z. S. 1861, p. 277.

Potamochoærus penicillatus, Gray, Ann. & Mag. N. H. xv. 66; P. Z. S. 1852, p. 131, t. 34; Gerrard, Cat. Bones, B. M. 279; Fitz. Kais. Akad. d. Wissen. xix. 365; Sclater, P. Z. S. 1861, p. 62, t. 12 (adult and young).

Hab. West Coast of Africa; Camaroons River; Guinea; naturalized in Brazil (*Marcgrave*).

Skeleton (no. 1363 *a*) of a male specimen, from the Camaroons, that lived for several years in the Society's Gardens. The skull of this animal is figured by Mr. Sclater in the 'Proceedings of the Zoological Society,' 1860, p. 301. The process on the base of the sheath of the canine is much shorter than in the skulls of *P. africanus* (1364 *a, b*); it does not reach the upper surface of the nose, is sub-cylindrical at the base, without any keel on its outer side, and broad at the end. It diverges much more from the side of the nose than in the skull from South Africa.

Two skulls, collected by Dr. Baikie in the interior of Africa (1363 *c* and 1363 *d*). They are very like the skull of the male animal from the Camaroons (1363 *a*). The process of the sheath of the upper canine in 1363 *c* is rather shorter and broader at the top than in that skull; and in 1363 *a* it is unfortunately broken off.

With these skulls Dr. Baikie brought another without the lower jaw (715 *b*), which is very like the others, only the side of the nose over the canines is not dilated, and there is only a slight ridge across the base of the upper surface of the sheath of the upper canine, as in

the female from the Gardens (1363 *b*). The skull has adult dentition, and it is nearly of the same size, but not so aged, as the skull sent by Captain Alexander; it differs from it in the nose being more compressed and narrowed in front of the orbit. The condyles of this skull are large, and separated by a broad space beneath, as in all the other skulls of the genus, except that received from the Zoological Society.

A skeleton of a female, from the Camaroons, that lived in the Society's Gardens (Gerrard, Cat. Bones, no. 1363 *b*). In the 'Catalogue of Bones in the British Museum' the sexes of 1363 *a* and *b* are accidentally reversed. The skull had the dentition of an adult animal; the canines are very imperfectly developed, cylindrical, and smooth, and the sides flattened and grooved longitudinally beneath. The side of the nose of the skull is not swollen nor warty over the canines, and there is only a well-marked ridge at the base of the upper surface of the sheath of the upper canine.

This skull differs from the others of the genus I have compared it with in the small size of the occipital condyles, which are also closer together on their under edge. The hinder nasal opening is wide and rounded.

The three skulls also differ in the form of the upper jaws in front of the base of the canines. They are longer and narrower in the two skulls which have been named *P. larvatus* (1364 *a*, 1364 *b*) than they are in the skull from the Camaroons named *P. penicillatus* or *P. porcus* (1363 *a*). But the two skulls with the longer intermaxillaries differ from one another, the intermaxillaries of 1364 *b* being longer and narrower than in the skull 1364 *a*.

The ridges on the underside of the canine of *P. penicillatus* (1363 *b*) are fewer, coarser, and more irregular than they are on the canines of the two other skulls (1364 *a* and *b*). The back and front sides of the canines are rounded in 1363 *a*, while they are flat in 1364 *a* and *b*; but the two latter differ considerably in flatness.

This species has bred in the Society's Gardens, and reared the progeny. It will not breed with the Domestic Pig, or at least has not done so.

Marcgrave describes it as having a cyst on the navel, and says that it had been introduced by the negroes, and naturalized in Brazil.

I suppose that the Pig has not been found profitable, or was not fitted for the American climate, as the breeding of it has been discontinued. I have inquired of persons who have lived in different parts of Brazil; they all state that they have never seen or heard of the Painted Pig in that country; nor do I find any account of it in the modern works on the natural history of the country. Mr. J. Miers, F.R.S., has observed that Marcgrave only knew of the northern provinces of Brazil, then in possession of the Dutch, and that perhaps it still breeds there. My son and daughter, who travelled in those districts, and first made entomologists acquainted with the smaller Lepidoptera of the country, of which they collected very many new species, state that they never saw any Red Pig there.

3. POTAMOCHÆRUS —.

Sanglier de Madagascar, Daubenton; Buffon, H. N. xiv. 396; Flacourt's Hist. Madagasc. 151.

Hab. Madagascar.

Mr. Selater informs me that a species of this genus from Madagascar is living in the Jardin des Plantes at Paris. I am not aware that any specimens from that country have reached England.

b. DOMESTIC SWINE. *Face short. The ear more or less dependent, often very large. Animal black, white, or mottled. Young like parent (not yellow-streaked). Skull short; facial line sunken; forehead and upper surface of the nose flattened, more or less distinct, margined on the sides.*

I do not believe that the Domestic Pig is derived from the Wild Boar of Europe, any more than the Domestic Cat is derived from the Wild Cat of Scotland, or the Dog from the Wolf of Europe; nor do I know of any exotic species of Pig from which it is likely to have been derived.

There is no doubt that the Domestic Pig will breed with the Wild Boar, and that there are hybrid breeds which are more like the Wild Boar than the normal domestic animal. On the other hand, the wild species are often more or less domesticated in the countries they naturally inhabit; but these animals differ little from the wild progenitors, and are very different from the true domestic animals.

4. SCROFA.

Face conical, smooth, or nearly so. Skull—sheath of the canine with a more or less distinct longitudinal crest across the base.

SCROFA DOMESTICA.

Sus verres, Plinius, Hist. Nat. viii. 151.

Sus domesticus, Brisson, Règ. Anim. 106.

Sus scrofa domesticus, Erxleb. Syst. 179; Fischer, Syn. Mamm. 422.

Cochon, Buffon, H. N. v. 99.

Verrat, Buffon, H. N. v. 99, t. 17. f. 2 (t. 24. f. 3) (skull).

Hog, Penn.

Hab. Domesticated in most parts of the inhabited world.

Some varieties have small erect hairy ears and strong long legs like *wild swine*.

(1) *Cochon de Siam*, Buffon, v. 125, 137, t. 1500 (t. 24. f. 2, skull?).

Sus scrofa sinensis, Schreb. t. 324 (copied from Buffon; not *S. sinensis*, Brisson).

Black. The young black, without any streaks. Face tapering. Skull rather short; crown rather convex (*Buffon*).

Hab. Siam. I have not seen the variety.

Daubenton describes the skeleton (v. p. 181). This has most unaccountably been confused with the Chinese Pig by Desmarest, Fischer,

and others, which has very short thin legs, with the belly almost to the ground. I have not seen this variety.

A young boar from Algiers. Rusty brown; hair black, with long rusty ends. Nose, orbits, edge of ears, and a longitudinal streak on the whiskers black. Chest nakedish. No warts on the cheeks. Ears moderate, densely hairy.

Hab. Algiers (B.M.; *Henry Christy, Esq.*).

Skull in the British Museum (no. 713r). This animal lived some time in the Society's Gardens. The skull is short, with a flat forehead and nose like a Domestic Pig. It is, in many respects, very like the *Cochon de Siam* of Buffon.

(2) *Porc noir à jambe courte*, F. Cuv.

Sus scrofa domestica meridionalis, Fischer, Syn. Mamm. 422.

Hab. Italy.

Black. Ears small, nearly erect. A fold over the eyebrow.

Var. *sinensis*.

Sus scrofa sinensis, Brisson, R. A. 108; Erxl. 181.

Chinesische schwein, Linn. West Goth. 62.

Small. Black, white, or variegated. Back nakedish. Body very large; legs very short and thin.

A short-headed, swollen-cheeked, full-bodied Pig, with short thin legs, like our prize Pigs, was well known to the ancient Greeks. There are several representations in marble of such Pigs in the British Museum that were procured from the Temenos of Demeter Cnidus, and are inscribed "Pig sacred to Persephone," by Captain Spratt. These models chiefly differ from the form of the English prize Pig in the back being furnished with a well-marked, high compressed crest of bristles from the crown of the head to the tail. Similar Pigs are represented on Greek silver coins.

Long-legged, flat-sided sows with their young are represented among the reeds on the Assyrian Marbles in the Museum Collection.

The Pigs naturalized in Para and Pernambuco are black, like the Berkshire or Chinese breeds, with very thin legs, short nose, and thick cheeks. They were introduced from Portugal. In Rio they send the Pigs out in the marshy places to destroy the snakes before the negroes are turned in to cultivate the land; they eat the snakes greedily, and are said never to be injured by the bite of a snake, however poisonous.

Var. *Wattled*, with a cylindrical wattle on the hinder corner of the lower jaw on one or both sides.

Hab. Irish Greyhound Pig (*Richardson on Pigs*, 30).

Var. *Solid-hoofed Pigs*, with two front toes united into one hoof.

Sus scrofa monongulus, Linn. Anim. v. 461.

S. unguis solidis, Plini. H. N. x. 146.

S. scrofa mononyx, Fischer, Syn. 423.

Solid-hoofed sow, Struthers, Edinb. N. P. Journ. 1863; Blainv. Ostéog. p. 128; Darwin, Dom. Anim. ii. 75.

The British Museum has a series of thirteen skulls of the Domestic Pig; all have very similar characters (see Gray, P. Z. S. 1862, 16). They are known by the shortness of the skull, the side of the nose being bluntly keeled; the cheeks concave, the concavity extending up to the edge of the orbit, and being separated from the aperture of the orbit by only a narrow ridge; the frontal line is more or less concave.

The skull of the male has a distinctly marked transverse ridge on the base of the sheath of the upper canine; in the young male it is only slightly indicated; in the skull of the female and young pigs it is not to be seen.

717 *a*. Skull of an old male from Africa, from the Gambia (*Sus gambianus*, Gray, List Mamm. B. M.; Gerrard, Cat. Bones B. M. 277). Forehead flat (see *Sus scrofa hybridus*, West-African Pig, Sclater, P. Z. S. 1862, p. 325).

713 *h*. Skull of an old male, from Africa. Forehead rather convex.

713 *r*. A very similar skull of an old male, purchased at a sale.

713 *o* and 713 *t*. Two nearly adult skulls, from the Museum of Dr. de Jeude.

713 *p*. A skull of an old specimen, diseased, from the Zoological Society's Gardens.

716 *r*. A skull of a young specimen from India, from the Museum of the Zoological Society; inscribed with Indian characters. Named *Sus indicus*.

713 *q*. Skull of a young Berkshire Sow.

713 *e*. Skull of a young Domestic Pig.

713 *s*. The skull of a very young Domestic Pig. This skull has an abnormality in the cutting-teeth. There are six in the upper jaw; the first two are in their natural position, and in their proper place; the two hinder ones on each side are close together, just in front of the suture of the intermaxillary bone, the front one being elongated, slender, conical, and bent outwards, and the hinder one short, broad, conical, and compressed. The canine on the right side is double; that is to say, the new one has appeared before the old one has been shed.

713 *w*. Skull developing its last grinder, from the Museum of Dr. de Jeude.

713 *t*. Skull of an adult, with the nose of the skull more elongated; from the Utrecht Collection. Probably half-bred between the Wild Boar and the Domestic Sow; it has the flat forehead, concave facial line, and the keeled side to the nose before the orbit, of the Domestic Pig, and the length of the face like the wild breeds.

5. CENTURIOSUS.

Face deeply and symmetrically furrowed. Ears very large, falling down. Tail moderate. Skull—forehead and upper part of the nose flat, smooth, keeled on the sides; sides of the cheek concave; the sheath of the upper canine tubercular above; upper canines coming

out in the lower edge of the jaws, and then bent upwards; palate broad.

Centuriosus, Gray, P. Z. S. 1862, p. 17.

Gyrosus, Gray; Gerrard, Cat. Bones B. M. 1862.

Ptychochærus, Fitz. Sitz. Akad. d. Wissen. 1864.

This genus is most allied to *Potamochærus* in the form of the skull, and to *Sus* in its external appearance. It is not likely to be a cross-breed between the two genera.

CENTURIOSUS PLICICEPS.

B. M.

Ears large, flat, rounded at the end, pendulous. Fur with scattered black bristles. Skin blackish grey. Limbs and beneath whitish.

Sus (Centuriosus) pliciceps, Gray, P. Z. S. 1861, p. 263, 1862, p. 14, fig. of skull, p. 15, fig. of palate.

Sus (Gyrosus) pliciceps, Gray, MS.; Gerrard, Cat. Bones B. M. p. 278; P. Z. S. 1864, pp. 160, 383.

Sus scrofa, var. *pliciceps*, Sclater, List Vert. Anim. Gard. Zool. Soc. ed. 3. 36; P. Z. S. 1862, p. 322.

Ptychochærus plicifrons, Fitz. Sitz. Akad. d. Wissen. 1864, p. 409; Führ. z. Zool. Garten z. München, p. 23.

Japanese masked pig, Bartlett, P. Z. S. 1861, p. 263 (figures); Illustr. London News, 1862, no. 1126 (figure).

Chinesische Maskenschwein, Schmidt, Zool. Gart. 1862, p. 80.

Hab. Japan; China. Male in the Gardens of the Zoological Society in 1864.

Evidently a domestic variety; the ears are pendulous, like those of most domestic animals. The young are of a uniform colour like the parents, and not striped like the wild species.

The skull in the British Museum (no. 1387 *a*), figured in the 'Proc. Zool. Soc.' 1862, is very unlike any of the skulls of the Domestic Pig in the Museum Collection, especially in the breadth of the nose and the rounder form of the tubercle on the base of the sheath of the upper canine.

Skeleton of a very old animal (no. 1387 *b*), from the Zoological Gardens. The forehead between the orbits deeply depressed; nasal bones very flat.

B. ABNORMAL SWINE (*Babirussina*).

Cutting-teeth 4/6; *intermaxillary and maxilla produced in front, forming a long diastema between the cutting-teeth and the grinders. Canines erect, parallel; the sheath of the upper canine bent up from the base, and closely applied to the side of the jaw. Premolars* $\frac{3-3}{3-3}$; *the front one very small, and early deciduous.*

There are two large oblong deep cavities at the hinder part of the depression behind the hinder nasal opening, separated from each

other by a sharp, high, central, longitudinal lamina, that are not to be observed in the skulls of other *Suidæ*.

These depressions seem to become deeper as the animal increases in age. I have only observed them in specimens which have well-developed canines; they may be confined to the males.

There is in the British Museum a small skull, obtained from Holland (718 o), of a half-grown animal, which has developed its second true grinder, and which is without canines, only having a slight ridge on the bone at the place where they are developed in the other skulls. The skull has no indication of the depression in the hinder part of the hinder nasal opening, and the grinders are much smaller than those in any other skull. Is it the skull of a female, or does it belong to a distinct species allied to *Babirussa alfurus*?

The prolongation of the skull in front and the length of the separation of the cutting-teeth from the grinders are produced by the prolongation of the maxilla in front and the elongation of the intermaxilla behind. The first premolar is very early deciduous; it is only to be observed in skulls of young animals; but the spot where it was placed is sometimes indicated by a porous structure in the full-grown skull, as in specimen no. 718 l.

6. BABIRUSSA.

Face conical, simple. Ears rounded. Tail and limbs slender. Skull conical; nose elongate, simple; the hinder upper part of the intermaxillary bones smooth; the upper cutting-teeth large, equal, equidistant; the sheath of the upper canine bent upwards from the base at the side of the jaw; canines arched backwards, sometimes even spirally recurved; lower premolar compressed.

Babirousa, Gray, Ann. Phil. 1825.

Babiroussa, F. Cuv. Dent. Mam. 212, t. 86*.

Babirussa, F. Cuv. Dent. Mam.; Lesson, Man. 338; Gray, List Mamm. B. M. 185; P. Z. S. 1852, p. 131; Gerrard, Cat. Bones B. M. 278.

Porcus, Wagler, Syst. 17; Fitz. Sitz. Akad. Wissen. 1864, p. 435.

M. F. Cuvier, when adopting this genus, described and figured the grinders as small and nearly equal-sided (see Dent. Mamm. t.); but this is a mistake; they are as large and elongate as the grinders of the other Pigs, compared with the size of the skull. This genus was first distinctly characterized in the 'P. Z. S.' 1852, p. 131.

BABIRUSSA ALFURUS.

B.M.

"Fur ashy; dorsal streak yellowish brown; beneath ferruginous-washed."

Aper orientalis, Brisson, Règn. Anim. 110.

Sus babyrussa, Linn. S. N. 50; Quoy & Gaim. Voy. Astrol. Zool. i. 125, t. 22, 23; Isis, 1836, t. 13; Schinz, Monogr. iv. 5, t. 5. f. a-d; Blainv. Ostéogr. t. 2, t. 5 (skull, ♂).

Sus baberoussa, Bodd. Elench. i. 157.

Sus babirussa, Schreb. Säugeth. t. 328; Blainv. Ostéog. Onguligr. t. 2 (skeleton, ♀), t. 5. f. 7 (skull and teeth).

Babirussa alfurus, Lesson, Mamm. 338; Gray, List Mamm. B.M. 185; Sclater, P. Z. S. 1860, p. 443, t. 83 (from life); Gerrard, Cat. Bones B. M. 279.

Porcus babyrussa, Wagler, Syst. 17; Schreb. Säugeth. Supp. v. 509; Fitz. Sitz. Akad. d. Wiss. 1864, p. 43; Giebel, Säugeth. 232.

Porcus babirussa, Reichb. Nat. Pachyd. 57, t. 54. f. 199, 197.

Aper in India, Plinius, Hist. Nat. vii. 52.

Horned hog, Green, Mus. R. S. 27, t. 1 (skull).

Babyroussa, Bontius, Ind. Orient. t. 1. fig.

Babyrussa, Jacob, Mus.

Babi roesa, Seba, Thes. i. t. 50. f. 2.

Babiroussa, Buffon, H. N. xii. 379, t. 48.

Hab. Borneo; Malacca?; Celebes; Ceram; Timor; Java; Sumatra; New Guinea; New Ireland (*Fitzinger*).

Fam. 2. DICOTYLIDÆ.

Teeth 38:—Cutting-teeth $\frac{2-2}{3-3}$; canines $\frac{1-1}{1-1}$; premolars $\frac{3-3}{3-3}$; molars $\frac{3-3}{3-3}$. Tail short. Teats 2.

Chæropotamidæ, Owen, Odont. 559 (not characterized).

See description of dentition (Owen, Odont. 560).

Dicotyles, Cuvier, Règ. Anim. i. 237, 1817; F. Cuv. Dent. Mamm. 210, t. 86; Owen, Odont. 559; Baird, Mamm. N. A. 627, t.; Fitzinger, Setigera, 429, 1864.

Notophorus, Fischer, Zool. 1819.

These animals do not breed with the Domestic Pig, or any of the genus *Sus*. They have not been domesticated, and very rarely breed in confinement. The two species, a male (*Dicotyles labiatus*) and female (*Notophorus torquatus*), bred together in the Zoological Gardens, 1864; they have only two teats, and have two at a birth.

Mr. E. Gerrard, in the 'Catalogue of Bones in the British Museum,' has pointed out that the Collared Peccary has six and the White-lipped Peccary nine caudal vertebræ (p. 289).

M. F. Cuvier, in 'Dent. Mamm.,' observes that his description of the teeth is taken from the Peccary (*N. torquatus*), and the figure from the Tagassu (*D. labiatus*); and he continues, "The hinder molar of the lower jaw of *D. labiatus* is terminated by a single tubercle as large as the others, and not by three small ones."—*Dent. Mamm.* 211. I cannot see any difference in the form of the crown of the last grinder of the two species. The teeth, like the skull, are much the largest in *D. labiatus*.

1. NOTOPHORUS.

Skull—side of the face in front of the orbit dilated, spread out, deeply concave beneath; the longitudinal ridge on the cheeks nearly

parallel with the tooth-line; orbit small, incomplete behind, with a concave half ring beneath, on the cheeks and upper part of the front of the zygomatic arch; occipital end much dilated on the sides, forming a case for the hinder part of the temporal muscle. Teeth moderate. Tail rudimentary; caudal vertebræ six (*Gerrard*).

De Blainville's figure of the skull on the skeleton (*Onguligrades*, *Sus*, t. 3) is not characteristic; the concavity in front of the lower part of the orbit is not sufficiently marked. The skull figured as that of *Sus torquatus* on tab. 5 is that of *Dicotyles labiatus*.

Dr. Spencer Baird's figure of the skull (t. 87) is much shorter and more ventricose than any of our specimens; the form of the ridge on the cheek is very imperfectly represented.

NOTOPHORUS TORQUATUS. Peccary.

B.M.

Black-brown, yellow-washed; neck and shoulders with a white streak.

Sus tajacu, Linn. S. N. i. 103.

Sus tajassu, Erxleb. S. R. A. i. 188.

Sus torquatus, Blainv. Ostéogr. Onguligr. *Sus*, t. 3 (skull), t. 8 (teeth).

Dicotyles torquatus, Cuv. R. A. i. 237; F. Cuv. Dent. Mam. t. 86. f. 1; Mamm. Lithogr. i. t.; Fitz. 1864, p. 49; P. Z. S. 1859, p. 51, 1860, pp. 181, 206, 242, 262, 417, 443; Baird, M. N. A. 627; Blainv. Ostéogr. t. 3 (skeleton), t. 5 (skull).

D. minor, Schinz, Cuv. Thierr. iv. 511 (jun.).

D. tajacu, Gray, List Mamm. B. M. 186; *Gerrard*, Cat. Bones B. M. 280.

Cuche, Oviedo.

Vagassou, Lerijs, Nav. in Bras. 115.

Saynos, Acosta, H. N. Indias, 287.

Zainus sive *Tajacu*, Jonst. Quad. 107, t. 46.

Tajacu, Piso, Ind. 98, fig.; Rai. Syn. Quad. 97.

Peccary, Wafer, Voy. 222.

Musk hog, Tyson, Phil. Trans. cliii. p. 359; Hill, Anim. 572.

Pecari ou tajacu, Buffon, H. N. x. 21, t. 3. f. 27, t. 5. f. 13.

Mexican hog, Penn.

Pecari, Shaw.

Hab. South America: Mexico, Red River, Arkansas, Guiana, Brazil, Paraguay, Peru, California (*Baird*).

Notophorus torquatus had a young one in 1860, the first occasion that the animal has bred in confinement in England (*Sclater*, P. Z. S. 1860, p. 443).

The skulls of the three old [males?], having large canine teeth, are rather larger than the other, and they have a well-marked oblong slightly sunk concavity in front of the orbits.

One adult skull, in the Museum, with large short thick canines, has this part of the skull, which is concave in the three other skulls above referred to, flat.

The angle of the lower jaw in the old skull becomes much di-

lated, with a produced lower edge, making the skull appear higher than the skull from an animal with all its teeth just developed, as 720 *h*.

2. DICOTYLES.

Skull—side of the face in front and on the under side of the orbits flattened, with a well-marked ridge on its lower edge; orbits small, incomplete. The longitudinal ridge on the cheeks bent up in an arched manner in front of the orbits, and then slightly indicated parallel to the line of the forehead, becoming a large concavity on the cheek beneath. Teeth large (see Blainv. *Ostéogr. Onguligr. Sus*, t. 5, figured as *Sus torquatus*). Tail rudimentary; caudal vertebræ nine (Gerrard).

DICOTYLES LABIATUS.

B.M.

Black-brown, varied with yellowish; no neck-bands; lower jaw white.

Sus tajassu, Erxleb. S. Règ. Anim. i. 185.

Sus albirostris, Illig., Licht. Verz. d. Doubl. Berl. Mus. 3.

Dicotyles labiatus, Cuv. R. A. i. 237; F. Cuv. Dent. Mamm. 210, t. 86. f. 2; Mamm. Lith. xxvii. t.; P. Z. S. 1848, p. 70, 1860, p. 262.

Sus labiatus, Gerrard, Cat. Bones B. M. 281; Blainv. *Ostéogr. Onguligr. t. 3* (foot).

Dicotyles albirostris, Wagner, Schreb. Säugeth. Suppl. iv. 306; P. Z. S. 1860, pp. 262, 442, 443.

D. torquatus, Blainv. *Ostéogr. Sus*, t. 5 (skull).

Cuche, Oviedo, H. N. de las Indias, p. 21.

Saynos, Acosta, H. N. de las Indias, p. 287.

Tayacutericus, Laet. Nov. Orb. 551.

Tagnicati, Azara, Paraguay, i. 25.

Hab. South America; Guiana, Brazil, Paraguay, Peru.

The skulls are shorter, and the ridge on the cheek is not so large and distinctly marked in younger animals as in the adults. The alveolus for the hinder grinders, which are about to be developed, is a kind of sheath with a slit along the middle of its exposed side.

The skulls of the young animals changing their teeth sometimes show two small conical canines on each side of the upper jaw, as 721 *a*, 721 *b*.

II. *The premolars deciduous, their place being supplied by the development of the molars.*

Fam. 3. PHACOCHERIDÆ.

Grinders formed of laminæ, with numerous roots. Canines cylindrical, conical; the upper bent upwards. Eyes and nostrils on a level with top of head. Young not streaked.

Hab. Africa. Lives floating among reeds. Intermediate between *Suidæ* and *Hippopotamidæ*.

PHACOCHÆRUS.

Cutting-teeth $\frac{3-3}{3-3}$, deciduous; canines $\frac{1-1}{1-1}$; grinders $\frac{6-6}{6-6}$; premolars $\frac{3-3}{3-3}$. The premolars fall out; and their places are eventually filled by the molars, as the large molar is developed and gradually increased in length by the addition of a new plate to its hinder edge (see Blainv. Ostéogr., *Sus æthiopicus*, t. 8).

The whole series of teeth are never or very rarely to be seen developed at the same time, as the last molar is rarely apparent until the first two or three premolars have fallen out.

Phacochæres (Phacochærus), F. Cuv. Dent. Mam. 213, t. 87.

Phascochærus, F. Cuv. Mém. Mus. viii. 454; I. Geoff.; A. Smith.

Phocochærus, F. Cuv. Dent. Mamm. 213, t. 87; Temm.; Reichenb.; Giebel, 235; Peters; Owen, Odont. 549, t. 141. f. 2; Fitz. Setigera, 415, 1864; Gerrard, Cat. Bones B. M. 279.

Eureodon, G. Fischer, Zoogr.

See for dentition of *Phacochærus*, and the changes in it, 'Owen, Odont.' p. 549, t. 140. f. 4, t. 141. f. 1. He represents the premolars, the fourth being the first tooth of the permanent series.

PHACOCHÆRUS ÆTHIOPICUS.

Fur dull ashy brown; beneath whitish. Ears and beard on cheeks whitish.

Sanglier du cap vert, Daubenton; Buffon, H. N. xiv. 409, xv. 148.

Sus æthiopicus, Erxleb. Sus, R. A. i. 187; Griffith, A. K. iii. 410, fig.; Blainv. Ostéogr. Onguligr. Sus, t. 5.

Sus africanus, Gmelin, S. N. i. 220; Home, Comp. Anat. ii. t. 39 (skull, adult).

Phascochærus africanus, F. Cuv. Mém. du Mus. viii. 454, t. 23; Lesson, Mamm. 341.

Phacochæres incisivus, I. Geoff. Dict. Class. II. N. xiii. 32.

Phacochærus africanus, F. Cuv. Dent. Mamm. 215, t. 87. f. b; Fischer, Syn. Mamm. 424; Peters, Mossamb. 181; Giebel, Säugeth. 237.

Sanglier d'Afrique, Adanson, Sénégal, 76.

Aper æthiopicus, Pallas, Misc. 16, t. 2; Spicil. ii. 3, t. 1, xi. t. 5. f. 7.

Sus æthiopicus, Linn. S. N. i. 223; Blainv. Ostéogr. t. 5 (skull), t. 8 (teeth).

Engalla, Merol. Cong. 667.

Porc à large groin, Vosm. Descrip. 1767.

Emgallo, Buffon, H. N. Supp. iii. 76, t. 11.

Æthiopian Hog, Penn.

Sus angalla, Boddaert, Elench. A. i. 150.

Phacochæres æthiopicus, F. Cuvier, Mém. du Mus. viii. 450, t. 23; Dent. Mamm. 215, t. 87. f. a.

Phascochærus æliani, Rüppell, Atlas, t. 25, 26.

Phacochærus barbatus, Temm. Monog. i. 29.

Phacochærus haroja, Ehrenb. Symb. ii. t. 20.

Phacochærus æliani, Gray, List Mamm. B. M. 185; Reichb. N. Pachyd. 36; Sclater, P. Z. S. 1864, p. 106; Gerrard, Cat. Bones B. M. 280; Owen, Odont. 549.

Phacochærus æthiopicus, Home, List Comp. Anat. ii. t. 38, 39.

Cape Verd Hog, Shaw; Penn.

Phascochæres africanus, Desm. Mamm. 593; A. Smith, Cat. S. A. Mus. 16.

Phascochærus edentatus, I. Geoff. Dict. Class. H. N. xiii. 320.

Phascochærus typicus (African Boar), A. Smith, S. African Quart. Journ. 90.

Phacochærus æthiopicus, Fischer, Syn. Mamm. 424; P. Z. S. 1850, p. 78, 1860, p. 443; Gray, List Mamm. B. M. 185; Giebel, Säugeth. 236; Fitz. Sitz. Akad. d. Wissen. 1864, p. 39.

Phacochærus africanus, Harris; Kirk, P. Z. S. 1864, p. 656.

Phacochærus pallasii, Van der Hoeven, Nov. Act. Leop. xix. i. 171, t. 18; Owen, Ann. & Mag. N. H. 2nd ser. xi. 246; Odont. 553, t. 140. f. 4 (teeth); P. Z. S. 1851, p. 63.

Phacochærus aper æthiopicus, Reichenb. N. Pachyd. 35, t. 32. f. 111, 112.

Hab. Africa; Central Africa, Tete, &c. (*Kirk*); Guinea, Senegal (*Adanson*); Mossambique (*Peters*); South Africa, called "Kau-naba;" Abyssinia; Arabia.

"Native name 'Jiri' or 'Njiri' at Tete; in Sechuana, 'Kolobe;' Sena and Tete; Batoka country."—*Kirk*, P. Z. S. 1864, p. 656.

M. F. Cuvier divides *Phacochærus* into (1) *Phacochæres* à incisives, *P. africanus*; (2) *Phacochæres* sans incisives, *P. æthiopicus*, Gmel. (Dent. Mam. 257, 213). He adds, "Notre dessin est tiré, pour la mâchoire supérieure d'un *Phacochære* sans incisives, et pour la mâchoire inférieure d'un *Phacochære* pourvu d'incisives, et nous ferons remarquer que les disques des dernières molaires du premier sont moins grands et moins nombreux que ceux de la dernière molaire du second, serait-ce encore un caractère spécifique?" (Dent. Mamm. p. 213).

The size and number of the disks on the crown of the last grinder depend on the age of the tooth and how much of the surface has been worn down.

In the British Museum there are three skeletons and fourteen skulls or parts of skulls. The skulls of ten of these have two incisors in the upper jaw, and seven are without any incisors in the upper jaw, as marked in Mr. Gerrard's 'Catalogue of Bones,' p. 280. Two of these skulls belong to skeletons of a male and female *Phacochere* that were brought together from Africa, and lived several years in the Gardens; they are both destitute of upper cutting-teeth. Another skeleton of a female that lived in the Zoological Gardens has two cutting-teeth in the upper jaw; so the existence or non-existence of the upper cutting-teeth is not a sexual character.

The presence or absence of the upper cutting-teeth does not depend on the age of the animal; for there are specimens without any

cutting-teeth that have the premolars still present and the hinder molar small, and there are specimens which have the cutting-teeth that have lost or are losing the premolars and have the hinder molar very large and well developed.

Nine of the skulls or front parts of the upper jaws were bought of Mr. Argent, who purchased them all together with a collection of Cape skins: five of these jaws have distinct teeth in the upper jaw, and four of them are without any indications of them; therefore the presence or absence of the upper cutting-teeth is common to animals inhabiting the same locality, not peculiar to the Phacochere of different districts of Africa as has been supposed.

Professor Sundevall observes, "*Sus (Phacoch.) æliani*, Crzm.; *Ph. harroya*, Ehr., in Caffraria a Wahlbergio inventus est. Plura specimina utriusque sexus retulit, nullum vero suis Æthiopici ibi vidit."—*Efversigt K. V. Akad. Förh.* 1846, p. 121.

I cannot discover any difference between the skull which we received from Professor Sundevall as *P. æliani* from Caffraria and the skulls without cutting-teeth which were obtained from Mr. Argent, which are called *P. æthiopicus*.

There is no difference, as far as I can see, except size, between the very large skull of a male from Cape Verde, that was given to the Museum by Mr. T. Tatum, and the skulls from South Africa and Caffraria in the Museum Collection, and the skull figured by Dr. Rüppell as the type of his *P. æliani*.

It is said that *P. æthiopicus*, without upper cutting-teeth, has a soft sac under the eyes, which is not to be observed in *P. africanus*, that has cutting-teeth in the upper jaw. Perhaps that may be a sexual character; for it was a male *P. æthiopicus* that was first described, with a large mane of slight bristles.

The teeth in the lower jaw are generally well developed and large. There is one skull in the British Museum, from Mr. Argent, in which they are nearly worn away to the roots; they are small. This skull has no upper incisors. De Blainville figures a lower jaw in which they are entirely absent, and another in which there are only two very small teeth (*Ostéogr. Sus*, t. 5, *Sus æthiopicus*).

It has been proposed to divide *Phacochærus* into two species, thus characterized:—

P. æthiopicus. Head short; forehead convex; cutting-teeth none above, and small and deciduous below.

P. æliani. Head elongate; forehead convex; cutting-teeth two in upper, six in lower jaw, both large and exerted.

I cannot find any difference in the form of the head and forehead between the specimens with and without cutting-teeth in the upper jaw. The head is as long and the forehead is as concave in the skulls that are destitute of upper cutting-teeth as in those that have them well developed.

There is a considerable variation in the skulls. The skull of the male from the Zoological Gardens is much broader, and the forehead more concave, than the skulls of the females from the same collection; but these are from animals that have been kept in confinement.

The teeth of the old male are greatly deformed, the grinders being absent on one side of the upper and on the opposite side of the lower jaw, the teeth working into cavities in the alveolar surface. The nose of the skull below the base of the canines is much broader and more rounded and arched in the males than in the females. The upper canine teeth are nearly of the same form in the two sexes; those of the males are much the thickest.

The skull from the Cape Verde is longer in proportion to its width than any of the other skulls, the line along the upper surface of the skull being full three times the length of the width between the upper edges of the orbits. In other skulls it is twice and a half, or rather more than twice and a half, the width at the same part of the skull. I cannot see any other character to separate it.

The Wild Pigs of Obbo, Central Africa, live under ground; they take possession of the holes made by the *Manis*; these they enlarge and form cool and secure retreats. (Baker, 'Albert N'yanza,' ii. 66.)

January 23, 1868.

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

An extract was read from a letter addressed to Dr. Gray by Mr. Gerard Krefft, Corr. Memb., dated Sydney, 23 Nov. 1867, stating that amongst other fossil remains which he was now arranging for the Australian Museum he had discovered a portion of the humerus of an extinct species of *Echidna* from the Darling Downs, indicating the former existence of a gigantic form of this Monotreme in Australia.

The following letter, addressed to the Secretary by Mr. E. P. Ramsay, Corr. Memb., was read:—

“SIR,—Seeing that great interest has been taken in the arrival of a living specimen of the New-South-Wales Lyre-bird (*Menura superba*) in England, I thought it my duty to investigate the subject, and to endeavour to procure some for the Society. I have therefore, during this last breeding-season, paid much attention to their habits and mode of nidification, and by sending men for that purpose have obtained three young birds, which, as soon as they are strong enough, shall be forwarded to the Society with all due care. At present these young birds are doing remarkably well, and are just able to run about and feed themselves. I have also obtained several of their nests and eggs, in the latter of which I find three distinct varieties. The nests also differ, according to the locality frequented by the birds:—some

being constructed of rough material, such as large sticks, stringy bark*, and dead ferns (*Pteris aquilina*); others of very fine rootlets and pieces of *Hymenophyllum tunbridgense*, which makes a remarkably neat nest. Braisher, the most successful of my collectors, who also procured the young birds, called upon me a few days ago with some of the eggs, when I took the opportunity of getting all the particulars respecting the nidification. I find that in no instance did he meet with more than one egg or one young bird in the same nest. The birds commence to build in May, and lay their eggs in June and July. The female is not fed by the male while she is sitting, nor has Braisher ever observed the male bird near the place after she has laid her egg. The female frequently leaves her egg during the middle of the day to search for food. This may account for the length of time taken in the hatching, which sometimes extends over a month. The young do not leave the nest until they are eight or ten weeks old. When one is standing in front of the nest, the egg or the young bird can easily be seen in it. The female enters the nest *head first*, and then turns round and settles herself on the egg, with her tail sometimes over her back, *but more often bent round by her side*. Thus in time the tail becomes quite askew, and is a tolerable guide to the length of time the bird has been sitting.

“The nests are for the most part placed on the darker side of the gullies and ravines. They are large, oval, domed structures, with the entrance in the front, are usually placed on the ground, at the foot of some stump or tree, by the side of a fallen log; sometimes they are placed on a ledge of rock in the face of a cliff at a considerable height from the ground; occasionally a nest is found in the end of a log which has been hollowed out by fire and formed in the shape of a scoop. They are always built on some solid foundation; nor do I see how such a bulky and loosely built structure could hold together if placed otherwise; great care must be taken in moving the nests to prevent their falling to pieces. I have now before me three nests:—No. 1, taken from the hollow end of a log; No. 2, from a ledge of rock; while the third was found by the side of a fallen tree. No. 2 is composed of fine roots and *Hymenophyllum tunbridgense*, with pieces of *Hypnum*, and lined with feathers; this nest is much more neat, smaller than the others, and looked very beautiful while the ferns and moss which covered the whole of the outside were fresh and green. Nos. 1 and 3 are much the same in appearance and size, being large, oval, dome-shaped structures of sticks, twigs, and roots interwoven loosely with pieces of bark and moss, roots of ferns, and fronds of *Pteris aquilina*; the inside is lined with rootlets and, finally, the long loose feathers from the flanks and backs of the birds. The entrance, which is in the side (or front), is not covered with a hood, nor does its upper edge hang over so as to conceal the egg. The lower edge, if anything, protrudes slightly in all the nests I have examined. The total length

* The inner bark of *Eucalyptus*, used as ties by the bushmen for almost all purposes.

of the nest is 26 inches, height 12, and width 18 inches; the entrance is 5 or 6 inches in diameter, and its lower edge $4\frac{1}{2}$ in thickness. The whole of the interior is lined with feathers, which, being much of the same colour as the egg, help to protect it and hide it from view. All the nests and eggs which I possess, with the exception of one, were procured in the Illawarra district, chiefly from the ravines and gullies in the neighbourhoods of Appin and Wollongong. Occasionally the same nest is used more than once, after being lined afresh with feathers. The eggs are of three varieties at least:—

“Var. α , the most common, is of a light stone-grey, with darker-coloured blotches and spots, and a few jet-black dots; length 2·4 to 2·5 inches by 1·6 to 1·7 in breadth. Other specimens are dull brown, stone-brown, or dark blackish brown, with dull-brown spots and blotches when fresh.

“Var. β is of a reddish-brown colour, with dark blackish-brown spots, and a beautiful blush of pinkish purple over the whole surface. I have only seen one of this very marked variety, 2·35 inches in length by 1·65 in breadth.

“Var. γ is a most peculiar-looking egg, of a uniform dark metallic blackish brown, having obscure spots and blotches of a darker tint, almost invisible at a short distance; length 2·5 by 1·7 inches; and, like many of the other specimens, this variety has jet-black lines and dots dispersed over the surface.

“The young, which are hatched early in August, but sometimes as late as the end of September, are of a whity-brown colour upon leaving the egg, but become darker as they get older; the crown of the head is covered with long dusky slate-coloured down, which hangs over the neck (which is quite bare) on to the back; the wings have a fringe of shorter down round them, being longest on their lower edge; the upper part of the rump, centre of the back, and the tail are also covered with down, while two rows of short down grow along the thighs. The bare triangular part of the neck is surrounded by a narrow fringe of very short down, while two edges, still shorter and of a light yellow colour, grow on either side of the breast or keel of the sternum. Down on the head from $1\frac{1}{2}$ to 2 inches in length; on rump and tail it is 2 inches long. Bill ·5 inch in length, blackish brown at tip; tarsi ·8 inch in length.

“Upon finding that Mr. Gould is wont to consider the South-Australian Lyre-bird to be of a distinct species from that found in New South Wales, I took the earliest opportunity of obtaining South-Australian specimens, and in due time received from Port Phillip six tolerably good skins, which I have now before me, consisting of three adult males, one young male, and two females. Having closely examined and compared these with numerous specimens shot in various parts of New South Wales, as well as with a very complete series in my own collection, I must say that, although not altogether unprepared, I was greatly disappointed to find that Mr. Gould had endeavoured to form a species from such trivial differences as are exhibited in the more defined and deeper-coloured bars of the two outer tail-feathers of some of the Port-Phillip birds. I say *some*,

because these differences do not exist in *all* the specimens I have examined from those parts. Nevertheless I must acknowledge that in most of the Port-Phillip specimens these bars on the two tail-feathers are *more defined* and of a deeper tint than I have observed in the New-South-Wales specimens. But this I attribute in a great measure to the age of the birds, and also of the tail itself; for an old tail always appears to me to be darker in tint than one freshly grown. I noticed this fact last year, when I examined some fifty specimens, and found that the most perfect tails were lightest in colour, and, moreover, that the two outside tail-feathers were the last to obtain their full length. This may in some way account for Mr. Gould's remark respecting the '*diminished length*' of these feathers in his Port-Phillip specimens; for when fully grown, in all my specimens from the same locality, these feathers are of the same average length, and bear the same proportion to the rest of the tail-feathers as those of the New-South-Wales birds.

"The South-Australian variety, then, differs upon the whole in being of a slightly darker tint, and in having the bars of the two outer tail-feathers more defined, especially at the base, and of a deeper colour than is usually found in New-South-Wales specimens. This darker tint of colour is also visible in the tails of the females. If such slight differences are considered by ornithologists to be specific, no more appropriate name could be found for the South-Australian bird than that chosen by Mr. Gould (*Menura victoriae*).

"With respect to the *Menura alberti*, I am afraid that I can add but little to the very complete account of it already given by Mr. Gould in his 'Handbook to the Birds of Australia.' We met with it on two occasions only during last year's visit to the Richmond River. So shy and distrustful was this species, that a passing glance and a random shot were all we could get in either instance, which, nevertheless, obtained us two fine specimens. One, a young female (?), shot on the 9th of November, and which I take to be about six months old, had still a large tuft of down on the chest; all the upper surface (except the back of the head and neck, which are dark brown) is of a deep rufous; front of the head, throat, underside of neck, and the upper and under tail-coverts are of a deep bright rufous; the chest is covered with dense, short, stiff, downy feathers of a dull-brown colour; all the under surface, except the centre of the breast and abdomen, which are light brown, is of a sandy buff; tail dark brown underneath, each feather tipped with rufous. Total length 23 inches, tail 14·12, bill 1·7, along the ridge 1·4, width at base ·6, height ·5, tarsi 4 inches; hind toe 1·4, its claw 1·5; second toe 1·9, its claw 1·2; third toe 2·1, its claw 1·1; fourth toe 1·7, its claw 1 inch. Bill, legs, and claws black."

Mr. Gould made some comments upon Mr. Ramsay's paper, in the course of which he remarked that any additional information respecting the birds forming the genus *Menura* must be of the highest interest to physiologists as well as to ornithologists. The ano-





J Smit lith

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DENDROCOLAPTES PUNCTICOLLIS

malous structure and habits of these birds had induced some naturalists to place them among the Gallinaceæ, and others with the Insessores, in which latter order was, in his opinion, their true position. To what family they belonged was still an open question. He had formerly associated them with the American genus *Pteroptochos*, but no longer entertained that view. By one, at least, of the old writers the Lyre-bird was placed with the *Paradiseidæ*, a view which has lately been revived by Mr. Bartlett. The features most favourable to this opinion appeared to be the character of the feathers covering the body, and the peculiar form of the two narrow central tail-feathers, which feathers were nearly of the same form in the true Birds of Paradise.

Mr. Gould then exhibited skins of *Menura superba* and *M. victoria*, with a chick and egg of the latter species, and directed the attention of the meeting to the peculiar condition of the bird at this early stage of its existence (two days after its exclusion from the egg), when its appearance was so extraordinary as to render it difficult for the most astute ornithologist to determine to what genus it belonged, the entire surface being thickly covered with a lengthened sooty-black down, which assumed the form of a great cowl or hood over the head; while the under surface was so sparsely clothed, that the throat, flanks, and thighs were nearly naked. The chick also differed from those of most other birds in the feebleness or comparative non-development of the tarsi, toes, and nails, particularly when compared with those of the Gallinaceæ and Plovers, in which these organs, so necessary for nimble running, were almost perfect, and eminently fitted for aiding them in procuring their subsistence. The *Menura*, on the other hand, was as helpless as a young thrush, or any other Insessorial nestling. It was evident, therefore, that, like them, the solitary young Lyre-bird remained sitting in its great domed nest, and was entirely dependent upon its parents for food and protection until its feeble legs had become fully developed, and its body covered with real feathers. Whether the chick was blind on exclusion from the egg was at present unknown, and this was a point which it would be very interesting to ascertain.

The following papers were read:—

1. Descriptions of New Species of Birds of the Families *Dendrocolaptidæ*, *Strigidæ*, and *Columbidæ*. By P. L. SCLATER and OSBERT SALVIN.

(Plate V.)

The following descriptions relate to presumed new species of birds which we have lately met with during a revision of the specimens of the families *Dendrocolaptidæ*, *Strigidæ*, and *Columbidæ* in our collections. We hope to give illustrations of the greater portion of them in the forthcoming numbers of our 'Exotic Ornithology.'

1. *DENDROCIINCLA RUFICEPS*, sp. nov.

Brunnescenti-olivacea; pileo, alis extus, et cauda tota castaneis: subtus, præcipue in gula, paulo dilutior: remigum primariorum quinque externorum apicibus nigricantibus: rostro corneo, pedibus corylinis: long. tota 8, alæ 4·2, caudæ 3·2, rostri a rictu 1·35 poll. Angl.

Hab. Isthmus Panamensis.

Sim. D. homochroæ, sed statura majore, rostro multo fortiore, et dorso olivaceo tincto distinguenda.

Sclater's collection contains a single skin of this *Dendrocincla*, which was obtained near the city of Panama by the late Mr. William Thomas Hodgetts Chambers-Hodgetts (formerly Chambers) during a temporary visit to the isthmus. It is, perhaps, the species indicated by Mr. Lawrence as *Dendromanes homochrous* (Ann. L. N. Y. viii. p. 466), but is certainly distinct. We are now inclined to consider Sclater's genus *Dendromanes* to be only subgenerically distinct from *Dendrocincla*, of which group the following species are known to us.

a. *Dendromanes*.

1. *D. anabatina*, Sclater, ex Mexico et Guatemala.
2. *D. homochroa*, Sclater, ex Mexico et Guatemala.
3. *D. ruficeps*, nobis, ex Panama.
4. *D. merula* (Licht.), ex Guiana et Amazonia.
5. *D. meruloides* (Lafr.), ex Venezuela.

b. *Dendrocincla*.

6. *D. fumigata* (Licht.), ex Brasil.
7. *D. atrirostris* (Lafr.), ex Boliv., Nov. Granada, rep. Æquator. et Panama.
8. *D. longicauda*, Pelzeln, ex Amazonia.
9. *D. tyrannina* (Lafr.), ex Nov. Granada.
10. *D. turdina* (Licht.), ex Brasil.

Of all these ten species there are specimens in Sclater's collection.

We are not acquainted with *D. minor*, lately described by Herr von Pelzeln, 'Orn. Bras.' p. 60.

2. *DENDROCOLAPTES PUNCTICOLLIS*, sp. nov. (Pl. V.)

Dendrocolaptes multistrigatus, Scl. et Salv. Ibis, 1860, p. 275 (nec Eytomi).

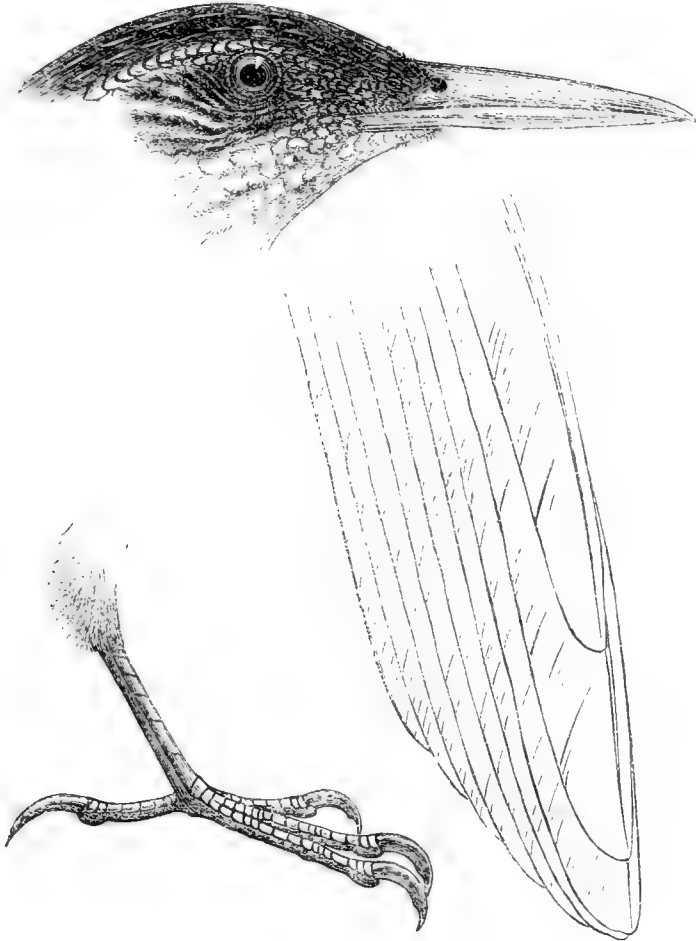
Olivaceo-brunneus: alis extus et cauda rufis: capite nigricante cum dorso superiore fulvo strigato; subtus dilutior et magis fuscus, gutture albescentiore; collo antico nigro punctato, pectore pallide fuscescenti-albido strigato: ventre toto indistincte nigro transfasciato: tectricibus subalaribus ochraceis nigro

punctatis: rostro pallide corneo, mandibula magis albicante :
pedibus nigris: long. tota 10·5, alæ 5·0, caudæ 4·5, rostri a
rictu 1·7.

Hab. Guatemala, prov. Veræ Pacis.

Sim. *D. picumno*, sed rostro longiore angustiore et colore pallidiore, collo nigro punctato et tectricibus subalaribus ochraceis dignoscendus.

Fig. A.



Dendrocolaptes puncticollis.

We have hitherto referred this bird to *D. multostrigatus* of Eyton (Contr. Orn. 1851, p. 75), but, having recently, through Mr. Thomas Moore's kindness, had an opportunity of examining the type specimen of Mr. Eyton's species in the Derby Museum, find that we have been in error. Mr. Eyton's bird is identical with a Peruvian and New-Granadian species which we consider to be *D. validus* of Tschudi, although, from the badness of the plate and description in the 'Fauna Peruviana,' this identification is open to some doubt.

We are acquainted with six species of this genus, which is divisible into two sections as follows:—

a. *Dendrocops*.

- (1) *D. picumnus* (Licht.), ex Brasil. reg. sylv.
 (2) *D. puncticollis*, nobis, ex Guatemala.
 (3) *D. validus* (Tsch.): Scl. et Salv. P. Z. S. 1866, p. 184. *D. multostrigatus*, Eyton. Ex Peruvia orient. et Nov. Granada.

b. *Dendrocolaptes*.

- (4) *D. certhia* (Bodd. ex Pl. Enl. 621). *D. cayennensis*, auct. ex Gmelin. *Premnocolopus undulatus*, Cab. Ex Guiana et Amazonia inf.
 (5) *D. radiolatus*, Scl. et Salv. P. Z. S. 1867, p. 755, ex Peruv. orientali.
 (6) *D. sancti-thomæ* (Lafr.), ex Panama, Costa Rica, et Guatemala.
 (7) *D. concolor*, Pelzeln, ex Amazonia.

There are specimens of all these species in Sclater's collection. We have not yet met with *D. pallescens*, Pelzeln, Orn. Bras. p. 61.

3. *SCOPS BARBARUS*, sp. nov.

Scops flammeola, Salvin, Ibis, 1861, p. 355 (err.).

Niger, pallido rufo punctatus et variegatus: superciliis in torquem nuchalem transeuntibus, albo guttatis: scapularium pogoniis externis distincte albo ocellatis: primariis fusco-nigris, in pogonio externo rufescente albo septies transfasciatis: cauda nigricante, rufescente quinquies transfasciata: subtus nigricans, præcipue in ventre ocellis albis frequenter aspersione; crisso albicante, nigro punctato: tarsi pro majore parte dense vestitis; horum autem parte terminali cum digitis omnino nudis: long. tota 7, alæ 5·4, caudæ 2·5, tarsi 1.

Hab. Guatemala, prov. Veræ Pacis.

The type specimen of this apparently undescribed *Scops*, now in the collection of Messrs. Salvin and Godman, was sent to Salvin from Vera Paz in the year 1866. The bird referred to by Salvin as *Scops flammeola*, as quoted above, turns out to be a rufous variety of the same species.

Scops barbarus, as we propose to term it, the last-mentioned example having been obtained near the village of Santa Barbara, in Vera Paz, is readily distinguishable from every other American *Scops*, except *Scops flammeola*, by its small size. From the latter it may be at once distinguished by the feathering of the tarsus terminating above its distal end, and leaving a narrow naked ring round its lower end (see fig. 2). In *Scops flammeola* (fig. 1) the feathering is continued rather beyond the extremity of the tarsus, and covers the basal joints of the anterior phalanges. The present bird is also remarkable for the round white spots which thickly cover its under plu-

mage. In *Scops flammeola* there are strongly marked longitudinal bars on the under surface, as in *Scops asio* and its allies.

Fig. B.

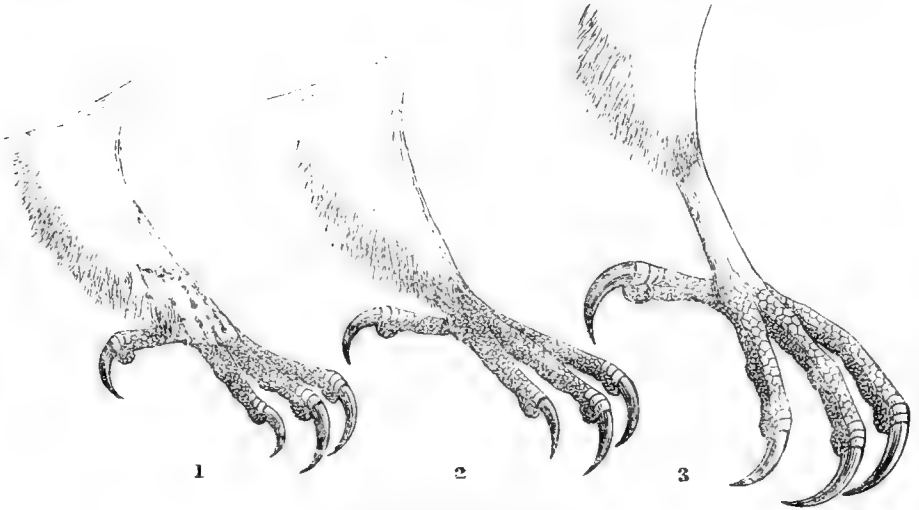


Fig. 1. Left foot of *Scops flammeola*.
 2. Left foot of *S. barbarus*.
 3. Left foot of *S. nudipes*.

We are acquainted with seven well-marked species of this genus in America, namely:—

a. *Digitis setosis*.

(1) *S. asio* (Linn.): Baird's B. N. A. p. 51, ex America septentr. universa.

(2) *S. kennicotti*, Baird, sp. nov., ex America bor.-occ.*

(3) *S. trichopsis*, Wagler, Isis, 1832, p. 276. *S. macalli*, Cassin. Ex Texas, Mexico, et Guatemala.

b. *Digitis omnino nudis*.

(4) *S. flammeola*, Kp., ex Mexico.

(5) *S. barbarus*, ex Guatemala.

(6) *S. brasilianus* (Gm.). *Strix choliba*, Vieill. *Strix crucigera*, Spix. Ex America meridionali tropica.

c. *Digitis cum tarsorum dimidio basali nudis*.

(7) *S. nudipes* (Vieill.). *Bubo nudipes*, Vieill. Ois. de l'Am. Sept. i. p. 53, t. 22. *Ephialtes nudipes*, Cassin, List of Owls. Ex Costa Rica (Arcé); Bogota (Cassin).

* We have lately had an opportunity of examining the type specimen of this new species, which has been sent to this country to be figured for Mr. Elliot's work on the 'Birds of North America,' now in progress. It is similar in form to *S. asio*, but is of larger size and more distinctly marked.

Mr. Salvin has lately received from Costa Rica a skin of a *Scops* which seems to be referable to this species. It is immediately distinguishable by its naked tarsus (see fig. 3).

We are not yet convinced of the validity of the following species:—

(1) *Scops atricapillus* (Temm.) Probably only a variety of *S. brasilianus*.

(2) *Scops ustus*, Sclater. Probably an hepatic variety of the same species.

(3) *Scops watsoni*, Cassin, (4) *Scops lophotes*, Less., and (5) *Scops portoricensis*, Less. Specimens of these species have not yet come under our observation.

4. SYRNIUM FULVESCENS, sp. nov.

Syrnium nebulosum, Scl. et Salv. Ibis, 1859, p. 221.

Supra chocolantino-brunneum, *fulvo transfasciatum et maculatum* : *disci facialis plumis albis, fulvo et nigro variegatis* : *alarum tectricibus minoribus in pogonio externo maculis rotundis albis distincte notatis* : *alis caudaque brunneis, fulvo transfasciatis* : *subtus fulvum, in pectore albicans, brunneo frequenter transfasciatum, ventre pallide fulvescenti-albido fulvo strigato, crisso immaculato* : *tectricibus subalaribus pallide fulvis* : *tarsis cum digitorum phalangibus primis dense vestitis, plumis fulvis nigricante punctulatis* : *rostro clare flavo* : *digitis nudis carneis* ; *unguibus nigris* : *long. tota 16, alæ 12·5, caudæ 7·3, tarsi 2·2.*

Hab. Guatemala.

Obs. Sim. *S. nebuloso*, sed crassitie minore, colore magis fulvo, et digitis nisi in summis phalangibus nudis dignoscendum.

The collection of Messrs. Salvin and Godman contains three specimens of this Owl from various parts of Guatemala; and we have met with other examples from the same country. We have hitherto confounded it with *Syrnium nebulosum*, but have recently convinced ourselves upon reexamination of its being quite distinct. In its more denuded toes it rather resembles the southern *S. hylophilum*. The fourth and fifth quills of the wing are nearly equal and longest. The ear-opercle is very well developed, as in *S. nebulosum*.

Mr. Gurney's collection contains a skin of this Owl, said to be from Mexico; so that the Mexican bird, hitherto referred to *S. nebulosum**, may possibly belong to this species.

We are acquainted with the following species of American Owls strictly referable to the genus *Syrnium*, which contains, according to our views, a series of large species without ear-horns, having the lower portion of the toes bare, the facial disk for the most part entire, and the operculum of the ear greatly developed. Species of Wagler's genus *Ciccaba* have been very much mixed up with those of this group. The presence or absence of the ear-opercle, however, is suf-

* Sclater, P. Z. S. 1858, p. 298.

ficient at once to indicate to which genus each species should be referred:—

- (1) *Syrnium cinereum* (Gm.): ex Am. bor.
- (2) *Syrnium nebulosum* (Forst.): ex Am. bor.-orient.
- (3) *Syrnium fulvescens*, nobis, ex Mexico et Guatemala.
- (4) *Syrnium rufipes* (King): ex terra Ignea (King).
- (5) *Syrnium hylophilum* (Temm.): ex Brasil.

Ulula fasciata, Des Murs, Ic. Orn. t. 37, probably the same as *Strix rufipes*, King, is only known to us from the plate; and *Syrnium occidentale*, Xantus, Pr. Ac. Phil. 1859, p. 193, we have not yet seen.

5. LEPTOPTILA PLUMBEICEPS, sp. nov.

Leptoptila rufaxilla, Scl. & Salv. Ibis, 1860, p. 402; Scl. P. Z. S. 1856, p. 309.

Supra læte brunnea, pileo toto plumbeo, antice albescentiore, postice violaceo tincto: subtus vinacea, gula et ventre toto cum crisso candidis: caudæ rectricibus quatuor mediis dorso concoloribus, lateralibus nigris albo terminatis: subalaribus castaneis: remigibus intus cinnamomeo-castaneis, remige externo et ceterorum apicibus plumbeis: rostro nigro: pedibus carneis: long. tota 10, alæ 5·5, caudæ 3·6, tarsi 1·1.

Hab. Prov. Veræ Pacis in rep. Guatemalensi, et Mexico.

Obs. Affinis *L. rufaxillæ*, ex Am. merid. sed pileo saturate plumbeo dignoscenda.

Mus. Salvino-Godmannico.

6. LEPTOPTILA CERVINIVENTRIS, sp. nov.

Leptoptila, sp.?, Salv. Ibis, 1861, p. 355.

Supra læte brunnea, cervice postica violaceo vix tincta: pileo antico albescente vinaceo induto: subtus cervino-cinnamomea, pectore plumbescente tincto, gula albicante: ventre superiore fumido-brunneo, hypochondriis obscurioribus, ventre imo cum crisso medialiter albis: caudæ rectricibus quatuor mediis supra dorso concoloribus: lateralibus nigricantibus, duabus aut tribus utrinque externis anguste albo terminatis: remigibus intus ad basin cum subalaribus castaneis: rostro nigro, pedibus læte carneis: long. tota 9, alæ 5·3, caudæ 3·4, tarsi 1·2.

Hab. Prov. Veræ Pacis in rep. Guatemalensi.

Mus. Salvino-Godmannico.

Sim. *L. cassini*, sed pectore dilutiore et vinaceo tincto et ventre summo saturate cervino differt.

We are acquainted with the following species of the genus *Leptoptila*, which may be easily distinguished from all other genera of *Columbidæ* (except *Peristera*) by the peculiar acumination of the outer primary. All of them have the under wing-coverts deep cin-

namomeous or chestnut, and the outer tail-feathers more or less terminated with white:—

(1) *Leptoptila jamaicensis* (Linn.); Bp. Consp. ii. p. 73, et Icon. t. 119. Ex ins. Jamaica. Mus. Brit.

(2) *L. albifrons*, Bp. Consp. ii. p. 74. *Perist. brachyptera*, Gray, MS. Ex Mexico et Guatemala. Mus. Brit. et S. & G.

(3) *L. verreauxi*, Bp. Consp. ii. p. 75. *Perist. brevipennis*, G. R. Gray, in Mus. Brit. Ex ins. Trinit. Venezuela, Nov. Granada, Panama, rep. Æquatoriali et Veragua. Mus. Brit. et S. & G.

(4) *L. rufaxilla* (Rich. et Bern.); Bp. Consp. ii. p. 73. Ex Guiana et valle Amazon. inf. Mus. Brit.

(5) *L. plumbeiceps*, sp. nov. Ex Vera Pace et Mexico.

(6) *L. erythrothorax* (Temm.); Bp. Consp. ii. p. 74. *Peristera macrodactyla*, G. R. Gray in Mus. Brit. Ex Guiana et Brasil. Mus. Brit. et S. & G.

(7) *L. cassini*, Lawr. Pr. Ac. Phil. 1867, p. 94. Ex Panama.

(8) *L. cerviniventris*, nobis, ex Guatemala.

We have not yet met with examples of *L. dubusi*, Bp.

2. Notice of *Macacus lasiotus*, a New Species of Ape from China, in the Collection of the Society. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

(Plate VI.)

Mr. Bartlett has brought to the British Museum for my examination and identification a large strong tailless male Macaque, which has just been imported from China in the 'Star of the Isles,' and added to the Collection of the Society. As the species is evidently new to science, I propose to name it *Macacus lasiotus*, and send the following short description, waiting until the animal can be more carefully examined after its death; for it is too fierce and unquiet to be closely observed or handled.

In the want of a tail, the square form of the rump, and the colour of the face it is much like the Magot (*Inuus ecaudatus*), or Tailless Ape of Africa; but in the colour of the fur, of the skin of the hinder part of the body, and in its general appearance it is more nearly allied to the Rhesus (*Macacus rhesus*) of Asia. Indeed it is very like a very fine large specimen of that group of Monkeys that has accidentally lost its tail; but the want of the tail is evidently a natural deficiency.



MACACUS LASIOTIS.







W. H. B. S. 1868.

PTEROMYIA SANDBACHII

J. MacGillivray

MACACUS LASIOTUS. The Hairy-eared Macaque. (Pl. VI.)

Tail none; ears ovate, prominent, exposed, covered with hair; fur yellowish olive, very minutely punctulated by the small sub-terminal yellow rings; of the rump and outer side of the thighs reddish; of the face, cheeks, chest, front of the shoulders, and under part of the body grey; the skin of the hinder part of the body near the callosities crimson; the crown covered with short erect or reflexed hairs, with a few blackish hairs projecting forwards over the eyebrows; the chest and under part of the body covered with abundance of hairs; skin of face whitish flesh-coloured, with a small red naked spot at the outer hinder angle of each eye; hand covered with hair, blackish.

Hab. China.

This fine Ape was presented to the Society on the 15th instant by Miss Charlotte Alice Winkworth, of 65 Gloucester Crescent, Regent's Park. Miss Winkworth received it from a relative in Shanghai, who sent the following account of the animal:—

“The Ape is about three or four years old, a fine male; he comes from the province of Szechuen, in China, and is probably the first conveyed home from the *interior* of China. In the winter he has a splendid coat of rich brown hair, very long and thick; and is very fierce and powerful.”

The canines are either not much developed, or they have been broken out, perhaps in some encounter with the wires of his den.

3. Observations on the Margined-tailed Otter (*Pteronura sandbachii*). By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

(Plate VII.)

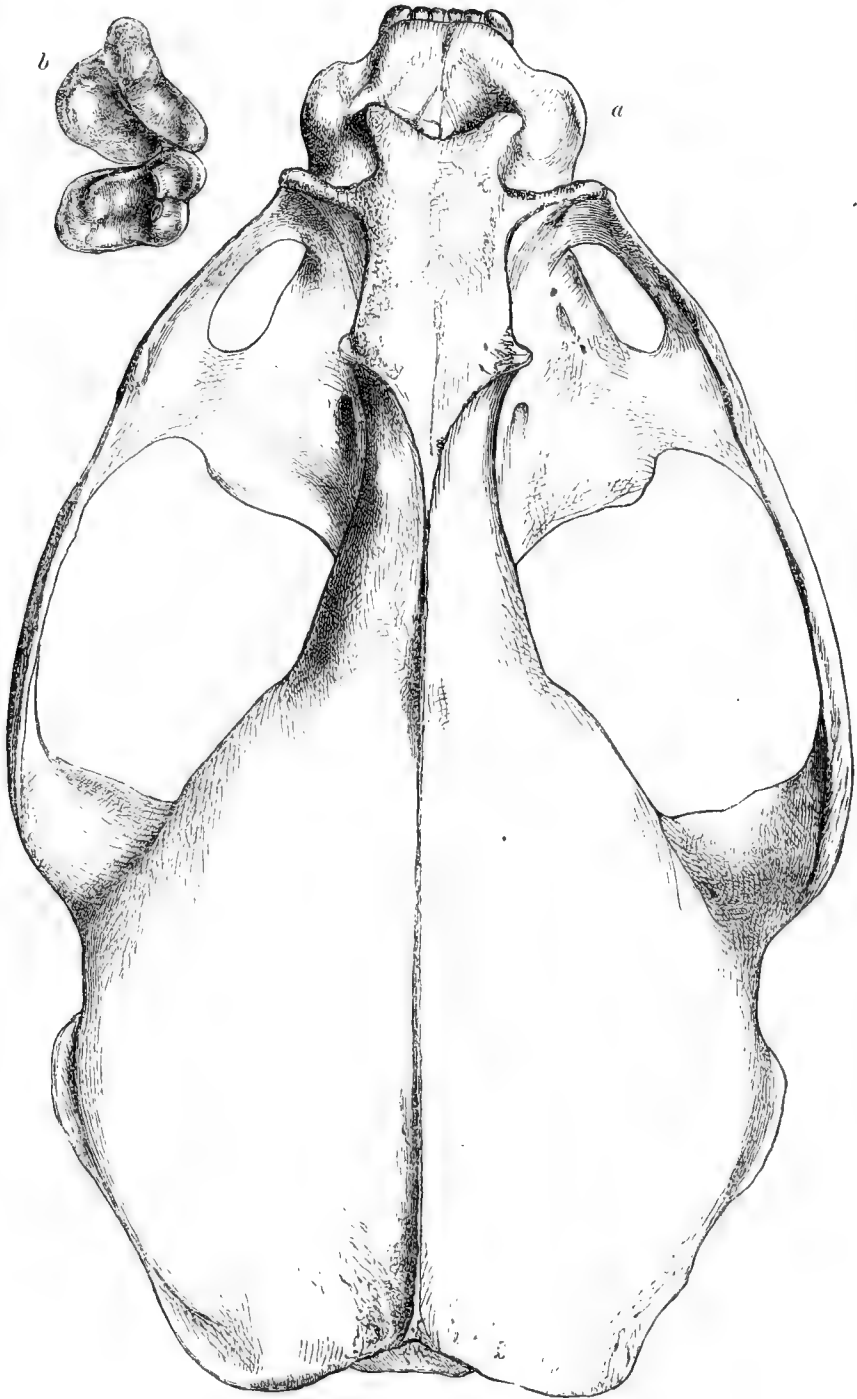
During the first visit of the British Association to Liverpool in 1837 I observed a depressed-tailed very large-footed Otter in the Museum of the Royal Institution of that town, which had been collected in Demerara by Mr. Edmondson, and presented to the Museum by my friend Mr. Sandbach. I brought it before the Natural-History Section, and named it *Pteronura sandbachii*.

A description of the specimen was published in ‘*Loudon's Magazine of Natural History*’ for 1837, i. 580.

Mr. Gould kindly made me a drawing of the specimen during the meeting, which was engraved, with some notes on the genus, in the ‘*Annals and Magazine of Natural History*’ for 1839, ii. 285, t. 14. This plate is copied in Wiegmann's ‘*Archiv*’ for 1838, p. 392, t. 10 (which did not appear until late in 1839).

Professor Wiegmann at first doubted the distinctness of the genus from *Euhadra*, but after he received the plate admitted that the genera were distinct. He proposed to alter the name of the genus from *Pteronura* to *Pterura*.

Fig. 1.



- a.* Upper surface of skull of *Pteronura sandbachii*.
b. Upper sectorial tooth and tubercular grinder of *P. sandbachii*.

Fig. 2.

Side view of skull of *Pteronura sandbachii*.

The Liverpool specimen has remained unique up to this time, and *Pteronura* was the only well-established genus of Mammalia wanting in the British-Museum Collection.

In the latter end of 1867 the British Museum received from Dr. Krauss the skins of a large female Otter and its cub, under the name of *Lutra brasiliensis*, which had been obtained in Surinam by Mr. Kappler.

As I had lately published a monograph of *Mustelidæ*, including the species of *Lutrinæ*, in the 'Proceedings of the Zoological Society' for 1865, these specimens were entered in the register, and put away for future examination. But the skin which Mr. Bartlett exhibited at the last Meeting having excited new interest as regards the specimens of Otters, the skins in store were examined, and it was soon seen that the Otter from Surinam was not the true *Lutra brasiliensis*, and was very nearly allied to, if not the same species as, the skin that Mr. Bartlett had exhibited. The specimen chiefly differs from Mr. Bartlett's skin in the tail being thick and strong, and convex on the upper and lower surface, nearly as in other Otters; so that the flatness of the upper and under surface of the prepared skin was doubtless produced by the preparation or dressing of it; and it was this excessive flatness that gave the tail such an artificial appearance. I believe that the tail of a Common Otter (*L. vulgaris*) might artificially be made to resemble the tail of that prepared skin. That there was considerable cause for scepticism I think is proved by the experiment that Mr. Bartlett himself made to see if the cord-like margins on the side of the tail were not artificially made, and would disappear in soaking and stretching.

As soon as I discovered the Surinam Otter I thought it ought to be compared with the one from Demerara. I therefore wrote to the Secretary of the Royal Institution of Liverpool to request that they would allow the specimen, which I originally described, to be sent to the Museum for me to examine it, and show it to the Zoological Society. He, most kindly and liberally, immediately granted my request, and, on a second application, allowed me to extract the skull of the specimen, in order that there might be no doubt on the subject of the specific identity, as there is a slight difference in the colouring of the throat, and also a very great difference in the size of the specimens.

A careful examination and comparison of the specimen has satisfied me that the Demerara and Surinam Otters are of the same species. The specimen in Liverpool, from Demerara, is a very young animal, with its milk series of teeth. The tail of the Demerara specimen has the same marginal ribs as the Surinam one; but in the preparation it has been too much depressed on the sides, and the sides also are artificially extended, giving it a fin like appearance, which induced me to give it the name of *Pteronura*. *Craspedura*, or margined-tailed, would have been a much more appropriate one. The bones have been almost entirely extracted from the skin of the feet, and they have been evidently flattened by the stuffer. The size and flatness of the feet in this specimen, which gave the animal so much

apparent relation to the Sea-Otters, do not exist in the unstuffed specimen from Surinam, which has large feet, with very strong toes united by a broad web extending to the end of the toes, and large acute claws, the feet being quite of the normal or usual form of the Otters', and having no more resemblance to those of the Sea-Otter or *Enhydra* than is the case in any of the other species of the genus.

The skull, which is very long and has sharply tubercular teeth, also shows that it is far removed from the very short, broad, square skull, with the very broad teeth with hemispherical tubercles, that is so peculiar to the Sea-Otter.

The Surinam specimen and the reexamination of the Demerara specimen and its skull enable me to give a revised character to the genus:—

PTERONURA.

Head depressed; ears hairy, small; muzzle entirely covered with hair. Fur very soft, short, with a fine short soft under-fur. Feet large and strong; toes 5.5, elongate, strong, widely webbed to the ends; toes on fore feet nearly equal, thumb smaller; the three outer toes of the hind feet are rather longer than the first toes, and the great toe a little smaller; claws large, compressed, acute; soles and palms bald to the heel, striated. Tail conical, tapering, rather depressed, covered with short hair, and furnished with a subcylindrical prominent ridge on each side; end more depressed, two-edged, and fringed at the tip. Teats four, abdominal. Skull elongate, rather high for an Otter; face very short; nose-opening large, nearly erect; nose with an oblong depression on each side near the orbits; orbits very incomplete, moderate, with a very large oblong aperture beneath the lower edge, and with an obtuse prominence in the front of the upper edge near the side of the nose; forehead shelving, flat, straight, sides over the orbits straight and short, triangular behind the very small conical supraorbital process; crown with a very narrow central ridge; brain-case very long, twice as long as the face to the back of the orbits, very narrow and compressed in front, broad and swollen behind; zygomatic arch very strong, broad, leaving a very large wide cavity beneath, infraorbital process slightly marked; the occipital end nearly erect, nearly twice as broad as high; the foramen magnum oblong, transverse; the upper edge of the foramen thick, concave, with two large roundish perforations close together in the upper part for the passage of two blood-vessels to the brain-cavity. Palate rather concave, narrowed behind, with a square hinder nasal opening. The four central cutting-teeth in each jaw moderate, equal, the outer larger and broader. The premolars conical; the front very small, on the inner side of the hinder edge of the base of the canine; two others conical, with distinct cingulum. The flesh-tooth large, with the inner lobe nearly as long as the outer edge, oblong, the front side being broadest. The last or tubercular grinder oblong, transverse, nearly twice as broad as long, with four distinct tubercles. The flesh-tooth of the lower jaw oblong, more than twice as long as broad, with three large anterior and one very large posterior lobes;

the hinder or tubercular grinder moderate, with a nearly circular crown.

PTERONURA SANDBACHII. (Pl. VII.)

Fur bright bay brown above and below; hairs all nearly of a uniform brown colour; lips and a large irregular patch on the throat and some spots on the side of the throat bright yellow.

Pteronura sandbachii, Gray, Loudon's Mag. N. H. i. 580, 1837; Ann. & Mag. N. H. ii. 285, t. 14, 1839.

Pterura sandbachii, Wiegmann's Arch. iv. 392, 1838 (published 1839).

Hab. Demerara (*Mus. Roy. Institution, Liverpool*). Young.

Length of adult female (a tanned skin in the possession of Mr. Bartlett), body and head 43, tail 24, = 67 inches. Throat with two bright yellow streaks and some yellow spots.

Var. kappleri.

B.M.

Bright golden brown above and below; hairs brown, with numerous white hairs intermixed; lips, chin, and an elongated streak on each side of the throat, which is dilated behind, and one branch of it extended up to the side of the chest, white.

Young duller, greyer; lips and throat spotted, white.

Lutra brasiliensis, Krauss, Mus. Stutgardt.

Hab. Surinam (*Kappler*).

The white hairs are better seen when the fur is examined by a hand magnifier.

Skull of adult:—Length 6, of brain-case from the back edge of the orbit $4\frac{1}{8}$, of the zygoma and orbit $3\frac{1}{2}$ inches; width at the zygomatic arch $3\frac{3}{4}$, at the back of ear-opening $3\frac{1}{8}$ inches; height of skull and lower jaw $2\frac{3}{4}$ inches. The skull of the young specimen chiefly differs from that of the adult in the space between the orbits and masseter muscles being thicker, and in the supraorbital process before the upper hinder edge of the orbit not being developed. These are the usual characters of the skulls in young animals.

The complete hairiness of the nose at once shows that it is not *Lutra brasiliensis*, as Dr. Krauss named it, which is the type of the genus *Lontra*.

It is probable that there is another species of this genus, which has been described under the name of *Lutra solitaria*, Natterer. It was obtained by that enterprising traveller and collector at Ypanema, in Brazil, and is described as "chestnut-brown, and dirty white beneath."

4. On the Morbid Appearances observed in the Walrus lately living in the Society's Gardens. By JAMES MURIE, M.D., Prosector to the Zoological Society. With a Description of a New Species of *Ascaris* found in the Stomach; by Dr. BAIRD, F.L.S.

In 1853 the Society obtained a very young Walrus (*Trichechus rosmarus*, Linn.), which specimen unfortunately only lived some few days after its arrival. From that time up to the 1st of November last (1867) no opportunity has offered of adding another example of this exceedingly interesting animal to the collection. When, therefore, a tolerably well-developed, although still young, male Sea-Horse was reported to have arrived safely in the Gardens, the curiosity of the Members of the Society and the public generally naturally was aroused. Notwithstanding the inclemency of the weather, the number of visitors was great.

The proper food of the Walrus in a state of nature has been variously stated by different naturalists. Some assert it to be a vegetable-eater; others believe it to be entirely carnivorous; while a third notion has gained ground, that it may occasionally partake of food of the one kind or the other.

Our Superintendent, therefore, under these circumstances felt a difficulty in deciding what might be the best food to give the creature so as to retain it in as good health as possible. The results of his experiments concerning suitable diet he has himself laid before the Society's Meetings on a previous occasion. I shall just reiterate his conclusions, namely:—It refused every kind of seaweed offered, but it greedily gulped up the soft bodies of *Mya truncata* and *M. arenaria*, which were its principal food, besides quantities of whelks, mussels, fish cut up in small strips, and the viscera of fish, these last, however, having previously been well washed and cleaned.

It may be remarked that the young Walrus dissected by Prof. Owen in 1853 had been fed during its captivity on oatmeal, milk, and water. The specimen at present under consideration, when first captured, and on shipboard, had also received a certain allowance of the above, along with strips of fat pork.

I have taken notice of the animal's food for the purpose of directing attention to the question, Whence were the ova of the Entozoa obtained that ultimately led to the Walrus's death?

At the period of arrival in the Gardens the Walrus looked thin and lean; there was an amount of loose skin, however, which indicated that better regimen than that which he had lately been under would soon render the body plump and comparatively free from the very numerous skin-folds. These wrinkles, it may be observed, in several places met each other, so as to form a series of elongated diamond-shaped enclosures.

It was early noticed that the conjunctivæ were suffused and injected with blood; this gave the eyes a disagreeable appearance.

The animal also at times chattered or rattled his teeth together in a very remarkable and noisy manner. This last habit, however, was put down to temper, or as a sign of hunger; the sanguineous effusion to a cold received during transport.

After the lapse of a few weeks it would seem that the body and limbs acquired more vigour; for the gait became altered, so that in walking on all fours, Sea-Bear fashion, the abdomen and chest were raised from the ground, whereas at first the animal rather trailed or draggled along than walked. This showed that the animal was growing stronger in body, an equivalent in some measure to improvement in health. It was noticed all the while that it remained emaciated, and did not increase in stoutness or otherwise become fatter, although the quantity of food it consumed was enormous. The ravenousness of its appetite was something extraordinary, and many thought that the animal was underfed.

The Walrus thus was considered by every one who saw it to have had apparently uninterrupted health till Monday the 16th December. On that day the keeper first began seriously to apprehend that the animal was out of order—as he thought, constipated; but meanwhile it did not refuse food.

On Mr. Bartlett being consulted, he proposed to give it some oily substance which might act as a purgative. One pound and a half of horse-fat cut in strips was therefore given the afternoon following. The next morning there were copious alvine evacuations. What passed at first was hard, black, and fetid; but the excretions became moister, though still very dark-coloured.

When this occurred it was thought relief was obtained and that the animal would go on well. It did not seem, however, to rally, but died rather suddenly on Thursday the 19th.

The body was examined by me a day afterwards, and disclosed unusual conditions.

Not a particle of subcutaneous fat was present, and the mesentery and other abdominal parts usually containing fatty substances were equally destitute of such.

The viscera of the thorax and abdomen, with the exception of the interior of the stomach, appeared quite sound. The brain was also normal in structure*.

* When the brain was taken out, its general appearance and firmness of texture, as implied above, was that of health. As it was desired for anatomical investigation, it was not then cut into or interfered with further than cursory examination permitted. At one point it was noticed that unusual vascularity existed; but as the diseased condition of the stomach was thought sufficient of itself to account for death, no great attention was then paid to this superficial cerebellar congestion. Subsequent examination showed, however, that upon the upper surface of the cerebellum (between the posterior cerebral lobes) and underneath the injected pia mater an abscess had begun to be formed. The brain-substance immediately underneath was very slightly softened, but around it was quite firm; the morbid deposit and infiltration had chiefly implicated the pia mater over the superior vermiform process. Whether this lesion was the more immediate cause of death, and not the ulcerated condition of the stomach, is an open question. Some of the symptoms during life might, indeed, be referred to it.

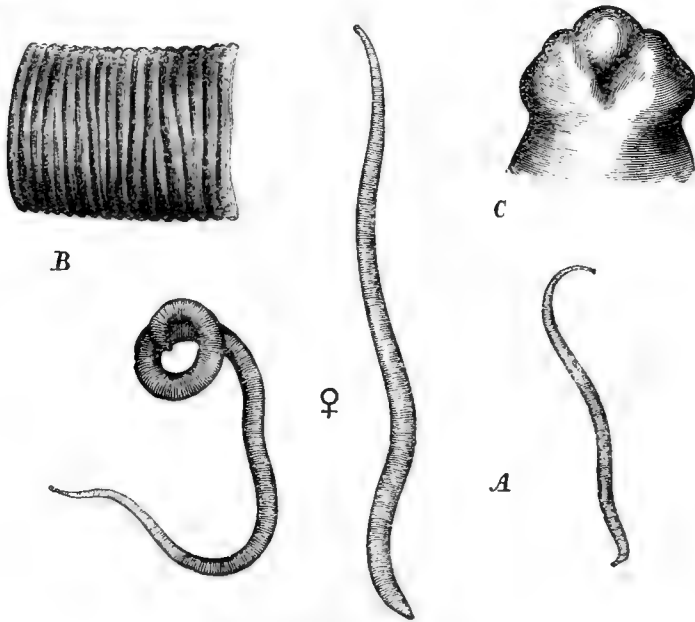
On opening the stomach, which was of moderate size, I was much surprised to find that it contained small round Worms, a species of *Ascaris*, in such quantities that, when these were turned out, there was altogether about half a pailful. They occupied the entire interior of the viscus, but were in greatest abundance at the bend of the peculiar siphon-like stomach.

The Entozoa swarmed between the rugæ, and in many cases were firmly attached to the membrane. The mucous membrane lining the interior was of an intense red hue; but here and there were somewhat paler patches. More rigid examination showed that these last were extensive ulcerations, the mucous membrane being entirely eroded, and only the muscular and a very thin lining of submucous tissue remained, preventing perforation of the walls of the stomach. The chief ulcerations were some four in number, and varied in size and situation.

One, nearly circular, $\frac{3}{4}$ of an inch in diameter, occupied the anterior wall at a distance of between 5 and 6 inches from the cardiac end. Another, somewhat diamond-shaped, $2\frac{1}{2}$ inches by $1\frac{1}{2}$ at widest, also existed on the anterior wall of the viscus and about its middle. In this ulcerated erosion, the mucous coat was in some parts so excavated underneath as to leave $\frac{1}{2}$ inch of an overhanging lappet of membrane. On a section being made vertically, the submucous tissue was seen to be absent, the muscular and serous coats alone preventing perforation of the wall. At this part the wall of the stomach had a thickness of only 0·1 of an inch, although it seemed as if the muscular fibres were slightly increased in numbers here, possibly from the effects of the irritation going on in the neighbourhood and within. A third ulcer, of an elliptical form, $2\frac{1}{4}$ inches long, and with more regular edges than the preceding, had been eaten away on the anterior wall, close to the lesser curvature of the stomach and between 5 and 6 inches from the pylorus. Between the second and third erosions here described, but upon the posterior wall of the stomach, another very extensive patch of ulceration had taken place. This ulcer stretched between the greater and lesser curvatures. It had a semilunar figure, was rather more than 4 inches long, possessed irregular borders, and varied from half to one inch in width. The mucous coat around had been undermined in a manner similar to that described above as occurring in the second ulcer. To the right and lying parallel with this large excavation were a series of small circular and ovoid spots, which had been eroded in like manner with those already described. The spots just spoken of varied in size from about a threepenny piece to a shilling, and they evidently were fast running into one single long ulcer, resembling that upon their left side. Only a very few Worms were found here and there in the intestinal tract; some were observed to have passed previously to the horse-fat having been given.

Dr. Baird, of the British Museum, having examined some of the Entozoa, considers them new to science, and sufficiently different to require a new specific name. He has proposed, therefore, that of *Ascaris bicolor*, on account of a peculiarity common to most of

them,—viz. that the posterior half of the body is more or less of a reddish or pinkish hue, the remaining segment being pale-coloured. I myself incline to the opinion that this coloration may not be of a specific kind, but due in some measure to the intensely congested condition of the stomach and sanguineous nature of the food. The accompanying figures I have had drawn under my supervision; and Dr. Baird is pleased to consider them a faithful delineation.



Ascaris bicolor, Baird.

- A. Three female specimens, of about the natural size; that to the left shows the manner in which occasionally the caudal end is found coiled up. B. Portion near the middle of the body, enlarged so as to display the transverse striations and how some of them interdigitate. C. Magnified view of the head and labia.

There still remain two points worthy of consideration—viz. the cause of death, and whence the Entozoa were derived.

1. Death seems to have resulted from the ulceration of the stomach. It is not clear, though, why the animal should have succumbed so suddenly. Literally speaking, these ulcerations were so extensive that it is curious the animal should have survived so long. The chronic stage of the ulceration alone accounted for this. This instance is one exemplifying pure chronic gastritis, due, no doubt, to the presence in such numbers of the Entozoa.

2. It has been said by some parties that the Entozoa were possibly derived from food given to the Walrus after its arrival at the Gardens; but there are many reasons against this being a likely circumstance. In the first place, the fact of the Entozoa being a new species peculiar to the Walrus militates against the above assertion.

Again, the ulceration apparently took a longer period to attain the chronic stage extant than the few weeks' residence of the Walrus in the Gardens would account for. Furthermore, the nature of the food given at the Gardens, and the care and regularity with which it was examined, make it unlikely that such swarms of Entozoa were derived from it and developed in so short a period.

Whether the Entozoa had been derived from the food given on board ship, or in what manner they had originally reached the stomach of the Walrus, are questions which I am quite unprepared to answer; and speculation leaves the matter quite as undecided.

Dr. Baird has furnished the subjoined description of this *Ascaris*, which proves to belong to a new species.

ASCARIS BICOLOR, Baird.

Head naked; labia distinct, prominent, rounded, and of moderate size. Both anterior and posterior portions destitute of alæ or wings. Body of worm cylindrical, attenuated anteriorly, of a brownish colour, except at the anterior extremity, which is white; the posterior extremity is sometimes red. The surface of the body is beautifully and minutely but distinctly striated across; as seen under the microscope (with a power of two-thirds of an inch), the striæ on each side terminate in such a manner that the edges of the body appear as if serrated. Caudal extremity thicker than anterior, obtuse, and generally convoluted.

A great many specimens were found in the stomach; but apparently all were females.

The *Ascaris simplex* of Rudolphi, found in the stomach of the Porpoise (*Phocæna communis*), very nearly approaches this species in general appearance and size, but differs from it in several respects.

The *Ascaris bicolor* is *less attenuated* at the anterior extremity than the *A. simplex*, and is *destitute* of alæ or wings equally at the *posterior* and at the *anterior* extremity. The striations on the surface of the body are much finer, and the labia or valves at the mouth are more distinct and larger.

Length from $2\frac{1}{2}$ to 3 inches; breadth from 2 to $2\frac{1}{2}$ millimetres.

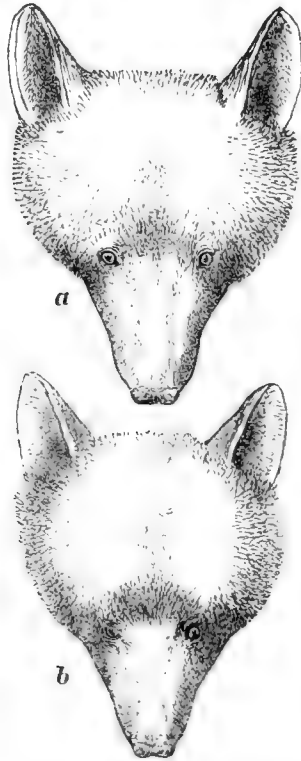
Hab. Stomach of a young male Walrus (*Mus. Brit.*).

February 13, 1868.

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

Mr. P. L. Sclater called attention to a Bear recently added to the Society's Menagerie, which appeared to be distinct from every recognized species. In general appearance it somewhat resembled the American Black Bear (*Ursus americanus*), but differed in its finer fur, larger and less densely clothed ears, pale brown muzzle, and white crescent-shaped mark on the chest, which was connected with

the brown chin by an ill-defined brown line. The shape of the muzzle was also much sharper and more prolonged than in *U. americanus*, rendering the distance between the eye and the point of the nose comparatively greater, as was shown by sketches of the heads of these two animals.



a. Ursus nasutus. b. Ursus americanus.

The specimen had been purchased of a dealer at Liverpool, and was stated to have been brought from the West Indies. It was probably from some part of the South-American Continent. The only generally recognized South-American Bear was the Spectacled Bear (*U. ornatus*), figured in Geoffroy St.-Hilaire and F. Cuvier's 'Hist. Nat.' (ii. t. 218), which was known by the brown spectacle-like markings on the forehead, and had a short broad nose. Tschudi had described a second species, from Peru*, which, however, did not seem at all to resemble the present animal. But it was very possible that the Venezuelan Bear, described by Sir R. Ker Porter, in a communication made to this Society on the 22nd of October, 1833†, might refer to it, as the description and presumed locality alike agreed with it.

* *Ursus frugilegus*, Tsch. F. P. Mamm. p. 90, characterized as "*supra nigro-fuscus concolor, subtus brunneus.*" Dr. Gray, in his lately published revision of the *Ursidæ* (P. Z. S. 1864), seems to have altogether overlooked this species.—P. L. S.

† See P. Z. S. 1833, p. 114.





JWolf lith

URSUS NASUTUS

M & N Hanhart imp.

Mr. Sclater proposed the temporary name of *Ursus nasutus* for this Bear, until its characters could be more completely determined from an examination of its osseous structure, and exhibited a drawing of it by Mr. Wolf (Pl. VIII.).

In concluding his remarks, Mr. Sclater submitted the following list of the Society's living collection of species of the genus *Ursus*, which was stated to consist of *nineteen* individuals:—

1. *Thalassarctos maritimus*. Female, purchased September 28th, 1846.

2. *Ursus arctos*. Presented by Capt. W. Beauchamp Seymour, R.N., C.B., October 18, 1864; said to be from Japan.

3. *U. arctos*. Received in exchange, February 7, 1866.

4. *U. syriacus*. Female, purchased April 4, 1851.

5. *U. syriacus*. Male, presented by E. T. Rogers, Esq., H.B.M.'s Consul at Damascus, September 21, 1864; from Syria.

6. *U. piscator*. Presented by W. Scott Stonehewer, Esq., September 14, 1867. See P. Z. S. 1867, p. 817.

7. *U. piscator*. Deposited, January 23, 1868.

8. *U. tibetanus*. Female, presented by W. H. Russell, Esq., F.Z.S., October 7, 1859. From India.

9. *U. tibetanus*. Presented by H. O. Hebler, Esq., 6th Regt. Foot, September 19, 1864. From India.

10. *U. tibetanus*. Presented by Robert Swinhoe, Esq., September 24, 1867. From Formosa. *U. formosanus*, Swinhoe. See P. Z. S. 1867, p. 818.

11, 12. *U. japonicus*. Two females, purchased April 1, 1863.

13. *U. americanus*. Presented by Capt. D'Arcy, R.N., November 22, 1864.

14. *U. americanus*. Deposited, March 1, 1866.

15. *U. americanus*. Presented by Capt. David Herd, H.B.C.S., C.M.Z.S., November 8, 1866. From the Hudson's Bay Territory.

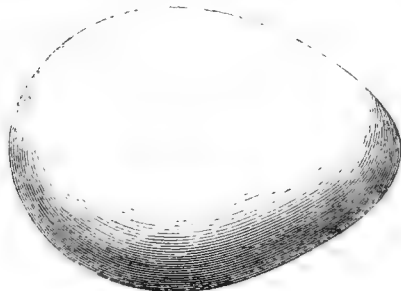
16. *U. nasutus*. Purchased, January 28, 1868.

17. *U. malayanus*. Purchased, March 12, 1863.

18. *U. malayanus*. Presented by T. Paudorf, Esq., September 14, 1867.

19. *Melursus labiatus*. Purchased, October 21, 1865.

Mr. Sclater exhibited a specimen of the egg of the Guacharo (*Steatornis caripensis*), which had been taken from one of the caves



inhabited by this bird in the island of Trinidad, and presented to him by the Hon. Arthur Gordon, C.M.Z.S., Governor of the island.

The egg was elliptical in shape and pure white in colour, the larger axis measuring 1·7 inch, and the smaller 1·2.

The following papers were read:—

1. On Two New Australian Birds.

By JOHN GOULD, Esq., F.R.S.

One of the many results which attend the progress of colonization over the great country of Australia is the bringing to light of new species in every department of zoological and botanical science. Whether the explorer proceeds towards the centre of this vast region, or in the direction of the as yet but little-known northern coast, some new bird is sure to be brought under our notice; and thus, through the exertions of the earlier settlers and the zeal of public officers, Northern Queensland has yielded many fine species previously unknown, some of greater interest than others. That the supply from this quarter is not yet exhausted seems evident from the fact that we rarely examine a fresh collection thence without finding therein either a new species or a specimen in such a state of plumage as to induce an anxious desire to see an example of it in its full beauty. The next collection that arrives probably adds something to our knowledge of the subject; and a third furnishes us with all we desire respecting it. For some years past I have been treasuring up all the specimens I could obtain of the little Bronze Cuckoo of Cape York, under the impression that it would ultimately prove to be distinct from the species of the same form inhabiting New South Wales, Western Australia, and Tasmania; and I have now before me four, exhibiting a uniformity of characterization which distinguishes them from all their congeners, however closely allied. To the unpractised eye they would appear to be identical with one or other of the previously described species; and a cursory observer might suppose that the Australian members of this genus are identical with those inhabiting the islands to the northward of that country. This, however, I venture to say, is not the case, and I shall here point out in what particulars the bird from the Cape-York peninsula differs from the rest. In size it is rather smaller than the one or more inhabiting the southern coast of Australia, but at the same time has a stouter bill, in which respect it somewhat resembles the Port-Essington *Chrysococcyx minutillus*; it differs, however, from that and every other species in the rich buff colouring of the under surface of the wings or the basal portions of the primaries. Moreover a rufous tint pervades the upper surface; and the rufous hue of the tail is of a deeper colour, all the feathers, except the two central ones, being of a rich rusty fawn-colour, and the outer one on each side only marked

with spots or bands of black and white; a similar mark of black and white also occurs on the tips of the three other lateral feathers. In some individuals (probably immature) the feathers of the scapularies are indistinctly barred near the shoulder with the bronzy green and buff seen in some of the extra-Australian species of the genus, but which I have not observed to exist in any other examples from that country. It would not have been necessary to give such minute details respecting this little Cuckoo, were it not most difficult to diagnose the members of this genus of parasitic birds, respecting which we have yet much to learn, particularly with regard to the colouring of their eggs, which are frequently totally different from each other and from those of the *Maluri*, *Acanthisæ*, and other birds in whose nests they are deposited. The young, too, are most puzzling; for they do not appear to follow the law which obtains in the young of the true Cuckoos (genus *Cuculus*), and, instead of being strongly barred like them, they are coloured uniformly, the outer tail-feathers only being barred with black and white.

Not having the opportunity or sufficient materials at hand to clear up these points, I have requested Mr. Ramsay of New South Wales to investigate those of the southern coast; and he will doubtless be most accurate in his statement as to the period when the throat and under surface becomes barred. That this takes place very soon after the birds leave the nest appears to be certain; at least I have specimens now before me which justify such an opinion. Has not my friend Professor Schlegel described a little Cuckoo in this state? And if so, has he not been deceived by the unusual state of plumage?

The specific appellation I propose for the Cape York *Chryso-coccyx* is *russata*, from the rusty hue of the under surface of the primaries.

Besides the Bronze Cuckoos, many of the birds of the Cape-York district differ from allied species inhabiting other parts of Australia; I may instance the *Maluri*, the *Meliphagæ*, &c. There also we find a beautiful and apparently very common *Pitta*, closely assimilating in colour, but in colour alone, to the *P. strepitans*; and I seldom receive a letter from my ornithological friends in Australia in which inquiry is not made as to whether it has been named. By more than one have I been favoured with the opinion that it is distinct from its near ally; yet up to the present time no specific appellation has, I believe, been assigned to it.

Having lately had a great number of specimens forwarded to me which all agree in being of a smaller size and in having the under surface of a deeper buff, I propose, notwithstanding the opinion given in my 'Handbook,' to characterize it as distinct, and at the same time to assign to it a name (*simillima*) which shall mark its affinity to the older known species. It would be interesting to ascertain the exact range of the two birds, and at what part of Australia they inosculate. One thing is certain; no example of *Pitta simillima* has yet been found in the brushes of New South Wales, where, on the other hand, the *P. strepitans*, which has never been found at Cape York, is abundant.

CHRYSOCOCCYX RUSSATA, Gould.

Head, all the upper surface, and wings pale shining rusty bronze ; under surface white, crossed by numerous bands of bronzy brown ; a wash of rufous across the breast, most apparent or defined on the sides in front of the shoulders ; under wing-coverts barred like the breast ; base of the primaries and secondaries deep fawn-colour ; tail deep rufous, the two centre feathers glossed with bronze, the lateral feather on each side with three double spots, the upper half black, in the form of a crescent, the lower round and white, a similar spot on the tip of the inner web of each of the next three feathers on each side, but with the white greatly diminishing as they approach the centre ; bill black ; legs and feet olive.

Total length $5\frac{3}{4}$ inches, bill $\frac{5}{8}$, wing $3\frac{1}{2}$, tail $2\frac{5}{8}$, tarsi $\frac{1}{2}$.

Hab. Cape-York district of Queensland, Australia.

PITTA SIMILLIMA, Gould.

Crown deep ferruginous, with a narrow stripe of black down the centre ; on the chin a large spot of black, terminating in a point on the front of the neck, uniting with a broad band on each side of the head, encircling the crown and terminating in a broad rounded point at the base of the neck ; back and wings pure olive-green ; shoulders and lesser wing-coverts bright metallic cerulean blue ; across the rump a band of the same colour ; upper tail-coverts and tail black, the latter tipped with dark olive-green ; primaries black, becoming paler at the tip ; near the base of the fourth, fifth, and sixth a small spot of white ; sides of the neck, throat, breast, and flanks buff ; on the centre of the abdomen a patch of black ; vent and under tail-coverts scarlet ; irides dark brown ; bill brown ; feet flesh-colour.

Total length $7\frac{1}{4}$ inches, bill $1\frac{1}{8}$, wing $4\frac{3}{8}$, tail $1\frac{3}{4}$, tarsi $1\frac{1}{2}$.

Hab. Cape-York district of Queensland, Australia.

2. Monograph of the Species of Worms belonging to the Subclass *Gephyrea* ; with a Notice of such Species as are contained in the Collection of the British Museum.
By W. BAIRD, M.D., F.R.S., F.L.S., &c.

(Plates IX., X., XI.)

Subclass GEPHYREA*.

Gephyrea, Quatrefages, Ann. des Sciences Nat. 3rd ser. Zool. tom. vii. p. 340, 1847 ; Hist. Nat. des Annelés, Annélides et Géphyréens, tom. ii. pt. 2. p. 563, 1865 ; Ehlers in Zeitschrift für wissenschaft. Zool. Band xi. Heft 2. p. 205, 1861.

Rhynchodea, suborder *Proctucha*, tribe *Sipunculidea*, Diesing, Syst.

* γέφυρα, bridge.

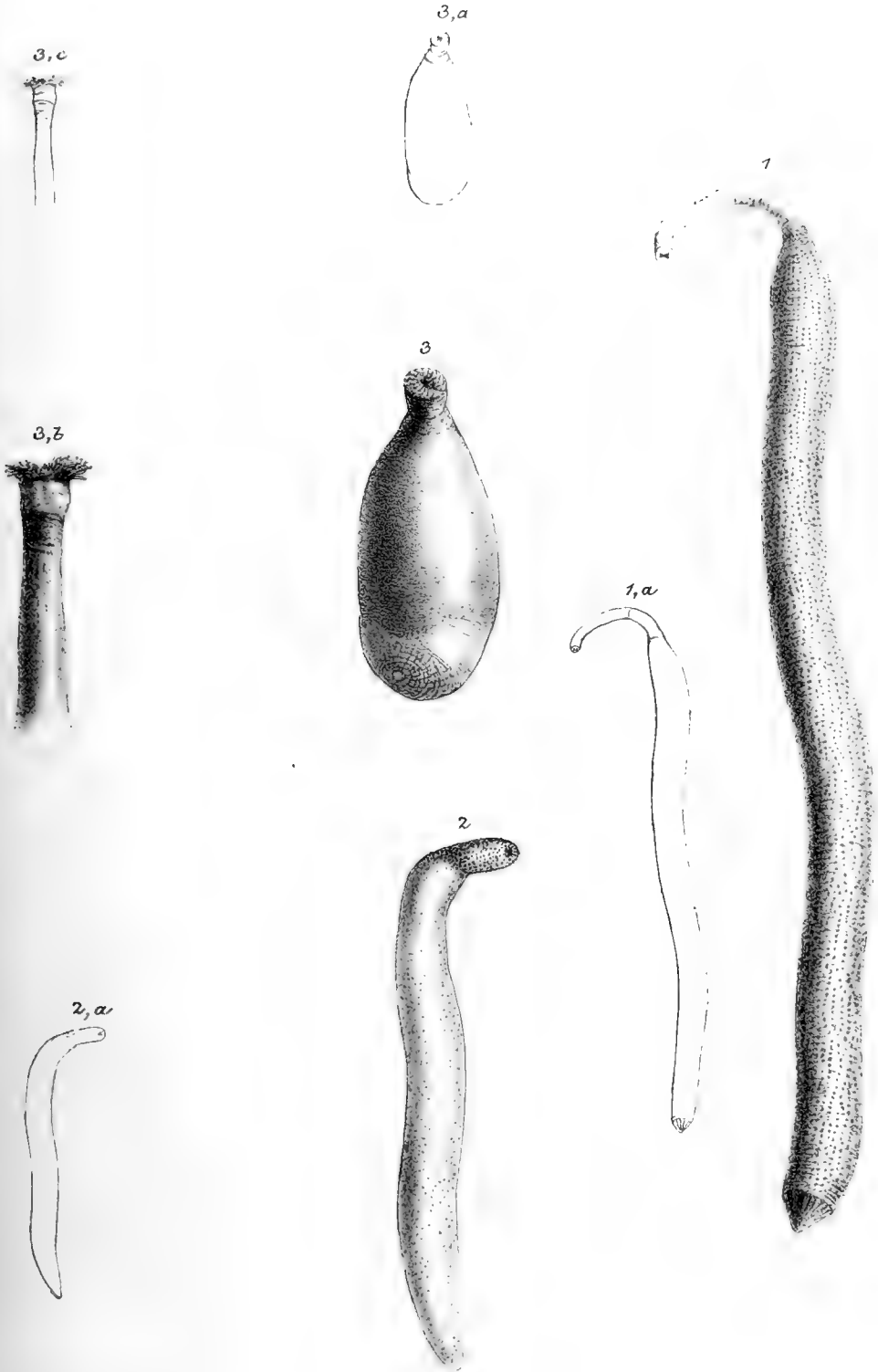


R. Minter and Th. ad. nat.

W. West imp.

New species of Gephyrea.



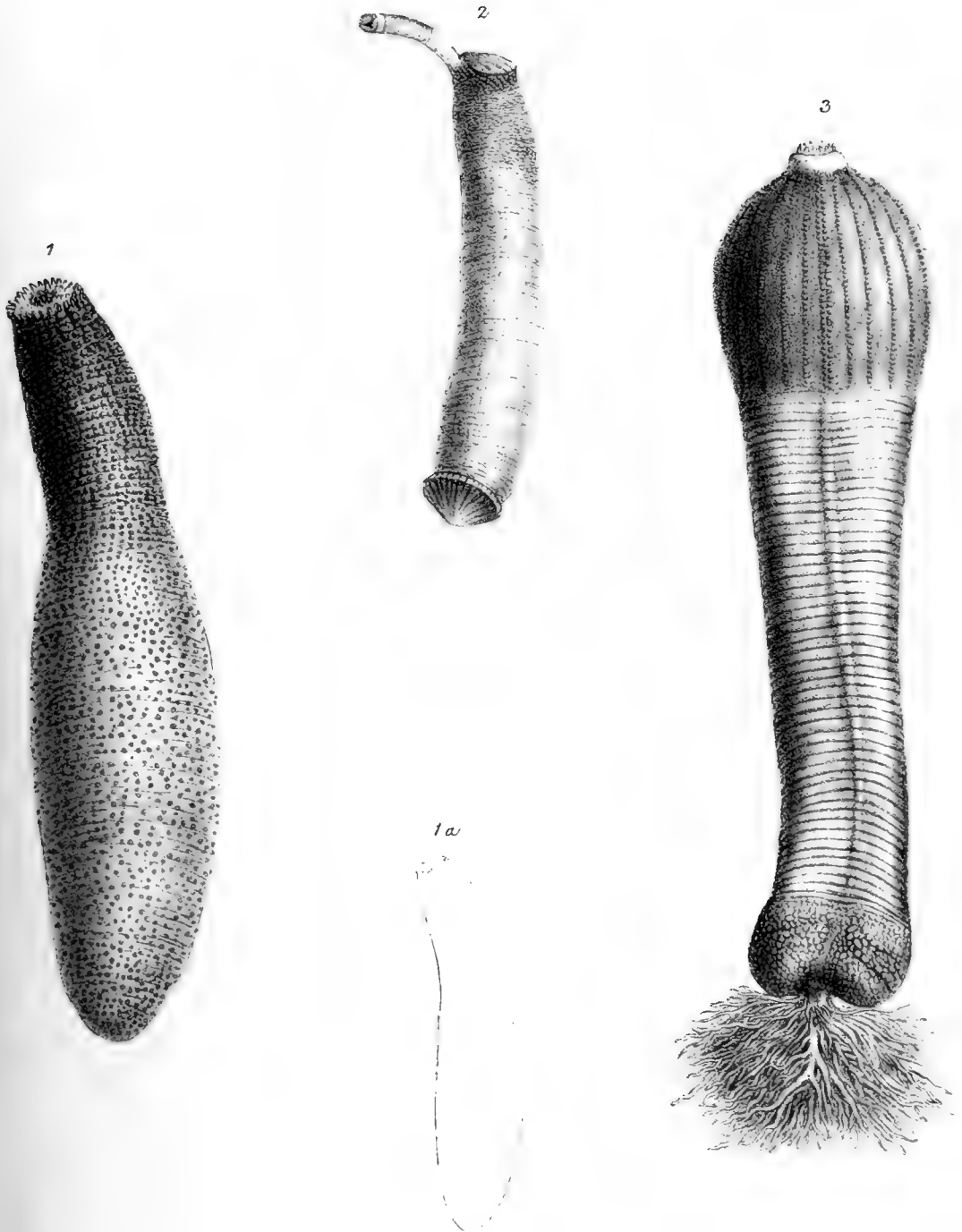


R. Minter lith. ad. nat.

W. West imp.

New species of Gephyrea.





R. M. Waterhouse del. nat.

W. Westrup.

New species of Gephyrea.



Helminth. tom. ii. p. 59, 1851; Revis. der Rhyngod. in Sitzungsberichte der kaiserlichen Akad. der Wissenschaft. Band xxxvii. p. 751, 1859.

Order I. GEPHYREA INERMIA.

Gephyrea inermia, Quatrefages.

Sipunculidea acrostomata, Diesing, Revis. der Rhyngod.

Sipunculida, Keferstein.

Family I. SIPUNCULIDÆ.

Sipunculea, Quatrefages, 1865.

Sipunculacea, Brandt, 1835; Keferstein, 1865.

Eusipunculidea, *Evaspidosiphones*, Diesing, Revis. der Rhyngod. 1859.

Anoteroprocta, *Baseoprocta* (pars), Diesing, Syst. Helminth. 1851.

Genus I. SIPUNCULUS.

Sipunculus, Linnæus, Blainville, Lamarck, Cuvier, Grube, Diesing, Quatrefages, Keferstein, &c.

Syrinx, Bohadsch, Forbes (pars).

Lumbricus, sp., Pallas.

1. SIPUNCULUS NUDUS.

Vermis microrhynchoteros, Rondeletius, Gesner De Vermib. Aquatilibus, liber iv. p. 1226. fig. superior, 1558.

Vermis macrorhynchoteros, Rond. Gesner *l. c.* fig. infer.*

Syrinx, Bohadsch, De quibusd. Animalib. Marinis, pp. 93–95, t. 7. f. 6, 7, 1761.

Sipunculus nudus, Linnæus, Syst. Nat. 12th edit. p. 1078, 1766; Pennant, British Zoology, vol. iv. p. 31, t. 20. f. 10 (bad), 1777; Barbut, Genera Vermium, p. 16, t. 2. f. 3, 1783†; Gmelin, Linn. Syst. Nat. vi. p. 3094 (synon. Martin exclud.), 1789; Lamarck, Système des Anim. sans Vertèb. p. 352, 1801, Hist. Nat. An. s. Vertèb. 1st edit. iii. p. 78, 1816, 2nd edit. iii. p. 469, 1840; Turton, Brit. Fauna, p. 128, 1807; Schweigger, Handbuch der Naturg. p. 553, 1820; Martens, Fauna Veneta, in Reise nach Venedig, Theil ii. p. 523, 1824; Blainville, Dict. des Sc. Nat. art. *Sipunculus*, tom. xlix. p. 309, and art. Vers, lvii. p. 554, Atlas, t. 31. f. 1, 1a, 1827; Leuckart, Brev. Animal. quorund. descriptiones, pp. 20, 21, t. 1. f. 3, 1828; Fleming, British Animals, p. 491, 1828; Costa, Faun. del

* The two worms figured by Gesner, in the work quoted above, appear to me, without doubt, to represent the same species, only in different states of preservation in spirits. I have equally little doubt that they are identical with the *Syrinx* figured by Bohadsch, and that the two species given by Linnæus in the 'Systema Naturæ,' *S. nudus* and *S. saccatus*, are only different states of the same species, as has been pointed out by Cuvier and others.

† The figure of *S. nudus* given by Barbut in the work quoted above is very bad and does not well represent this species; but the description appended to it is very good. The figure given by him of the *S. saccatus* is copied from Bohadsch, and refers to this species.

Regn. di Napoli, p. 4, t. 1. f. 9, 1832?; Grube, Müller's Archiv für Anat. 1837, p. 237, t. 10. f. 1; Krohn, Müll. Archiv, 1839, p. 348; Grube, Actin. Echinod. Würm. Adriat. p. 43, 1840; Diesing, Syst. Helminth. ii. p. 60, 1851; Revis. der Rhyngod. l. c. p. 756, 1859; Keferstein, Beitr. z. Anat. der Sipunculoid. in Nachricht. königl. Gesellsch. der Wissenschaft. zu Göttingen, p. 196, 1865; Zeitsch. für wissenschaft. Zool. 1867, p. 45; Quatrefages, Hist. des Annelés, l. c. p. 614, 1865.

Sipunculus reticulatus, Martin, Observ. on Marine Vermes, &c., p. 6, t. 1. f. 3, 1786.

Syrinx tessellatus, Rafinesque, Précis des découvertes, p. 32, 1814.

Sipunculus tessellatus, Keferstein, l. c. p. 196, 1865.

Sipunculus balanophorus, Delle Chiaje, Mem. sull. Stor. e Notom. Animal. s. Vertebre, tom. i., sur la Notom. e la Classificaz. del Sipunc. Nud. p. 22, t. 1. f. 1-7, 1823.

Syrinx nudus, Forbes, Brit. Starfishes, p. 245. fig., 1841.

Sipunculus saccatus, Barbut (not Linn.), Genera of Worms, p. 18. t. 2. f. 4, 1783 (figure copied from Bohadsch); Turton, British Fauna, p. 128, 1807.

Hab. Mediterranean; British seas; Weymouth and Devonshire (*Mus. Brit.*); ? American seas; (*Keferstein*). B.M.

2. SIPUNCULUS PHALLOIDES.

Lumbricus phalloides, Pallas, Spic. Zool. tom. i. fasc. 10. p. 12, t. 1. f. 8, 1774.

Sipunculus phalloides, Blainville, Dict. Sc. Nat. art. *Sipunculus*, tom. xlix. p. 311, 1827, Atlas, t. 32. f. 1 (copied from Pallas); Diesing, Syst. Helminth. ii. p. 61, 1851; Revis. der Rhyngod. l. c. p. 757, 1859; ? Grube, Annulat. Ærsted. p. 12, 1858*; Keferstein, Beitr. z. Anat. der Sipunc. in Gesellsch. Wissensch. Götting. p. 196, 1865; Quatrefages, Hist. Nat. Annel. p. 615, 1865.

? *Nereis (sacculo induta)*, Linnæus, Chinensia Lagerstrœmiana, f. 5, 1754; and in Amœn. Acad. iv. p. 254, t. 3. f. 5 (1788).

? *Sipunculus saccatus*, Linnæus, Syst. Nat. ed. 12, p. 1078, 1766†; Gmel. Syst. Nat. et var. β , p. 3095, 1789; Bosc, Hist. Nat. des Vers, ii. p. 130, 1802; Turton, Brit. Fauna, p. 128, 1807; Lamarck, An. s. Vert. 1st edit. iii. p. 79, 1816, 2nd edit. iii. p. 469, 1840; Fleming, Brit. Anim. p. 491, 1828.

Hab. Shores of Grenada (*Pallas*); Punta Arenas (*Ærsted*); Indian seas? (*saccatus*) (*Linnæus*).

* Grube describes the tentacular membrane (as he calls the cirri round the mouth) of Dujardin as being "6-fariam laciniata, laciniis iterum incisus," which does not agree with Pallas's description of his *Lumbricus phalloides*, and which, indeed, would almost place this species in the genus *Themiste* of Gray (*Dendrostomum* of Grube). The habitat, Punta Arenas in Central America, is not, however, very widely apart from that given by Pallas, "Shore of the island of Grenada in the West Indies."

† Pallas refers the *saccatus* of Linnæus, with a doubt, to his species *L. phalloides*, it only differing in the skin which covers it being rendered lax by having been badly preserved in spirits.

3. SIPUNCULUS GIGAS.

Sipunculus gigas, Quatrefages, Hist. Nat. Ann. ii. p. 514, 1865.

Hab. Coast of Brittany (*Quatrefages*).

I suspect this is only a variety of *Sipunculus nudus*. The chief difference seems to consist in the oral cirri, which, according to Quatrefages, are "quasi conglobati," or, as he elsewhere describes them, something like cauliflowers. This, however, he says may be the action of the spirits in which the specimen has been preserved.

4. SIPUNCULUS EDULIS.

Lumbricus edulis, Pallas, Spic. Zool. tom. i. fasc. x. p. 11, t. 1. f. 7, 1774.

Sipunculus edulis, Lamarck, An. s. Vert. 1st edit. iii. p. 79, 1816; 2nd edit. iii. p. 469, 1840; Blainville, Dict. Sc. Nat. art. *Sipunculus*, 1827, Atlas, t. 31. f. 4; Cuvier, Règn. Anim. iii. p. 243, 1830; Guérin Icon. Règn. An. Zooph. p. 8, pl. 5. f. 3 (copied from Pallas?); Griffith, An. Kingd. xii. Zooph. t. 12. f. 3 (copied from Guérin), 1834; Diesing, Syst. Helminth. ii. p. 61, 1851, Revis. der Rhyngod. l. c. 757, 1859; Quatrefages, Hist. Nat. Annel. ii. p. 615, 1865.

Hab. Java (*Pallas*); Siam (*Mouhot*).

B.M.

5. SIPUNCULUS INDICUS.

Sipunculus indicus, Peters, Müller's Archiv für Anat. &c. 1850, p. 385, t. 4. f. A-H*; Diesing, Syst. Helminth. ii. p. 555, 1851, Revis. der Rhyngod. in l. c. p. 757, 1859; Keferstein, Beitr. z. Anat. der Sipunc. in l. c. p. 196, 1865; Quatrefages, Hist. Nat. Annel. ii. p. 615, 1865.

Hab. Coast of Mozambique (*Peters*).

6. SIPUNCULUS RUFOFIMBRIATUS.

Sipunculus rufofimbriatus, Blanchard, Ann. Sc. Nat. 3rd ser. tom. xii. p. 56, 1849; Cuv. Règn. An. edit. Crochard, Zoophytes, t. 22. f. 1, 1a; Diesing, Syst. Helminth. ii. p. 62, 1851; Revis. der Rhyngod. l. c. p. 757, 1859; Quatrefages, Hist. Nat. Annel. ii. p. 616, 1865.

Hab. Nice (*Blanchard*).

7. SIPUNCULUS ECHINORHYNCHUS.

Siphunculus echinorhynchus, Delle Chiaje, Memor. sulla Storia e Notom. degli Animal. s. Vertebre, tom. i. pp. 124 & 133, 134, t. 10. f. 8-11, 1823.

Sipunculus echinorhynchus, Diesing, Syst. Helminth. ii. p. 60, 1851; Dujardin, in Lamk. An. s. Vert. 2nd edit. tom. iii. p. 469; Quatrefages, Hist. Nat. Annel. ii. p. 616, 1865†.

* Peters's figure of this species represents the tentacular membrane as being divided into a considerable number (eight according to Diesing) of laciniae or oral cirri, which appear again to be divided into others, amounting, according to Diesing, to from 40 to 60. This structure would appear to be almost sufficient to refer this species to another genus, allied to the *Dendrostomum* of Grube.

† Quatrefages says it is likely that this species may turn out to be only the young of *S. nudus*. The oral cirri, however, are very different from those of that species.

Phascolosomum echinorhynchus, Diesing, Revis. der Rhyngod. *l. c.* p. 763, 1859.

Hab. Bay of Naples (*Chiaje*).

8. SIPUNCULUS ROBUSTUS.

Sipunculus robustus, Keferstein, Beitr. z. Anat. der Sipunc. in Nach. könig. Gesellsch. der Wissensch. Götting. p. 196, 1865; Quatrefages, Hist. Nat. Annel. ii. p. 616, 1865.

Hab. Wallis Islands, Oceania (*Dr. Gräffe fide Keferstein*).

9. SIPUNCULUS ANGASII, sp. nov. (Pl. IX. fig. 1.)

Corpus cylindricum, inæquale, infra medium contractum, laxè clathratum, longitudinaliter costatum et transverse striatum; apice caudali globoso-clavato, lævi; proboscis brevis, crassiuscula, cylindrica, muricata, oris limbo papilloso; totum corpus iridescens.

Long. corporis 6 unc., crassitud. in medio corporis 8 lin., long. proboscid. muricat. 8 lin.

Retractile portion of body, containing the proboscis, short, tolerably well developed, covered with numerous rather large triangular tubercles, the points projecting downwards. The tentacular membrane is divided in the centre into numerous short and somewhat conical papillæ, forming, as it were, a pad at the extremity of the proboscis. Body contracted a little below the middle. The upper portion is much the larger, and for a short distance below the proboscis it is divided, for about half an inch, by several rather deep circular sulci. Then the grooves or ridges run longitudinally throughout the whole length of the body, which is cylindrical, and terminates at the lower extremity in a round-shaped club, smooth and shining. The grooves or ridges in the upper half of the body are rather distant from each other, and are crossed by faint transparent circular lines. Below the contraction the circular grooves are more decided, and the longitudinal grooves are crowded and of a wavy form. The whole body is shining, and of an opal iridescent hue, especially about the centre of the body.

Hab. Port Lincoln, South Australia (*G. F. Angas, Esq.*). B.M.

10. SIPUNCULUS DEFORMIS, sp. nov. (Pl. IX. fig. 2.)

Corpus subcylindricum, inæquale, hinc et illinc valde constrictum, dense clathratum et tuberculatum, apice caudali subinflato, ovali, tuberculis parvis muricato; proboscis crassa, quintam partem longitudinis corporis æquans, tuberculis minimis rufis circulariter obsita; color corporis fuscus.

Longit. $5\frac{1}{2}$ unc., crassitud. major 4 lin.; long. probosc. $1\frac{1}{2}$ unc., crass. prope extremitat. 3 lin.

Retractile part of body, containing the proboscis, of considerable length, nearly equalling the fifth part of the body, roughened with numerous very small brown dots or tubercles arranged in circular rows, robust, of nearly equal thickness with the rest of the body, ex-

cept at the thickest portion. The extremity of the proboscis, containing the tentacular filaments, in the only specimen we possess, is withdrawn completely, so that it cannot be seen. The body is of a subcylindrical form, and is roughly clathrate, the longitudinal ridges being close set, and the circular striæ cutting rather deep, and forming, as it were, small tubercles along the longitudinal ridges, which are especially prominent near the base of the proboscis. In several places it is very much constricted, the constricted parts in one or two places being very narrow*. The caudal extremity is of an oval slightly inflated form, and densely roughened with crowded small tubercles. The general colour of the body is brown, the small dots or tubercles on the proboscis being of a deeper hue.

Hab. Sir Charles Hardy's Island, North Australia (*J. B. Brookes, Esq.*). B.M.

11. *SIPUNCULUS ÆNEUS*, sp. nov.

Corpus cylindricum, gracile, antice attenuatum, postice crassius, fusiforme, reticulatum, in parte anteriore corrugatum, deinde lævius et minute granulatum, apice caudali ovali, lævi, lucente; proboscis brevis, lævis, parte anteriore corporis crassior; color albus, æneo lucens.

Longit. corporis $6\frac{1}{2}$ unc. ; crass. part. anter. $1\frac{1}{2}$ lin., part. posterior. 4 lin. ; long. probos. 6 lin., crass. 2 lin.

The proboscis in this species is much thicker than the upper or anterior part of the body ; so that it is difficult to imagine how the animal could withdraw it within its body, and "where it could pack it," as Professor Forbes says of another species. It is smooth-looking, but when examined with a glass we see it ringed or annulated and finely reticulated. The oral cirri or tentacles are not visible in the only specimen we possess. The body is slender, ringed, the rings or annulations being very close together, small, and finely but distinctly reticulated across. The upper extremity is strongly corrugately reticulated, the middle portion less distinctly so, and the caudal almost smooth. Scattered over the surface we see a good many small warty-looking tubercles. The upper extremity is narrow, the body gradually enlarging in size as it descends, so that at the caudal extremity it is three times as large as anteriorly, and is of a fusiform conoidal form, the warty tubercles at the same time being larger there than elsewhere.

The general colour is nearly white, except towards the caudal extremity, where it is very shiny with an iridescent metallic lustre.

Hab. New Zealand (*Mr. Cuming's Collection*). B.M.

12. *SIPUNCULUS EXIMIO-CLATHRATUS*, sp. nov.

Corpus cylindricum, infra medium coarctatum dense clathratum, extremitatibus inflatis, læviusculis, iridescentibus; proboscis brevis, crassiuscula, muricata; color griseus.

Long. $2\frac{1}{2}$ unc. ; crassit. in medio 3 lin., ad extremitates $5\frac{1}{2}$ lin.

* This may, to a considerable extent, be produced by the spirit in which the animal has been immersed.

The body of the animal is cylindrical in form, rather narrow in the middle, and densely clathrate, presenting the appearance, to a certain extent, of *chain armour*. The two extremities are inflated and nearly smooth and shining, the longitudinal ridges being much wider asunder, and the transverse sulci shallow and less apparent; the posterior extremity is a little larger than the anterior. The proboscis is only partially excluded, but appears short and cylindrical, and is densely covered with triangular soft murications, the points projecting downwards. The body is of a grey colour, and the two extremities are somewhat iridescent.

Hab. Philippine Islands (*Mr. Cuming's Collection*). B.M.

13. SIPUNCULUS CORALLICOLUS.

Sipunculus corallicolus, Pourtalès, Proc. Amer. Soc. Adv. Knowl. 1851, p. 41.

Hab. Florida, living in hollows in dead coral (*Portalès*).

Another species has been shortly described; but, according to Diesing, it requires further investigation.

Genus 2. PHASCOLOSOMA.

Phascolosoma, Leuckart, Grube, Ærsted, O. Schmidt, Keferstein, Costa.

Phascolosomum, Diesing.

Sipunculus (*Phascolosomum*), Quatrefages, *l. c.*

Sipunculus, Blainville, Forbes (in part), Grube (in part).

Siphunculus, Montagu, Gray.

Syrinx (part.), Forbes, M'Coy.

Phymosomum (part.), Quatrefages, *l. c.*

Ædematosomum (part.), Quatrefages, *l. c.*

Cryptosomum (part.), Quatrefages, *l. c.*

* *Species with the skin smooth.*

(PHASCOLOSOMUM, Quatrefages.)

1. PHASCOLOSOMA HARVEI †.

Syrinx harveii, Forbes, British Starfishes, p. 249. fig., 1841; Gosse, Rambles of a Naturalist on the Devonshire Coast, p. 157, 1853.

? *Sipunculus nudus*, Bosc, Hist. Nat. des Vers, ii. p. 130, 1802 (Syn. Bohadsch exclud.); ? Turton, Brit. Faun. p. 128, 1807.

Siphunculus nudus, Martin, Marine Vermes, p. 4, t. 1. f. 2, 1786; Gray, Spic. Zoolog. p. 8, 1828.

Phascolosomum harveii, Diesing, Revis. der Rhyngod. *l. c.* p. 763, 1859.

† In this species the extremity of the proboscis is encircled by a close-set series of short bristles, "as if," says Mr. Gosse, "it had omitted to shave its beard the day before;" and the oral cirri consist of a "dense tuft of white tentacula."

Sipunculus (Phascolosomum) harveyi, Quatrefages, Hist. Nat. Annel. ii. p. 617, 1865.

Hab. Coast of England, Weymouth, Devonshire, Cornwall, &c. B.M.

2. PHASCOLOSOMA FORBESI*.

Syrinx forbesii, M'Coy, Ann. & Mag. Nat. Hist. xv. p. 273, t. 16. f. 3, 1845.

Phascolosomum forbesi, Diesing, Syst. Helminth. ii. p. 66, 1851; Revis. der Rhyngod. l. c. p. 764, 1859.

Sipunculus (Phascolosomum) forbesii, Quatrefages, Hist. Nat. Ann. ii. p. 618, 1865.

Hab. South Devon, Cornwall (*Montagu, Laughrin*). B.M.

3. PHASCOLOSOMA TENUICINCTUM.

Syrinx tenuicinctus, M'Coy, Ann. & Mag. Nat. Hist. xv. p. 273, t. 16. f. 4, 1845.

Phascolosomum tenuicinctum, Diesing, Syst. Helminth. ii. p. 64, 1851; Revis. der Rhyngod. l. c. p. 764, 1859.

Sipunculus (Phascolosomum) tenuicinctus, Quatrefages, Hist. Nat. Ann. ii. p. 618, 1865.

Hab. Falmouth (*J. Cranch*). B.M.

4. PHASCOLOSOMA OXYURUM.

Lumbricus oxyurus, Pallas, Spic. Zoolog. i. fasc. 10. p. 16, 1774; Miscell. Zool. p. 147, t. 11. f. 7, 8, 1766.

Sipunculus oxyurus, Blainville, Dict. Sc. Nat. xlix. art. Siponcle, p. 312, 1828.

Sipunculus, sp., Forbes, Brit. Starfishes, p. 255, 1841.

Anoplosomatium pallasii, Diesing, Syst. Helminth. ii. p. 69, 1851; Revis. der Rhyngod. l. c. p. 756, 1859; Quatrefages, Hist. Nat. Annel. ii. p. 631, 1865†.

Hab. Hastings; coast of Sussex (*Pallas*). B.M.

5. PHASCOLOSOMA CAPSIFORME, sp. nov. (Pl. IX. fig. 3.)

Corpus cylindrico-fusifforme, lævissimum, lutescens, in medio inflatum, sacciforme, capsico simile, apice caudali acuminato, granuloso; proboscis cylindrica, crassiuscula, cirris brevibus, numerosis, apice clavatis, obsita.

Long. corporis 2 unc., crass. corporis in medio 10 lin., crass. apic. caudal. 2½ lin.

In this species the body is cylindrical and fusiform, very smooth-

* In this species the extremity of the proboscis is surrounded by from six to eight distinct circles of minute bristles, and the oral cirri are in the form of short lacinia.

† One of the characters of the genus *Anoplosomatium*, according to its founder, Grube, and Diesing himself, is the position of the anus in the caudal extremity. Pallas, however, distinctly states that in this species the anus is placed in the anterior portion of the body; and the specimen we possess from the coast of Sussex, and which I refer to the *oxyurus* of Pallas, agrees in this particular with the description given by that author.

looking and shining. It is inflated like a bottle, more swollen near the anterior extremity, but with the inferior extremity elongately acuminate and somewhat granular or warty. The general appearance of the animal, especially with the proboscis retracted, is that of a capsicum. The proboscis is thick and cylindrical, and at the apex is crowned with numerous short, fleshy-looking cirri, each slightly club-shaped at the free extremity. The surface of the body, when examined with the lens, presents the appearance of very minute circular striæ, and numerous, very fine, flat granulations. The posterior extremity becomes suddenly acuminate, and is of considerable length.

Hab. Falkland Islands (*W. Wright, Esq.*). B.M.

The *P. capsiforme* approaches in characters to the *Sipunc.* (*Edematosomum*) *rapa* of Quatrefages, a species brought by M. d'Orbigny, but from what quarter of the world the author does not state; neither has the proboscis been seen by M. Quatrefages, and the body is described as "albo setaceum," or like the cocoon of a white moth.

6. PHASCOLOSOMA BOREALE.

Phascolosoma boreale, Keferstein, Beitr. z. Anatom. der Sipunc. in *l. c.* p. 206, 1865.

Sipunculus (Phascolosomum) borealis, Quatrefages, *l. c.* ii. p. 620, 1865.

Hab. Godthaab, Greenland, in from 30 to 40 fath. (*Hollbüll*).

B.M.

7. PHASCOLOSOMA CÆRSTEDII.

Phascolosoma cærstedii, Keferstein, *l. c.* p. 205, 1865.

Sipunculus (Phascolosoma) cærstedii, Quatrefages, *l. c.* ii. p. 620, 1865.

Hab. Godthaab, Greenland (*Hollbüll*).

B.M.

8. PHASCOLOSOMA OBSCURUM.

Sipunculus (Phascolosomum) obscurus, Quatrefages, *l. c.* ii. p. 616, 1865.

Hab. Les côtes de l'Océan (*Quatrefages*).

9. PHASCOLOSOMA VULGARE.

Sipunculus vulgaris, Blainville, Dict. Sc. Nat. art. Siponcle, Atlas, pl. 33. f. 3, 3 *a*, *b*, 1828.

Phascolosomum vulgare, Diesing, Syst. Helm. ii. p. 65, 1851; Revis. der Rhyngod. p. 759, 1859.

Phascolosoma vulgare, Keferstein, Beitr. in *l. c.* p. 201, 1865.

Sipunculus (Phascolosomum) vulgaris, Quatrefages, *l. c.* ii. p. 616, 1865.

Hab. Dieppe (*Blainville*).

10. PHASCOLOSOMA PUNCTATISSIMUM.

Sipunculus punctatissimus, Gosse, Ann. & Mag. of Nat. Hist. 2nd ser. vol. xii. p. 125, 1853; Quatrefages, *l. c.* ii. p. 617, 1865.

Phascolosomum punctatissimum, Diesing, Rev. der Rhyng. l. c. p. 763, 1859.

Hab. English coast (*Gosse*); Isles of Chausey (*Quatrefages*).

11. PHASCOLOSOMA RUBENS.

Phascolosoma rubens, Costa, Faun. del Regn. di Nap. p. 11, t. 1. f. 6-8, 1860?

Phascolosomum rubens, Diesing, Rev. der Rhyng. l. c. p. 764, 1859.

Sipunculus (Phascolosomum) rubens, Quatrefages, l. c. ii. p. 617, 1865.

Hab. Coasts of Naples and Sicily (*Costa*).

12. PHASCOLOSOMA CARNEUM.

Phascolosoma carneum, Leuckart & Rüppell, Atlas der Reise im nördl. Africa, t. 2. f. 2, 1828; Diesing, Rev. der Rhyngod. in l. c. p. 764.

Sipunculus carneus, Diesing, Syst. Helm. ii. p. 63, 1859.

Sipunculus (Phascolosomum) carneus, Quatrefages, l. c. ii. p. 618, 1865.

Hab. Red Sea (*Rüppell*).

13. PHASCOLOSOMA GOULDII.

Sipunculus gouldii, Pourtalès, Proc. Amer. Ass. for Advance. of Science, 1851, pp. 40, 41.

Phascolosomum gouldii, Diesing, Revis. der Rhyngod. in l. c. p. 764, 1859.

Sipunculus (Phascolosomum) gouldii, Quatrefages, l. c. ii. p. 618, 1865.

Phascolosoma gouldii, Keferstein, Beitr. in Nach. Gesellsch. Wissen. Göttingen, p. 205, 1865; Zeitsch. für wissensch. Zool. Band xv. t. 33. f. 32, 1865, and Band xvii. Hest 1. p. 54, 1867.

Hab. Massachusetts (*Portalès*).

14. PHASCOLOSOMA VIOLACEUM.

Sipunculus (Phascolosomum) violaceus, Quatrefages, Hist. Nat. des Annelés, ii. p. 619, 1865.

Hab. Indian Seas (*Quatrefages*).

15. PHASCOLOSOMA VERMICULUM.

Sipunculus (Phascolosomum) vermiculus, Quatrefages, l. c. ii. p. 619, 1865.

Hab. Indian Seas (*Quatrefages*).

16. PHASCOLOSOMA ELONGATUM.

Phascolosoma elongatum, Keferstein, Unters. üb. nied. Seethiere-Kenntn. in Zeitschr. für wiss. Zool. tom. xii. p. 39, t. 3. f. 5, 1862; Beitr. in l. c. p. 201, 1865.

Sipunculus (Phascolosomum) elongatus, Quatrefages, l. c. ii. p. 619, 1865.

Hab. St. Vaast, Normandy (*Keferstein*).

17. PHASCOLOSOMA AUSTRALE.

Phascolosoma australe, Keferstein, Beitr. in l. c. p. 197, 1865.
Sipunculus (Phascolosomum) australis, Quatrefages, l. c. ii. p. 619,
 1865.

Hab. Sydney (*R. Schütte* fide *Keferstein*).

18. PHASCOLOSOMA CORIACEUM.

Phascolosoma coriaceum, Keferstein, Beitr. in l. c. p. 203, 1865.
Sipunculus (Phascolosomum) coriaceus, Quatrefages, l. c. ii.
 p. 203, 1865.

Hab. St. Thomas's, West Indies (*Riise* fide *Keferstein*).

19. PHASCOLOSOMA PELLUCIDUM.

Phascolosoma pellucidum, Keferstein, Beitr. in l. c. p. 204, 1865.
Sipunculus (Phascolosomum) pellucidus, Quatrefages, l. c. ii.
 p. 620, 1865.

Hab. St. Thomas's, West Indies (*Riise* fide *Keferstein*).

20. PHASCOLOSOMA PAPILLIFERUM.

Phascolosoma papilliferum, Keferstein, Beitr. in l. c. p. 204, 1865.
Sipunculus (Phascolosomum) papillifer, Quatrefages, l. c. ii.
 p. 620, 1865.

Hab. St. Thomas, West Indies (*Riise* fide *Keferstein*).

21. PHASCOLOSOMA PYGMÆUM.

Sipunculus (Ædematosomum) pygmæus, Quatrefages, l. c. ii.
 p. 627, 1865.

Hab. ———?

22. PHASCOLOSOMA RAPA.

Sipunculus (Ædematosomum) rapa, Quatrefages, l. c. ii. p. 627, 1865.
Hab. ———?

23. PHASCOLOSOMA MARGARITACEUM.

Phascolosoma margaritaceum, Sars, 1851, fide Keferstein, Nach.
 Gesell. Wissensch. 1865, p. 201.

Hab. Bergen (*Keferstein*).

24. PHASCOLOSOMA CUMANENSE.

Phascolosoma cumanense, Keferstein, Nach. kön. Gesell. Wissen.
 Göttingen, 1866; Zeitsch. f. wiss. Zool. Band xvii. p. 53, t. 6,
 f. 19, 21, 1867.

Hab. Cumana, Venezuela (*Couthoy* fide *Keferstein*).

† *Species inhabiting shells belonging to the Mollusca.*

(CRYPTOSOMUM, Quatrefages.)

1. PHASCOLOSOMA BERNHARDUS.

Sipunculus strombus, Montagu, Tr. Linn. Soc. vii. p. 74, 1804;

Turton, Brit. Faun. p. 74, 1807; Fleming, Brit. Animals, p. 491, 1825; Gray, Spic. Zool. p. 8, 1828.

Sipunculus (Cryptosomum) strombi, Quatrefages, Hist. Nat. Ann. ii. p. 628, 1865.

Phascolosoma strombi, Diesing, Syst. Helminth. ii. p. 65, 1851.

Phascolosoma strombi, Kefenstein, Beitr. z. Anat. Sipunc. l. c. p. 202, 1865.

Sipunculus dentalii, Gray, Spic. Zool. p. 8, 1828; Johnston, Loudon's Mag. N. Hist. vi. p. 233, f. 25, 1833.

Phascolosomum dentalii, Diesing, Syst. Helm. ii. p. 64, 1851.

Sipunculus (Cryptosomum) dentalii, Quatrefages, Hist. Nat. Annel. ii. p. 627, 1865.

Sipunculus bernhardus, Forbes, Brit. Starfish. p. 251, f., 1841; Girard, Stimpson, Contrib. Smithson. 1853, p. 28.

Phascolosoma bernhardus, Pourtalès, Proc. Amer. Ass. Adv. Sc. Meeting v. 1851, p. 41; Diesing, Revis. d. Rhyngod. l. c. p. 759, 1859.

Sipunculus (Phascolosoma) concharum, Ørsted, De Regionib. Marin. p. 80, 1844; Krøyer's Nat. Tidssk. 1844-45, p. 419; Sars, Magaz. f. Naturvidensk. 1850, p. 77.

Var. *capitata*.

Sipunculus capitatus, Rathke, Nov. Act. Nat. Cur. xx. part i. pp. 143-147, t. 6. f. 20-23, 1843; O. Schmidt, Zeitsch. f. d. gesamt. Naturw. 1854, pt. 3. p. 2, t. 1. f. 2.

Phascolosomum capitatum, Diesing, Syst. Helm. ii. pp. 65 and 555, 1851.

Phascolosomum bernhardus, var. *capitata*, Diesing, Revis. d. Rhyngod. l. c. p. 760, 1859.

Hab. Coasts of England, Scotland, &c., inhabiting *Dentalium*- and *Stromb*-shells, &c.

a. *P. dentalii*, Cornwall (*Laughrin*), Devonshire (*J. Cranch*). B.M.

b. *P. strombus*, Devonshire (*Montagu*), Aberystwith (*Henslow*). B.M.

c. *P. dentalii*, var. *capitata*, Yorkshire (*W. Clift, Esq.*). B.M.

2. PHASCOLOSOMA CÆMENTARIUM.

Sipunculus (Cryptosomum) cæmentarius, Quatrefages, Hist. Nat. Annelés, ii. p. 628, 1865.

Hab. North America, in *Dentalium*-shells (*M. Richard* fide *Quatrefages*).

‡ *Species with skin more or less densely covered with warts or granules.*

(PHYMOSOMUM, Quatrefages.)

1. PHASCOLOSOMA TUBERCULATUM.

Sipunculus tuberculatus, Blainville, Dict. Sc. Nat. art. Siphonele, Atlas, pl. 33. f. 5, 1827.

Sipunculus verrucosus, Cuvier, Règn. An. 2nd ed. iii. p. 243, 1830; Grube, Actin. Echin. und Würm. Adriat. p. 44, 1840.

Phascolosoma granulatum, Leuckart, Brev. desc. An. quor. p. 22, f. 5, 1838; Keferstein, Unters. üb. nicd. Seeth. p. 38, 1862; Beitr. in l. c. p. 200, 1865.

Phascolosomum granulatum, Diesing, Syst. Helm. ii. p. 63, 1851; Revis. der Rhyngod. in l. c. p. 759, 1859.

Sipunculus (Phymosomum) tuberculatus, Quatrefages, l. c. ii. p. 624, 1865.

Hab. Mediterranean, Adriatic (*Blainville, Leuckart*), Santa Cruz, West Indies (*Ersted*).

2. PHASCOLOSOMA GRAYI, Baird.

Siphunculus tuberculatus, Gray, Spic. Zool. i. p. 8. no. 4, 1828 (not Blainville, Dict. Sc. Nat. art. Sipuncle, 1827).

Hab. — ?

B.M.

The worm described by Blainville under the name of *Sipunculus tuberculatus* differs considerably from the species described by Dr. Gray under the same name in his 'Spicilegia Zoologica;' and a comparison of Gray's type in the National Collection with De Blainville's figure confirms this opinion. In the present species the caudal extremity terminates in a prolonged acuminate point, studded all over with flattened tubercles like warts. The exsertile part of the body is of considerable thickness, and is, like the opposite extremity, also thickly covered with warts. In De Blainville's species the caudal extremity is rounded and blunt, and the anterior or proboscidal extremity is much more attenuated than the posterior. The name *verrucosus* would have been appropriate; but Cuvier has pre-occupied that name; and more lately Hermann Meyer, in the 'Zeitschrift für wissenschaft. Zool.' i. p. 268, gives some anatomical details of a species which he considers the *Sipunculus verrucosus*, but which Diesing states to be the same as the *S. tuberculatus* of Blainville. As the species described by Blainville takes precedence by a year of Dr. Gray's, I have named it after this zoologist, who has very well defined the species in his 'Spicileg. Zoolog.'

3. PHASCOLOSOMA ARCUATUM.

Sipunculus arcuatus, Gray, Spic. Zool. i. p. 8. no. 5, 1828.

Hab. India (*General Hardwicke's Collection*).

B.M.

4. PHASCOLOSOMA JEFFREYSII, sp. nov.

Corpus attenuatum, fusiforme, maculis rubris in dorso notatum, striis circularibus transverse cinctum, in medio sparse granulatum, postice et antice dense granulatum, granulis brunneis; pars exsertilis sparse granulata et in dorso rubro cincta; tentaculis retractis.

Long. corp. 14 lin., proboscistertiam partem corpori æquans; crass. corp. $1\frac{1}{2}$ lin., proboscidis $\frac{1}{2}$ lin.

Hab. Spezzia (*J. G. Jeffreys, Esq.*).

B.M.

The body of this worm is narrow and cylindrically fusiform in

shape, rather acuminate posteriorly, slightly narrowed in front. Along the back it is marked with variously shaped reddish marks; it is striated transversely, the striæ distinct, marked with small, flattish, indistinct warts, and more sparingly with elevated brown granules. The caudal extremity is densely and rather strongly granulated, the granules of a reddish-brown colour and elevated. The proboscis at the root, next the body, is also densely granulated; anteriorly it is circularly striated, sparingly granulated, and ringed dorsally with reddish brown. The extremity of the proboscis, in the only specimen we possess, is withdrawn, so that the tentacles cannot be seen.

5. PHASCOLOSOMA FASCIATUM, sp. nov.

Corpus cylindricum, transverse obsolete striatum, antrorsum attenuatum, granulis parvis rubris obsitum, postice rotundatum, subito conicum, pars exertilis perlonga, attenuata, laevis, striis circularibus distinctis cinctu, et in dorso fasciis latis rubris notata; color albidus, maculis rubridis conspersus; tentaculis retractis.

Long. corp. 15 lin., proboscis corpore fere duplo longior; lat. corp. 2 lin., proboscis. 1 lin.

Hab. Madeira (*N. Lister, M.D.*).

B.M.

The body of the worm is of a whitish colour, obsoletely transversely striated, marked here and there with reddish-brown spots, and covered with small red granules, which are nearly similar in size anteriorly and posteriorly. It is more attenuated anteriorly, and sends out a very long proboscis, which is narrow, not tuberculated, but distinctly circularly striated, and fasciated with interrupted broad bands of brown. Posteriorly the body is blunt, but becomes suddenly pointed at the very extremity. The broad bands of brown on the proboscis, the marks of red on the body, and the small tubercles on the surface are all nearly confined to the dorsal aspect, the abdominal region being nearly white.

Is this the *Sipunculus laevis*, Cuvier = *Phascolosoma laeve*, Keferstein? In the 'Zeitsch. f. wiss. Zool.' 1867, p. 50, Keferstein mentions having received a specimen 11 mm. long from Fayal, Azores; but in some respects his description differs from that of the species here given.

6. PHASCOLOSOMA PLACOSTEGI, sp. nov.

Corpus fusiforme, breve, utrinque attenuatum, striis circularibus cinctum, fere laeve, parte caudali acuminata, granulis majusculis obsita, parte anteriore verrucis complanatis sparsis instructa, parte exertili circulariter striata; tentaculis absconditis.

Long. corp. 10 lin., crass. 1 lin.; long. probosc. 3½ lin.

Hab. Cape of Good Hope; found lodged in a mass of *Serpulæ* (*Placostegus*).

B.M.

The body is fusiform in shape, a little attenuated at both extremities, rather more so at the caudal termination, which is somewhat acuminate and covered with raised warty-looking granules. The

body is not verrucose, but is roughened with numerous, close-set, circular striæ near the anterior extremity, showing a few scattered, flattened-looking warty granules. The exsertile portion of the body is attenuated, and circularly striated; but the extremity or proboscis is withdrawn in the only specimen we possess, so that the tentacles cannot be seen. This was found lodged in some of the crevices of a mass of a species of tubicolous Annelides belonging to the genus *Placostegus*, which formed a portion of the collection of Dr. Krauss; it was dry, but was afterwards moistened and put into spirits.

7. *PHASCOLOSOMA NIGRICEPS*, sp. nov. (Pl. XI. figs. 1, 1^a.)

Corpus fusiforme, antice paulo attenuatum, postice rotundatum, granulis fuscis numerosis circulariter obsitum, parte antica nigra, granulis nigris multo majoribus instructa; pars exsertilis retracta.

Long. corp. fere 2 unc., crassitud. corp. med. $\frac{1}{2}$ unc.

Hab. St. Thomas's, West Indies (*Mr. Cuming?*); Jamaica (*Mr. Gosse*); Chili (*Mus. Brit.*). B.M.

The body is of a fusiform shape, slightly attenuated posteriorly, much more so anteriorly, and thicker about the centre. It is covered with numerous, rather small, rounded granules, of a brown colour, with a small white point in the centre, but which, at the anterior extremity, become much larger, rather square-shaped, and so dark as to give the whole of the anterior part, and what can be seen of the exsertile portion, a deep black hue. The proboscis itself, in all the specimens possessed by the Museum, is withdrawn, so that I could not ascertain the appearance of the tentacles. The body, with the exception of the granules and the anterior portion, is of a light colour.

8. *PHASCOLOSOMA ÆTHIOPS*, sp. nov.

Corpus utriculare, totum nigrum, granulis parvis, in extremitatibus, anteriore presertim, majoribus, obtectum, extremitate caudali conoidea, antica paulo attenuata; pars exsertilis brevis, crassiuscula, spinulis numerosis parvis obsita; tentacula brevia, numero-rosa.

Long. corp. 14 lin., probosc. 3 lin.; crass. corp. in medio 4 lin.

Hab. St. Vincent's, West Indies (*Rev. J. Guilding?*). B.M.

The whole body is of a deep black colour, and it is covered with numerous small black granules, which, however, become larger at the extremities, especially anteriorly. The posterior extremity is conoidal, and the anterior is rather attenuated. The exsertile portion is also black, and is roughened with numerous small black spines. The cirri of the proboscis are short and numerous.

9. *PHASCOLOSOMA PERLUCENS*, sp. nov. (Pl. X. figs. 2, 2^a.)

Corpus subcylindricum, arcuatum, elongatum, postice paulo attenuatum, pellucido-albidum, granulis minimis sparsis obsitum, dimidia

pars anterior longitudinaliter sub cute albo lineata ; pars exsertilis granulis parvis rubris dense oblecta et rubro vittata.

Long. corp. 1 unc., crass. $1\frac{1}{2}$ lin.; long. probosc. $2\frac{1}{2}$ lin., crass. $\frac{1}{2}$ lin.

Hab. Jamaica; taken out of holes in coral-rocks (*Mr. Gosse*).

B.M.

The body of this worm is slightly arched or curved in form, is somewhat cylindrical, rather slender, much longer than broad, and is of a pellucid white colour, at first appearing smooth and shining, but with the assistance of a lens showing itself to be partially covered with minute light-brown-coloured granules. These are more numerous at the posterior extremity than on the rest of the body, except the exsertile or proboscidal portion, which is thickly covered with small reddish-brown granules and here and there a stain of reddish-brown hue. The upper half of the body is the smoothest, and is marked by a series of longitudinal white lines showing under the integument, and which disappear at about half the length of the body.

10. PHASCOLOSOMA ALBO-LINEATUM, sp. nov.

Corpus subcylindricum, arcuatum, subpellucidum, in medio punctis seu granulis minimis sparse obsitum, extremitatibus utrinque subattenuatis, granulis majoribus rubro-fuscis oblectis ; pars anterior laevis, sub cute longitudinaliter albo lineata ; pars exsertilis longa, postice granulis parvis rubris, antice laevis, rubro maculata, et prope extremitatem lineis nigris exilibus viginti circumdata ; proboscis cirris curtis paucis violascentibus induta.

Long. corp. $1\frac{3}{4}$ unc., long. part. exsert. 1 unc.; crass. corp. in medio 2 lin., crass. probosc. $\frac{1}{2}$ lin.

Hab. Philippine Islands (*Mr. Cuming's Collection*).

B.M.

This species is much larger than the preceding, but resembles it in many respects. The body is arched or curved in form, and is somewhat translucent, especially the upper or anterior half, which is smooth and shining to appearance, and is marked under the skin with numerous longitudinal white lines. Under the lens the middle of the body appears covered partially with very minute point-like granules, which enlarge at each extremity and become more numerous. The caudal extremity is conoidal, rather sharp-pointed, and the granules are like raised warty projections; the anterior extremity is rather attenuated, the exsertile portion being of considerable length, more than half the length of the body. It is covered at the base with numerous reddish-brown granules, is smooth on the anterior portion, is marked with reddish-brown-looking stains, and near the extremity is surrounded with about twenty very fine black rings, each ring being composed of numerous very small spines. The proboscis does not at first sight seem to be provided with any cirri; upon more attentive examination, however, they appear to be very short, few in number, and of a violet hue. The only history we have of this species is, that it was found in the Philippine Islands; but I should be disposed to consider, from its general resemblance

to the foregoing (*P. perlucens*), that it was found burrowing like it in holes in coral-rocks.

11. PHASCOLOSOMA NODULIFERUM.

Phascolosomum noduliferum, Stimpson, Proc. Acad. Philad. tom. viii. p. 375, 1855; Diesing, Rev. der Rhyngod. l. c. p. 761, 1859.

Phascolosoma noduliferum, Keferstein, Beitr. in l. c. p. 198, 1865.

Sipunculus (Phymosomum) nodulosus, Quatrefages, l. c. ii. p. 621. no. 30, 1865.

Sipunculus (Phymosomum) noduliferus, Quatrefages, l. c. ii. p. 624. no. 42, 1865*.

Hab. Australia, Sydney (*J. M. Gillivray*); Nicol Bay, north coast of Australia (*M. de Boulay*); Australia (*J. B. Jukes, Esq.*). B.M.

12. PHASCOLOSOMA AGASSIZII.

Phascolosoma agassizii, Keferstein, Nach. d. kön. Gesellsch. der Wissensch. in Göttingen, 1866; Zeitsch. für wissenschaft. Zool. Band xvii. Heft i. p. 46, t. 6. f. 3-8, 1867.

Phascolosoma Hawkinsii, Baird, MS. in Mus. Brit.

Hab. California and Panama (*Agassiz fide Keferstein*); Esquimalt Harbour, Vancouver Island (*Lieut.-Col. Hawkins*). B.M.

I had named this species after Lieut.-Col. Hawkins, H.M. Commissioner on the North-American Boundary Survey, who collected the specimens, and to whom we are indebted for them. There are two specimens, one much more slender than the other. This has the exsertile portion protruded; the other has it withdrawn, which may account for the difference in circumference.

13. PHASCOLOSOMA LORDI, sp. nov.

Corpus brevifusiforme, griseum, transverse rugosum, granulis parvis fuscis obsitum, ad extremitatem posteriorem coacervatis, ad extremitatem anteriorem sparsis; pars exsertilis cylindrica, brevis, rugibus circularibus circumdata.

Long. corp. 1 unc., part. exsert. 4 lin.

Hab. Esquimalt Harbour, Vancouver Island (*J. K. Lord, Esq.*). B.M.

The body of this animal is of a greyish colour, wrinkled across with transverse rugæ, or, as it were, corrugated. The skin is covered with very small light-brown granules, which at the posterior extremity are larger, darker-coloured, and more numerous, and at the anterior extremity are very few and scattered at intervals. The exsertile portion is rather short, cylindrical in form, and rugose. The tentacles are withdrawn. We have only one specimen of this species, which differs very much from the preceding in general appearance, size, and colour, though collected at the same place. I have named it after Mr. J. K. Lord, who was the naturalist attached

* Quatrefages has, evidently in mistake, quoted this species twice over, but has, in the first instance, given it the name of *nodulosus*. The synonyms he has quoted are the same in both instances.

to the North-American Boundary Survey under Col. Hawkins. It may possibly be only a variety of the preceding species.

14. PHASCOLOSOMA PLANISPINOSUM, sp. nov.

Corpus sacciforme, albo-griseum, granulis brunneis minutis oblectum, granulis ad extremitatem posticam in spinis latis mutatis; pars exsertilis partem tertiam corporis æquans, spinis latis, majoribus, brunneis oblecta; tentaculis retractis.

Long. corp. 6 lin., part. exsert. 4 lin.; corp. crass. usque ad $3\frac{1}{2}$ lin.

Hab. — ? (*Mr. Cuming's Collection*).

B.M.

The body of this species is of a light greyish colour, deeper at the two extremities, where the minute granules with which the body is covered are replaced by flat sharp-pointed spines, standing out nearly erect from the skin. The exsertile portion is particularly marked in this manner, the spines being numerous and larger than at the posterior extremity. The shape of the body is very similar to that of *Sipunculus (Phascolosoma) genuensis* of Blainville, but differs in being very much smaller and having the exsertile portion, comparatively speaking, longer, and being very rough with the flat spines. Unfortunately we have only one specimen, which was collected by the late Mr. Cuming, but no habitat was attached to it.

15. PHASCOLOSOMA MULTITORQUATUM.

Sipunculus (Phymosomum) multitorquatus, Quatrefages, *l. c.* ii. p. 621, 1865.

Hab. Guettyary (*Quatrefages*).

16. PHASCOLOSOMA SPINICAUDA.

Sipunculus (Phymosomum) spinicauda, Quatrefages, *l. c.* ii. p. 621, 1865.

Hab. Barcelona (*Quatrefages*).

17. PHASCOLOSOMA GUTTATUM.

Sipunculus (Phymosomum) guttatus, Quatrefages, *l. c.* ii. p. 621, 1865.

Hab. Red Sea (*Quatrefages*).

18. PHASCOLOSOMA ORBINIENSE.

Sipunculus (Phymosomum) orbiniensis, Quatrefages, *l. c.* ii. p. 622, 1865.

Hab. American seas (*M. d'Orbigny*).

19. PHASCOLOSOMA PLICATUM.

Sipunculus (Phymosomum) plicatus, Quatrefages, *l. c.* ii. p. 622, 1865.

Hab. ? Indian seas (*Quatrefages*).

20. PHASCOLOSOMA JAVANENSE.

Sipunculus (Phymosomum) javanensis, Quatrefages, *l. c.* ii. p. 622, 1865.

Hab. Java (*Quatrefages*).

21. PHASCOLOSOMA CONSTELLATUM.

Sipunculus (Phymosomum) constellatus, Quatrefages, *l. c.* ii. p. 622, 1865.

Hab. Isle of France (*Quatrefages*).

22. PHASCOLOSOMA COCHLEARIUM.

Sipunculus cochlearius, Valenciennes, *Comptes Rendus*, tom. xxxix. p. 641, 1854.

Sipunculus (Phymosomum) cochlearius, Quatrefages, *l. c.* ii. p. 623, 1865.

Hab. Indian seas, in coral (*Quatrefages*).

23. PHASCOLOSOMA NIGRESCENS.

Phascolosoma nigrescens, Keferstein, *Beitr. in l. c.* p. 198, 1865.

Sipunculus (Phymosomum) nigrescens, Quatrefages, *l. c.* ii. p. 623, 1865.

Hab. Fiji Islands (Viti) (*Dr. Grüffe fide Keferstein*).

24. PHASCOLOSOMA VARIANS.

Phascolosoma varians, Keferstein, *Nach. kön. Ges. Wissen.* p. 199, 1865; *Zeitsch. f. wiss. Zool.* Band xv. pp. 424-426, t. 31. f. 3, t. 32. f. 22, 1865; Band xvii. p. 48, 1867.

Phascolosoma puntarenæ, Keferstein, *Unters. über nied. See-thiere*, in *Zeitsch. f. wiss. Zool.* tom. xii. p. 40, t. 3. f. 1, 6, 12, 15, 1862.

Sipunculus (Phymosomum) varians, Quatrefages, *l. c.* ii. p. 623, 1865.

Hab. St. Thomas, West Indies (*Riise*), Florida (*Agassiz fide Keferstein*).

25. PHASCOLOSOMA CYLINDRATUM.

Phascolosoma cylindratum, Keferstein, *Beitr. in l. c.* p. 200, 1865.

Sipunculus (Phymosomum) cylindratum, Quatrefages, *l. c.* ii. p. 623, 1865.

Hab. Bermuda (*Riise fide Keferstein*).

26. PHASCOLOSOMA LORICATUM.

Lithodermus cuneus?, Cuvier, *R. An.* 2nd edit. iii. p. 242, 1830.

Sipunculus (Phymosomum) loricatus, Quatrefages, *l. c.* ii. p. 623, 1865.

Hab. New Holland (*Quatrefages*).

27. PHASCOLOSOMA PUNTARENÆ.

Phascolosoma puntarenæ, Grube et Ørsted, *Annul. Ørsted.* p. 13, 1858, not Keferstein, *Unters. n. Thier.* p. 40, 1863.

Phascolosomum puntarenæ, Diesing, Rev. der Rhyng. p. 761, 1859.

Sipunculus (Phymosomum) puntarenæ, Quatrefages, *l. c.* ii. p. 624, 1865.

Hab. Puntarenas (*Ærsted*).

28. PHASCOLOSOMA GENUENSE.

Sipunculus genuensis, Blainville, Dict. Sc. Nat. art. Siponcle, Atlas, t. 33. f. 4, 1828.

Phascolosomum genuense, Diesing, Rev. der Rhyngod. *in l. c.* p. 761, 1859.

Phascolosoma lima, Costa, Faun. del Regn. di Napoli, Annelid. pl. . f. , 18 ?

Phascolosomum lima, Diesing, *l. c.* p. 761, 1859.

Sipunculus (Phymosomum) genuensis, Quatrefages, *l. c.* ii. p. 625, 1865.

Hab. Coast near Genoa (*Blainville*); near Naples (*Costa*).

29. PHASCOLOSOMA GRANULOSUM.

Syrinx granulosus, M'Coy, Ann. & Mag. Nat. Hist. tom. xv. p. 272, t. 16, f. 2, 1845.

Phascolosomum granulosum, Diesing, Syst. Helminth. ii. p. 63, 1851; Revis. d. Rhyng. *in l. c.* p. 761, 1859.

Sipunculus (Phymosomum) granulosus, Quatrefages, *l. c.* ii. p. 625, 1865.

Hab. Roundstone Bay, Ireland (*M'Coy*).

30. PHASCOLOSOMA PAPILLOSUM.

Sipunculus papillosus, Thompson, Ann. & Mag. vol. v. p. 101, 1840.

Syrinx papillosus, Forbes, Brit. Starfishes, p. 247, fig., 1841.

Phascolosomum papillosum, Diesing, Revis. der Rhyngod. *in l. c.* p. 762, 1859.

Sipunculus (Phymosomum) papillosus, Quatrefages, *l. c.* ii. p. 625, 1865.

Hab. Miltown Bay, &c., Ireland (*Thompson*).

31. PHASCOLOSOMA JOHNSTONI.

Sipunculus johnstoni, Forbes, Brit. Starfishes, p. 254, fig., 1841.

Phascolosomum johnstoni, Diesing, Revis. d. Rhyng. *in l. c.* p. 762, 1859.

Sipunculus (Phymosomum) johnstoni, Quatrefages, *l. c.* ii. p. 625, 1865.

Hab. Berwick Bay (*Johnston*).

32. PHASCOLOSOMA LONGICOLLE.

Phascolosomum longicolle, Leuckart and Rüppell, Atlas z. der Reise im nördl. Afr. Zooph. p. 6, t. 2. f. 1, 1828.

Sipunculus (Phymosomum) longicollis, Quatrefages, *l. c.* ii. p. 625, 1865.

Hab. Red Sea (*Rüppell*).

33. PHASCOLOSOMA ANTILLARUM.

Phascolosomum antillarum, Grube & Ærsted, *Annulat. Ærsted.* p. 13, 1858; Diesing, *Revis. d. Rhyngod. in l. c.* p. 762, 1859.

Phascolosoma antillarum, Keferstein, *Beitr. in l. c.* p. 205, 1865; *Unters. Nied. Seethiere in Zeitsch. f. wiss. Zool.* Band xii. p. 40, 1862, t. 3. f. 2, 11; Band xv. p. 435, 1865, t. 31. f. 11, t. 33. f. 37, and Band xvii. p. 54, 1867.

Sipunculus (Phymosomum) antillarum, Quatrefages, *l. c.* ii. p. 626, 1865.

Hab. Puntarenas and Santa Cruz (*Ærsted*); St. Thomas, West Indies (*Keferstein*); Panama (*Agassiz*).

34. PHASCOLOSOMA GLANS.

Sipunculus (Ædematosomum) glans, Quatrefages, *l. c.* ii. p. 626, 1865.

Hab. ? Indian Seas (*Quatrefages*).

35. PHASCOLOSOMA IMMODESTUM*.

Sipunculus (Ædematosomum) immodestus, Quatrefages, *l. c.* ii. p. 627, 1865.

Hab. Indian Seas (*Quatrefages*).

36. PHASCOLOSOMA LÆVE.

Sipunculus lævis, Cuvier, *Règne An.* 2nd ed. tom. iii. p. 243, 1830.

Phascolosoma læve, Keferstein, *Zeitsch. f. wiss. Zool.* Band xii. p. 38, t. 3. f. 4, 1862; Band xv. p. 427, t. 31. f. 6, t. 32. f. 20, 21; 1865; Band xvii. p. 50, t. 6. f. 14, 1867; *Beitr. in l. c.* p. 200, 1865.

? *Phascolosoma fasciatum*, Baird, see sp. 5.

Hab. Sicily (*Cuvier, Keferstein*); Fayal, Azores (*Higginson fide Keferstein*).

37. PHASCOLOSOMA RIISEI.

Phascolosoma riisei, Keferstein, *Beitr. in l. c.* p. 206, 1865.

Hab. St. Thomas, West Indies (*Riise fide Keferstein*).

38. PHASCOLOSOMA PECTINATUM.

Phascolosoma pectinatum, Keferstein, *Nach. königl. Gesellsch. Wissensch. Göttingen*, 1866; *Zeitsch. f. wissensch. Zool.* Band xvii. p. 47, t. 6. f. 9-12, 1867.

Hab. Panama (*Agassiz fide Keferstein*).

39. PHASCOLOSOMA PACIFICUM.

Phascolosoma pacificum, Keferstein, *Nach. kön. Gesell. Wissen. Göttingen*, 1866; *Zeitsch. f. wissensch. Zool.* Band xvii. p. 49, t. 6. f. 1-2, 1867.

Hab. Kingsmill Island, Gilbert Group, Pacific (*Keferstein*).

* Quatrefages does not mention, in his description of this species, whether it is smooth or tuberculated.

Species considered doubtful, or not sufficiently described.

40. PHASCOLOSOMA NORDFOLCENSE.

Sipunculus nordfolcensis, Brandt, Prod. Descript. Animal. ab Mertens. observat. p. 61, 1835; Dujardin in Lamarck, An. s. Vertèb. (2nd edit.) iii. p. 470, 1840.

Phascolosomum nordfolcense, Diesing, Syst. Helm. ii. p. 67, 1851; Revis. d. Rhyngod. l. c. p. 765, 1859; Dujardin, Hist. Nat. Ann. ii. p. 631, 1865.

Hab. Norfolk Sound (*Mertens*).

41. PHASCOLOSOMA FASCIOLATUM.

Sipunculus fasciolatus, Brandt, Prod. Desc. An. Mertens. obs. p. 61, 1835.

Phascolosomum fasciolatum, Diesing, Syst. Helm. ii. p. 66, 1851; Revis. d. Rhyngod. l. c. p. 765, 1859; Dujardin, l. c. ii. p. 631, 1865.

Hab. Island of Ualan, Caroline Islands (*Mertens*).

42. PHASCOLOSOMA AMBIGUUM.

? *Sipunculus ambiguus*, Brandt, Prod. An. Mertens. obs. p. 62, 1835.

Phascolosomum ambiguum, Diesing, Syst. Helm. ii. p. 67, 1851; Revis. d. Rhyng. l. c. p. 765, 1859; Dujardin, l. c. ii. p. 631, 1865.

Hab. — ? (*Mertens*).

43. PHASCOLOSOMA TIGRINUM.

Sipunculus tigrinus, Risso, Hist. nat. Europ. mérid. v. p. 292, 1826; Guérin, Icon. Règ. An. Cuv. Zooph. t. v. f. 4, 1834?.

Phascolosoma granulatum, Leuckart? *fide* Diesing; Joh. Müller, Wieg. Archiv, 1844, p. 168.

Phascolosomum tigrinum, Diesing, Syst. Helm. ii. p. 66, 1851; Revis. d. Rhyng. l. c. p. 765, 1859; Dujardin, l. c. ii. p. 631, 1865.

Hab. Nice, amongst *Fuci* (*Risso*).

44. PHASCOLOSOMA FLAVUM.

Sipunculus flavus, Risso, Hist. nat. Eur. mérid. v. p. 292, 1826.

Phascolosomum granulatum, Leuckart?; Joh. Müller, Wieg. Archiv, 1844, p. 168 (quoted by Diesing).

Phascolosomum flavum, Diesing, Syst. Helm. ii. p. 66, 1851; Revis. d. Rhyng. l. c. p. 765, 1859; Dujardin, l. c. ii. p. 631, 1865.

Hab. Nice (*Risso*).

45. PHASCOLOSOMA LEACHII.

Sipunculus leachii, Blainville, Dict. Sc. Nat. xlix. p. 312, 1827.

Phascolosomum leachii, Diesing, Syst. Helm. ii. p. 67, 1851; Revis. d. Rhyngod. l. c. p. 765, 1859; Dujardin, l. c. ii. p. 631, 1865.

Hab. — ? (*Leach*).

46. PHASCOLOSOMA POURTALESI.

Sipunculus granulatus, Pourtalès, Proc. Amer. Ass. Adv. Sc. 1851, p. 41.

Phascolosomum pourtalesi, Diesing, Revis. der Rhyngod. l. c. p. 765, 1859.

Hab. Florida (*Pourtalès*).

Genus 3. PETALOSTOMA.

Phascolosoma (sp.), Keferstein, 1862.

Petalostoma, Keferstein, 1865.

PETALOSTOMA MINUTUM.

Phascolosoma minutum, Keferstein, Unter. niedere Seethiere in Zeitsch. f. wissensch. Zool. Band xii. p. 40, t. 3. f. 7-10, 1862.

Petalostoma minutum, Keferstein, Beitr. Nach. kön. Gesellsch. Göttingen, p. 207*, 1865; Quatrefages, l. c. ii. p. 631, 1865.

Hab. St. Vaast, Normandy (*Keferstein*).

Genus 4. THEMISTE.

Themiste, Gray, Spicilegia Zoolog. p. 8, 1828.

Dendrostomum, Grube & Ærsted, Annulat. Ærsted, p. 14, 1858; Diesing, Rev. d. Rhyngod. 1859; Quatrefages, l. c. ii. p. 629, 1865.

Dendrostoma, Keferstein, Beitr. z. Anat. Sipunc. in Nach. könig. Gesellsch. Göttingen, p. 207, 1865.

1. THEMISTE HENNAHI.

Themiste hennahi, Gray, Spic. Zool. p. 8, 1828.

Hab. Peru (*Rev. W. Hennah*).

B.M.

2. THEMISTE ALUTACEA.

Dendrostomum alutaceum, Grube & Ærsted, Annulat. Ærsted, p. 14, 1858; Diesing, Revis. der Rhyngod. in l. c. p. 765, 1859; Quatrefages, l. c. ii. p. 630, 1865.

Hab. Santa Cruz, West Indies (*Ærsted*).

3. THEMISTE PINNIFOLIA.

Dendrostoma pinnifolium, Keferstein, Beitr. in l. c. p. 207, 1865.

Dendrostomum pinnifolium, Quatrefages, l. c. ii. p. 630, 1865.

Hab. St. Thomas's, West Indies (*Riise*).

4. THEMISTE RAMOSA.

Dendrostomum ramosum, Quatrefages, l. c. ii. p. 629, 1865.

Hab. Brazil (*Quatrefages*).

5. THEMISTE LAGENIFORMIS. (Pl. X. figs. 3-3^c.)

Corpus cum proboscide exserta lageniforme, læve, corrugatum,

* *P. minutum*! evidently a misprint for *minutum*.

transverse rugoso-striatum, rotundato-inflatum, extremitate postica in mucronem obtusum desinente, antica paulo attenuata; pars exsertilis longa, cylindrica, rugoso-plicata; tentaculis 6? in pinnulas numerosas divisas.

Long. corp. 6 lin., crass. 5 lin.; long. part. exsert. 5 lin.

Hab. ? Australia (*Earl of Derby's Coll.*). B.M.

This species, which is one of many specimens of natural history collected for the late Earl of Derby by the late John Macgillivray, appears different from all the others in our collection. When the exsertile portion is protruded, it is completely bottle-shaped, and the skin is entirely free from granulations. It is, however, wrinkled, transversely finely striated and rugose, and at the posterior extremity is almost clathrate. This portion of the body is rounded, inflated, and terminates in a blunt conical point. The exsertile portion is of considerable length, is cylindrical in shape, and rugosely plicate. The tentacles or cirri are short and much pinnated.

We possess two specimens of this species—one with the exsertile portion and tentacula protruded, from which the diagnosis is chiefly drawn up, and which apparently, when collected, had been allowed to dry, and has thus, to outward appearance, become almost smooth; when examined, however, more carefully, the skin is seen to be wrinkled and transversely striated. In the other specimen the proboscis is almost entirely withdrawn, and the skin is much more distinctly wrinkled and striated. At first sight they appear to be distinct species; but as they come from the same locality, I am led to believe them the same.

Genera of Sipunculidæ not sufficiently established, and the position of which is doubtful.

Genus 1. ASCOSOMA.

Ascosoma, Leuckart, Brev. Animal. quor. Descript. 1828; Quatrefages, *l. c.* ii. 1865.

Ascosomum, Diesing, Syst. Helminth. ii. p. 75, 1851; Revis. d. Rhyngod. in *l. c.* p. 778, 1859.

ASCOSOMA BLUMENBACHII.

Ascosoma blumenbachii, Leuckart, Brev. Animal. quor. Descrip. p. 21, t. 1. f. 4, 1828; Quatrefages, *l. c.* ii. p. 630, 1865.

Ascosomum blumenbachii, Diesing, Syst. Helminth. ii. p. 76, 1851; Revis. d. Rhyngod. in *l. c.* p. 778, 1859.

Phascolosoma granulatum, Leuckart? Joh. Müll. Wieg. Arch. p. 168, 1844.

Hab. Mediterranean, near Cette (*Leuckart*).

Genus 2. ANOPLOSOMATUM.

Anoplosomatium, Grube, Act. Echin. Würm. Adriat. p. 47, 1840 (charact. emend.); Diesing, Syst. Helm. ii. p. 68, 1851; Revis. d.

Rhyng. *in l. c.* p. 766, 1859; Quatrefages, *l. c.* ii. p. 630, 1865; Keferstein, Beitr. *in l. c.* p. 209, 1865.

Lanceola, Blainville, Dict. Sc. Nat. lvii. art. Vers, p. 553, 1828.

1. ANOPIOSOMATUM UTRICULUS.

Anoplosomatum utriculus, Grube, Actin. Echin. Würm. Adriat. p. 48, t. 1. f. 3, 1840; Diesing, Syst. Helminth. ii. p. 69; Revis. d. Rhyngod. *in l. c.* p. 766, 1859; Quatrefages, *l. c.* ii. p. 631, 1865.

Hab. Mediterranean, near Palermo (*Grube*).

2. ? ANOPIOSOMATUM PARETTI.

Lanceola paretii, Blain. *l. c.* art. Vers, 1828.

Anoplosomatum paretii, Diesing, Syst. Helm. ii. p. 69, 1851; Revis. d. Rhyngod. *in l. c.* p. 776, 1859; Quatrefages, *l. c.* ii. p. 631, 1865.

3. ANOPIOSOMATUM ANTILLENSE.

Anoplosomatum antillense, Steenstrup, Keferstein, Beitr. *in l. c.* p. 209, 1865.

Hab. St. Ian, West Indies (*Prosch, Suenson, fide Keferstein*).

? Genus 3. DICLIDOSIPHON.

Diclidosisiphon, Diesing, Revis. d. Rhyngod. 1859.

Sipunculus, sp., Lesson, Quatrefages.

DICLIDOSIPHON LUMBRICIFORMIS.

Sipunculus lumbriciformis, Lesson, Cent. d. Zool. p. 152, t. 53. f. 3, 1830.

Sipunculus (Phylosomum) lumbriciformis, Quatrefages, *l. c.* ii. p. 626, 1865.

Diclidosisiphon lumbriciformis, Diesing, Syst. Helminth. ii. p. 70, 1851; Revis. d. Rhyngod. *in l. c.* p. 766, 1859.

Hab. Falkland Islands (*Lesson*).

Family II. ASPIDOSIPHONIDÆ.

Eusipunculidea, Aspidosiphones (part.), Diesing.

Aspidosiphonea, Quatrefages.

Genus 1. ASPIDOSIPHON.

Aspidosiphon, Diesing, Syst. Helm. ii. p. 67, 1851; Revis. der Rhyngod. *l. c.* p. 767, 1859; Quatrefages, *l. c.* ii. p. 608, 1865.

Sipunculus, sp., Blainville.

Sipunculus (Phascolosomum), sp., Joh. Müller.

Lesinia, O. Schmidt, Zeitsch. f. d. gesamt. Naturwiss. 1854, tom. iii. p. 2; Diesing, Revis. der Rhyngod. *l. c.* p. 779, 1859; Quatrefages, *l. c.* p. 599, 1865.

(Anus dorsalis.)

1. ASPIDOSIPHON MÜLLERI.

Sipunculus (Phascolosomum) scutatus, Joh. Müller, in Wiegmann Archiv, tom. xix. p. 166-168, t. 5. f. A-D, 1844; Krohn, in Müll. Archiv, p. 371, 1851.

Aspidosiphon mülleri, Diesing, Syst. Helminth. ii. pp. 68 & 556; Revis. der Rhyngod. l. c. p. 767, 1859; Quatrefages, l. c. p. 609, 1865; O. Schmidt, Mitth. Nat. Verein. Steirmark, p. 56, 1865.

Lesinia farcimen, O. Schmidt, Zeitsch. f. d. gesamt. Naturwiss. 1854, vol. iii. p. 2, t. 1. f. 3; Diesing, Revis. der Rhyngod. l. c. p. 779, 1859; Quatrefages, l. c. p. 599, 1865.

Hab. Mediterranean (*Grohman & Krohn*); Lesina (*Schmidt*); off the Shetland Isles (*J. G. Jeffreys*).
B.M.

Notwithstanding the difference of habitat, I cannot distinguish any marks by which to separate our specimen from the species found in the Mediterranean. It is perhaps less narrow posteriorly; and the small brown points or papillæ, as Diesing terms them, on the body, are smaller than in the species figured by Müller. The *Phascolosoma radiata* of Alder, found in the same locality, and described by him in the 'Annals and Magazine of Natural History' in 1860, approaches in some respects this species, and may possibly be synonymous with it. The description given by Mr. Alder is rather indefinite, and a further examination of fresh specimens is necessary to elucidate the point.

2. ASPIDOSIPHON STEENSTRUPII.

Aspidosiphon steenstrupii, Diesing, Revis. der Rhyngod. l. c. p. 767, 1859; Icon. Zoogr. Ferdinand. I. Imperatoris; Quatrefages, l. c. p. 610, 1865.

Hab. Island of St. Thomas, West Indies (*Riise fide Diesing*).

3. ASPIDOSIPHON RHYSSASPIS.

Aspidosiphon rhyssaspis, Diesing, Revis. der Rhyngod. l. c. p. 768, 1859; Icon. Zoogr. Ferdinand. I. Imperatoris; Quatrefages, l. c. p. 610, 1865.

Hab. West Indies (*Suenson fide Diesing*).

4. ASPIDOSIPHON EREMITA.

Aspidosiphon eremita, Diesing, Revis. der Rhyngod. l. c. p. 768, 1859; Icon. Zoogr. Ferd. I. Imperat.; Quatrefages, l. c. p. 610, 1865.

Hab. Madeira (*Dr. Lister*); inhabiting empty shells of *Ditrupa* (*Diesing*).
B.M.

5. ASPIDOSIPHON COYI.

Aspidosiphon coyi, Quatrefages, l. c. p. 608, 1865.

Hab. Indian seas? (*Quatrefages*).

6. ASPIDOSIPHON LÆVE.

Aspidosiphon læve, Quatrefages, *l. c.* p. 609, t. 20. f. 23, 24.

Hab. Indian seas? (*Quatrefages*).

7. ASPIDOSIPHON CUMINGII, sp. nov. (Pl. XI. fig. 2.)

Corpus cylindricum, fuscum, antice densissime, postice paululum verrucosum, in medio rugosum et circulariter striatum; scutellum anterius subellipticum, brunneum, longitudinaliter sulcatum, posterius centrifuge sulcatum, sulcis dichotomis; proboscis brevis, cylindrica, gracilis, rugosa, fasciata.

Long. corp. 3 unc., lat. 7 lin.; long. probosc. 8 lin.

Hab. Philippine Islands (*Cuming*).

B.M.

This is the largest species I have seen. Anteriorly it is densely granularly tuberculated for nearly an inch in length, posteriorly for only a very short distance. In the middle the body is circularly striated and longitudinally ribbed, as it were, with pellucid ribs. It is of a brownish colour, much deeper at the two extremities, and marked with scattered granulations. The anterior scutellum is of a somewhat oval or elliptic shape, broadly sulcated longitudinally, near the proboscis tubercularly granulated, and at a short distance from where it terminates on the body it is keeled. The posterior scutellum is circular, is marked by the same kind of sulci as the anterior, but radiately disposed and dichotomously divided towards the external margin. It is separated from the lower part of the body by a sharp keel which surrounds it. The proboscis is rugose, slender, and short, is of a light colour at its two extremities, and peculiarly marked in the middle with a broad band of a deep brown.

8. ASPIDOSIPHON TRUNCATUM.

Phascolosoma truncatum, Keferstein, Nach. kön. Gesell. Göttingen, 1866.

Phascolosoma (Aspidosiphon) truncatum, Keferstein, Zeitsch. f. wissensch. Zool. Band xvii. p. 50, t. 6. f. 15-18, 1867.

Hab. Panama (*Agassiz fide Keferstein*).

9. ASPIDOSIPHON RADIATUM.

Phascolosoma radiata, Alder, Ann. & Mag. Nat. Hist. 3rd ser. v. p. 75, t. 5. f. 4-6, 1860.

Sipunculus (Cryptosomum) radiatus, Quatrefages, *l. c.* ii. p. 629, 1865.

Hab. Shetland Isles, in shells of *Aporrhais* (*Barlee fide Alder*).

Genus 2. PSEUDASPIDOSIPHON, Baird.

Corpus gracile, duabus opacitatibus, scutella simulantibus, instructum. Extremitas posterior conica, centrifuge radiata; extremitas anterior, scutello destituta, opaca. Cetera ut in Aspidosiphone.

1. PSEUDASPIDOSIPHON CLAVATUM.

Sipunculus clavatus, Blainville, Dict. Sc. Nat. tom. xlix. art. *Sipunculus*, Atlas, t. 33. f. 2, 1828.

Aspidosiphon clavatum, Diesing, Syst. Helminth. ii. p. 68, 1851.

Aspidosiphon clavatus, Diesing, Revis. der Rhyng. l. c. p. 768, 1859; ? Quatrefages, l. c. p. 611, 1865.

Hab. Mediterranean (*Blainville*).

Quatrefages says of this species that the figure given of it by Blainville in the work quoted above does not represent the anterior scutellum so characteristic of the genus, and which is found in all the other species described. The posterior extremity is conical and centrifugally radiated, but does not appear to have a regular scutellum. The same may be said of the next species, which is said by Diesing to belong doubtfully to the genus *Aspidosiphon*. I have therefore made a new genus for the reception of these two species, and for a third, which does not appear to have been previously described.

2. PSEUDASPIDOSIPHON SPRATTI.

Sipunculus, sp., Spratt, Lond. Edin. & Dublin Philosoph. Magaz. xxxiii. p. 171, 1848.

Aspidosiphon ? spratti, Diesing, Revis. der Rhyngod. l. c. p. 768, 1859.

Hab. Near the island of Malta, at 320 fathoms depth (*Spratt*).

3. PSEUDASPIDOSIPHON GRACILE, sp. nov. (Pl. X. figs. 1, 1^a.)

Corpus gracile, elongatum, cylindricum, striis circularibus cinctum, et granulis parvis, numerosis, brunneis obsitum, parte caudali conoidea, subito acuminata, centrifuge radiata, parte anteriore infra proboscidem attenuatam scutelliformi, brunnea, longitudinaliter rugoso-verrucosa; pars exsertilis attenuata, granulis minimis obsita; proboscis retracta.

Long. corporis $2\frac{1}{4}$ unc., crass. $1\frac{1}{2}$ lin.; long. proboscid. $\frac{1}{2}$ unc., crass. $\frac{1}{2}$ lin.

Hab. Philippine Islands (*Mr. Cuming*).

B.M.

The body of this peculiar species is long and slender, circularly striated, the interspaces between the striæ regularly beset with numerous small brown granules. The caudal portion terminates abruptly in a short conical point, which is longitudinally centrifugally striated, while the upper portion of the body just beneath the exsertile portion is of a dark brown colour, and longitudinally granulosly striated, the two extremities resembling a good deal the scutella of the genus *Aspidosiphon*. The colour of the body is of a light yellowish hue, the two extremities (which show the resemblance to the scutella) being of a darker brown, resembling in this respect the *Sipunculus clavatus*, as represented by Blainville in his figure in the Atlas of the Dict. des Sc. Nat.

Family III. LOXOSIPHONIDÆ.

Eusipunculidea, Aspidosiphones (part.), Diesing, Rev. Rhyng. 1859.

Loxosiphonea, Quatrefages, Hist. Nat. Ann. ii. p. 604, 1865.

(Anus terminalis.)

Genus 1. LOXOSIPHON.

Loxosiphon, Diesing, 1851; Quatrefages, 1865.*Sternaspis*, sp., Chamisso & Eysenhardt.*Sipunculus*, sp., Blainville.

1. LOXOSIPHON ELEGANS.

Sternaspis elegans, Chamisso & Eysenhardt, Nov. Act. Nat. Cur. tom. x. p. 351, t. 24. f. 5 *a-e*, 1820.*Sipunculus elegans*, Blainv. Dict. Sc. Nat. art. Siponcle, Atlas, t. 26. f. 2 (copied from Cham. & Eysenh.), 1828.*Loxosiphon elegans*, Diesing, Syst. Helm. ii. p. 70, 1851; Revis. Rhyng. *l. c.* p. 769, 1859; Quatrefages, Hist. Ann. ii. p. 605, 1865.*Hab.* Island of Radack, Pacific Ocean (*Chamisso*).

2. LOXOSIPHON ASPERGILLUM.

Loxosiphon aspergillum, Quatrefages, Hist. Nat. Annel. ii. p. 605, t. 20. f. 20, 1865.*Hab.* Isle of France (*Quatrefages*).

Genus 2. DIESINGIA.

Diesingia, Quatrefages, ii. p. 606, 1865.

1. DIESINGIA CHAMISSOI.

Diesingia chamissoi, Quatrefages, Hist. Nat. Annel. ii. p. 606, t. 20. f. 22, 1865.*Hab.* — ?

2. DIESINGIA CUPULIFERA.

Diesingia cupulifera, Quatrefages, *l. c.* p. 607, t. 20. f. 21, 1865.*Hab.* ? Indian seas (*Quoy & Gaimard fide Quatrefages*).

Family IV. PRIAPULIDÆ.

Priapulidea, Diesing, 1851 & 1859.*Priapulea*, Quatrefages, *l. c.* p. 600, 1865.*Priapulacea*, Keferstein, Nach. Gesellsch. Wissensch. Götting. 1865.

Genus 1. PRIAPULUS.

Priapulus, Lamarck, 1816; Blainville, 1828; Cuvier, 1830; Edwards; Forbes, 1841; Diesing, 1851 & 1859; Ehlers, 1862; Quatrefages, 1865, &c.*Priapus*, Linnæus.*Holothuria*, sp., Müller, Linnæus.

1. PRIAPULUS CAUDATUS.

Holothuria priapus, Linnæus, Syst. Nat. 12th ed. p. 1091 (synonym. et habitat partim exclusis), 1766; Gmelin, Linn. Syst. Nat.

p. 3140. no. 9, 1789; Müller, O. F., Zool. Dan. Prod. no. 2807, 1776; Zool. Danicæ, tom. iii. p. 27, t. 96. fig. infera, 1789; Fabricius, Faun. Grœnland. p. 355. no. 347, 1780; Abildgaard, in Schrift. der Gesellsch. naturf. Freunde zu Berlin, tom. ix. p. 133, t. 3. f. 1-3, 1789; Rathke in Zool. Dan. iv. pp. 18-19, ? t. 135. f. 2, 1784.

? *Priapus humanus*, Linnæus, Amœn. Acad. tom. iv. p. 255, 1754?

Madkomoder, Olafsen & Povelsen, Reyse igiennem Island, Deel ii. p. 1001, t. 10. f. 9 (from an injured specimen), 1772.

Priapulus caudatus, Lamarck, An. s. Vert. 1st edit. tom. iii. p. 77, 1816; 2nd edit. iii. p. 467, 1840; Schweigger, Handb. der Naturg. p. 554, 1820; Fleming, British Animals, p. 491, 1828; Blainville, Dict. Sc. Nat. art. Vers, tom. lvii. p. 554, 1828; Forbes, Hist. British Starfishes, p. 256, fig. annexed, 1841; M.-Edwards, Cuv. R. An. edit. Crochard, Zooph. t. 21. f. 2; Frey and Leuckart, Beit. zur Kenntn. wirbellos. Thiere (anatom.), pp. 40-45, 1847; Sars, Mag. for Naturvidenskab. p. 76, 1850; Diesing, Syst. Helm. tom. ii. pp. 71 & 556, 1851; Revis. der Rhyngod. l. c. p. 769, 1859; O. Schmidt, Zeitsch. für die gesammten Naturwissensch. Halle, 1854, p. 4, t. 2. f. 4 a-b; Maitland, Faun. Belgii Septent. tom. i. p. 96, 1851; Phillips, Report of British Assoc. 23rd meeting, at Hull, in 1853, Notices and Abstracts, pp. 70-71, 1854; Ehlers, Zeitsch. für wissenschaft. Zool. tom. xi. p. 209, t. 20. f. 1-13, t. 21. f. 14-22, 1862; Keferstein, Beitr. zur Anat. und Syst. Kennt. der Sipunculid. p. 208, 1865; Quatrefages, Hist. Nat. des Annel. tom. ii. part 2. p. 601, 1865.

Priapulus, sp., Cuvier, R. An. 2nd edit. tom. iii. p. 242, 1830.

Priapula caudata, Guérin, Iconog. R. Anim. Zooph. t. 5. f. 2, copied into Griffith's An. Kingd. xii. Zooph. t. 12. f. 2, 1834 (both copied from Müller).

Priapulus hibernicus, M'Coy, Ann. & Mag. Nat. Hist. 1st ser. tom. xv. p. 272, t. 16. f. 1, 1845; Diesing, Syst. Helm. ii. p. 71, 1851; Revis. Rhyng. l. c. p. 770, 1859.

Lacazia hibernica, Quatrefages, Hist. Nat. Annel. ii. p. 604, 1865.

Hab. Coasts of Greenland, Norway, Great Britain, and shores of German Ocean.

B.M.

This species, like most of the group to which it belongs, varies remarkably in appearance according as it is observed alive or, as it is generally seen, corrugated and preserved in spirits. Professor Forbes, in his 'History of the British Starfishes,' points this out, and says that when alive it will in a moment change its size from half an inch to as many as four or five inches. Professor Phillips, in his notes upon the animal seen alive, quoted above, says that it becomes very active in the sunshine, "drawing in and exerting the proboscis quickly and even suddenly, opening and again contracting the large caudal plume, bending, extending, and shortening the body without any settled order of changes." This will account for the discrepancy in the various figures given by different authors. The figure given by Müller in his 'Zoologia Danica,' copied into Guérin's 'Iconography,' and the works of Abildgaard & Forbes would almost be sufficient, were

it not for the author's descriptions, to induce one to suppose that they referred to a distinct species from the animal figured by Ehlers and others, and the specimens from Scotland and Greenland which we possess in our Collection. The *P. hibernicus* of M'Coy, as figured by him in the 'Annals,' exactly corresponds with the figure given by Ehlers of *P. caudatus*, and with our specimens of that species in the Collection as corrugated by the spirits in which they have been preserved. I have no hesitation, therefore, in referring it to our *P. caudatus*. What Quatrefages could see in either M'Coy's description or figure to induce him to place it in the genus *Lacazia* I am at a loss to understand. Indeed he himself places it there with doubt. Linnæus, in his dissertation, 'Chinensia Lagerstrœmiana' (first published in 1754), and afterwards in the 'Amœnitates Academicæ,' vol. iv. p. 255, and in the 10th edit. of the Syst. Natur. p. 656 (1758), describes a species of *Priapulus* which has been usually quoted as synonymous with the *P. caudatus*. He names it in these works *Priapus humanus*—an objectionable name in itself, and which he afterwards changed in the 12th edition of the 'Systema Naturæ' to *Holothuria priapus*. As the species of plants and animals mentioned in that dissertation ('Chinensia Lagerstrœmiana') chiefly refer to those inhabiting the Southern or East-Indian and Chinese seas, and as in the 10th edit. of the Syst. Nat. he mentions distinctly the habitat "*in mari indico*," I have some hesitation in referring the species described there to the *caudatus*, which is a northern species, and not likely to be met with in the Indian seas. Osbeck, however, a pupil of Linnæus, mentions a species as found in China, and which is referred to the *Holothuria priapus* of Linnæus. His voyage to China was made in the years 1750–52; and an English translation, with a 'Faunula Chinesia' attached, was published in London in 1771: *vide* this edition, p. 337.

2. PRIAPULUS GLANDIFER.

Priapulus glandifer, Ehlers, Zeitschr. f. wissensch. Zool. tom. ii. p. 209, t. 20. f. 24, 1862; Quatrefages, *l. c.* p. 601, 1865.

Hab. North seas (*Ehlers*).

3. PRIAPULUS BREVICAUDATUS.

Priapulus brevicaudatus, Ehlers, *l. c.* t. 21. f. 23, 1862; Quatrefages, *l. c.* p. 601, 1865.

Hab. North seas (*Ehlers*).

4. PRIAPULUS TUBERCULATO-SPINOSUS. (Pl. XI. fig. 3.)

Proboscis 25 *costis longitudinalibus tuberculato-spinosis*; *cauda brevis, papillis numerosis validis longe acuminatis*; *dentes os cingentes, pallidi, in basi lati cum aculeo parum incurvato unico*; *corporis pars postica verrucis magnis obsita.*

Hab. Falkland Islands. Collected by Dr. J. Robertson during the Antarctic expedition under the command of Sir James Ross. B.M.

This species, according to the only specimen we have in the Collection, is upwards of five inches in length, and the trunk is about one inch in circumference. It is of an olive colour, the exsertile part of the body, or proboscis, darker than the rest of the animal. This proboscis is large, somewhat club-shaped; and the ribs, which run down longitudinally, are placed at some distance from each other, and, instead of being roughened with short spines (*muricated*) as in the other known species, are beset at nearly equal distances with unequal-sized small tubercles, which have a lax spine coming out of the centre. The lower extremity of the body is covered with rather large warts. The tail itself is short; but the papillæ which surround it are numerous, rather strong, and terminate in a long sharp point. The teeth (which surround the mouth) are of a pale colour, of tolerable size, spring from a broad base, and have only one (the central) spine, slightly curved inwards. The lateral small teeth, seen in the other species, in this one appear to be altogether wanting. The body is divided into numerous flattened rings, about fifty in number; the grooves or sulci which separate them are very distinct; and each ring is marked with a fine groove running round the centre; it is nearly smooth at the upper part, becoming striated as it descends, and is beset very sparingly with sharp spines, which, however, are most numerous posteriorly.

Genus 2. HALICRYPTUS*.

Halicryptus, Siebold, 1849?; Diesing, 1859; Keferstein, 1865; Quatrefages, 1865.

HALICRYPTUS SPINULOSUS.

Halicryptus spinulosus, Siebold, in *Neue Preussische Provincial-Blätter*, vii. figs. 8, 9, 1849?; Diesing, *Revis. der Rhyngod. in l. c.* p. 779, 1859; Keferstein, *Beitr. in Nach. kön. Gesellsch. Göttingen*, p. 208, 1865; Quatrefages, *l. c.* ii. p. 599, 1865.

Hab. —?

Genus 3. CHÆTODERMA.

Chætoderma, Lovén, *Hornschuch, Arch. Skandinav.* 1845; Diesing, *Revis. d. Rhyngod.* 1859; Keferstein, *Beitr. in l. c.* 1865.

Chætoderma, Quatrefages, *l. c.* 1865.

CHÆTODERMA NITIDULUM.

Chætoderma nitidulum, Lovén, *Hornschuch, Arch. Skandinav. Beitr. z. Naturg.* i. p. 69, tab., et in *Froriep, Neue Notiz.* tom. xxxiv. p. 26, f. 43, 1845; Diesing, *Revis. der Rhyng. in l. c.* p. 770, 1859; Keferstein, *Beitr. in l. c.* p. 208, 1865.

Chætoderma nitidulum, Quatrefages, *l. c.* ii. p. 602, 1865.

Hab. Coast of Sweden (*Lovén*).

* Diesing, followed by Quatrefages, places this genus amongst his "genera minus cognita;" but Keferstein accepts it as belonging to the family *Priapulidæ*.

? Genus 4. LACAZIA.

Lacazia, Quatrefages, *l. c.* 1865.

LACAZIA LONGIROSTRIS.

Quatrefages, *l. c.* ii. p. 603, t. 20 (16 bis *in textu*). f. 18, 19, 1865.

Hab. — ?

This appears to be a doubtful genus. Certainly the second species quoted by Quatrefages (*Lacazia hibernica*) is a true *Priapul*us, and is nothing more than the *Priapul*us *caudatus* (*P. hibernicus*, M^cCoy).

Order II. GEPHYREA ARMATA.

Rhynchelidea, Diesing, Syst. 1851.

Sipunculidea baseostomata, Diesing, Revis. 1859.

Gephyrea armata, Quatrefages, *l. c.* ii. 1865.

Family I. STERNASPIDÆ.

Sternaspidea, Quatrefages, *l. c.* ii. 1865; V. Carus.

Sternaspididæ, Malmgren, Annulat. polychæt. Spitsberg. Grœnland. &c. p. 85, 1867.

Genus STERNASPIS*.

Sternaspis, Otto, Nov. Act. 1821; Blainville, Dict. Sc. Nat., 1828; Cuvier, R. A. 1830; Lamarck, A. s. V. 1838; Krohn, Müll. Archiv, 1842; Quatrefages, Hist. Nat. Annel. 1865; Malmgren, *l. c.* 85, 1867.

Echinorhynchus, sp., Renier, 1807.

Thalassema, sp., Ranzani, Isis, 1817; Schweigger, Handb., 1820; Martens, 1824.

1. STERNASPIS SCUTATA.

Mentula cucurbitacea marina, Janus Plancus, De Conchis minus notis, p. 110, t. 5. App. f. D, E, 1760.

Echinorhynchus scutatus, Renier, Tavola alfabetica delle Conchiglie Adriatiche, 1807† (as quoted by Ranzani in his paper in 'Isis').

Schreberus bremseri, Renier, Catalog. Vienn. (? MS.), 1807? fide Otto et Blainv.†

Thalassema scutatum, Ranzani, Isis, 1817; *ib.* xii. pp. 1457–60,

* M. Claparède, in his critique on the classification of the Annelida, especially with reference to that of M. Quatrefages, in the 'Bibliothèque Universelle,' 1867, and translated in the 'Annals & Magazine of Nat. Hist.' for November 1867, expresses his concurrence with Oken, Siebold, Max Müller, and Malmgren in their opinion that the genus *Sternaspis* belongs to the true Annelida. He also says that it is astonishing "that in the year 1865 M. de Quatrefages, in assigning to *Sternaspis* a place among the Gephyrea, should still mistake the head of these animals for the tail, without taking any notice of the beautiful anatomical investigations of MM. Krohn and Max Müller, and more especially as neither Bianchi (Janus Plancus), Ranzani, nor Delle Chiaje had fallen into the error of Oken and Otto, now corroborated by the authority of M. Quatrefages" (Ann. & Mag. Nat. Hist. 1867, p. 361).

I retain here the genus *Sternaspis* amongst the Gephyrea, as, in outward form at least, it seems to be more nearly allied to this group than to the true Annelids.

† These works I have not been able to see.

t. 11. f. 10-14; Eysenhardt, *Isis*, 1818; *ib.* xii. p. 2086, t. 26. f. 1, 2; Schweigger, *Handb. der Naturgesch. der ungeglied. Thiere*, p. 593, 1820; Martens, *Fauna Veneta*, in *Reise nach Venedig*, Theil ii. p. 486, 1824.

Sternaspis thalassemoides, Otto, *Epist. gratulator.* Vratislav. 1820*, and in *Nov. Act. Nat. Cur.* t. x. pp. 619-27, t. 50. f. 1-5, 1821; Blainville, *Dict. des Sc. Nat. art. Vers*, p. 500, *Atlas*, t. 26. f. 1, 1a-1d, 1828; Delle Chiaje, *Mem. Stor. e Notom. degli Animali del Reg. Napol.* vol. iv. t. 62. f. 18, and (*descript. of plate*) p. 204, 1829; Cuvier, *Règn. Animal*, tom. iii. p. 245, 1830; Guérin, *Icon. du Règn. An. Zoophytes*, t. 6. f. 4; Cuvier, *R. A. edit. Griffith*, vol. xii. p. 456, t. (Zoophytes) 1. f. 3, copied from Guérin, 1834; *Cuv. R. A. edit. Crochard, Echinod.* p. 45, t. (Zoophytes) 22. f. 3, ? 1837; Lamarck, *An. s. Vert.* v. p. 535, 1838; Krohn, *Müll. Archiv für Anat.* 1842, p. 426; Max Müller, *Obs. Anat. de Verm. quibusd. Marin.* p. 1, tab. 1* (quoted by Quatrefages), 1852; Quatrefages, *Hist. Nat. des Annelés*, tom. ii. p. 391, 1865.

Sternaspis scutata, Malmgren, *Annulat. polychæt. Spitsberg. &c.* p. 85, 1867.

Hab. Mediterranean and Adriatic seas.

B.M.

2. STERNASPIS FOSSOR, Stimpson.

3. STERNASPIS AFFINIS, Stimpson.

Sternaspis affinis, *Proceed. Acad. Nat. Sc. Philadelphia*, 1864, p. 159.

Hab. Puget Sound (*Stimpson*).

4. STERNASPIS ASSIMILIS.

Sternaspis assimilis, Malmgren, *l. c.* p. 87, 1867.

Hab. West coast of France.

5. STERNASPIS ISLANDICA.

Sternaspis islandica, Malmgren, *l. c.* p. 87, t. 14. f. 85.

Hab. Iceland.

Family II. ECHIURIDÆ.

Echiurea, Quatrefages.

Schizorhynchelidea (part.), Diesing.

Thalassemæ (part.), Cuvier.

Thalassamaceæ (part.), Forbes & Goodsir.

Thalassemata (part.), Brandt.

Genus ECHIURUS.

Lumbricus, sp., Pallas, Fabricius, Gmelin.

Thalassema, Cuvier, Lamarck, Bosc, Blainville, Leach, Savigny, M. Edwards.

Echiurus, Cuvier, *Règn. Animal*, 2nd edit. tom. iii. p. 244; Guérin, Forbes, Brandt, Quatrefages, Diesing.

1. ECHIURUS VULGARIS.

Lumbricus echiurus, Pallas, *Spicil. Zool. fasc. x.* p. 5, t. 1.

* Works not seen by me.

f. 1-5, 1774; *Miscell. Zool.* p. 148, t. 11. f. 1-6, 1766; O. Fabricius, *Faun. Grœnland.* p. 285. no. 268, 1780; Gmelin, *Syst. Natur.* tom. i. p. 3085. no. 9, 1789; Bruguière, *Encyc. Méthod. Helm.* t. 35. f. 3-6.

Thalassema rupium, Lamarck, *Syst. des An. sans Vert.* p. 339 (synonyms excluded), 1801*.

Thalassema echiurus, Bosc, *Hist. des Vers.* i. p. 224, t. 8. f. 2, 3, 1802; Cuvier, *Bullet. des Scien.* 18 ; *Règn. An.* 1st edit. ii. p. 529, 1817; Lamarck, *An. s. Vert.* 1st edit. v. p. 300, 1818; 2nd edit. v. p. 534, 1838; Schweigger, *Handb. der Naturg. ungegl. Thiere*, p. 593, 1820; Blainville, *Dict. des Sc. Nat. art. Vers.* p. 499, 1828; Mettenheimer, in *Senckenbergische Abhandl.* tom. i. Lief. 1. p. 6, t. 1. f. 19 (cum anat.).

Thalassema vulgaris, Savigny, *Syst. des Annélides*, p. 102, 1809.

Thalassema aquatica, Leach, *Encyc. Brit. Supp.* vol. i. p. 451, 1824.

Echiurus, sp., Cuvier, *Règn. An.* iii. p. 244, 1830.

Echiurus pallasii, Guérin, *Icon. Règn. Anim. Zoophytes*, t. 6. f. 3, copied into Griffith's *An. Kingd.* vol. xii. p. 456, t. (Zoophytes) 1. f. 3, 1833; Diesing, *Rev. d. Rhyng. l. c.* p. 775, 1859; Quatrefages, *Hist. Nat. des Annelés*, tom. ii. part 2. p. 592, 1865.

Thalassema neptuni, Edwards, *Règn. An. edit. Crochard, Zooph.* t. 21. f. 4.

Echiurus vulgaris, Forbes & Goodsir, *Ed. New Phil. Journ.* xxx. p. 369, t. 7. f. 1, 1841; Forbes, *Brit. Starfishes*, p. 263, f., 1841, copied into Froriep's *N. Notiz.* tom. xviii. no. 392, pp. 273-280, f. 11-23 (cum anat.), 1841; Sars, in *Mag. for Naturvidensk.* 1850, pp. 10 & 17; O. Schmidt, *Zeitschrift f. d. gesamt. Naturwiss.* 1854, Band iii. p. 6, t. 2. f. 5.

Hab. Coasts of Belgium and Great Britain, W. sands, St. Andrew's (*Dr. McIntosh*). B. M.

2. ECHIURUS GAËRTNERI.

Echiurus gærtneri, Quatrefages, *Ann. des Sc. Nat.* 3rd series, t. vii. p. 307, t. 6 (anatomy), 1847; Cuv. *Règn. Anim. edit. Crochard, Zoophytes*, t. 23. f. 1; *Hist. Nat. des Annelés*, tom. ii. part 2. p. 593, t. 16. f. 13, 1865; *Voyage en Sicile*, p. 221, t. 25, 26; V. Carus, *Icon. Zootom.* t. 8. f. 20; Diesing, *Revis. der Rhyngod.* p. 776, 1859.

Hab. St. Vaast, Normandy (*Quatrefages*).

3. ECHIURUS FORCIPATUS.

Holothuria forcipata, Fabricius, *Faun. Grœnland.* p. 357, 1780.

Echiurus forcipatus, Reinhardt, *Naturhist. Bidr. Besk. Grœn-*

* This species was named *Thalassema rupium* by Lamarck in 1801, but not described; and the references he gives to the figures of Pallas and the *Encyc. Méthod.* represent the *Sipunculus edulis*. Savigny was the next to name it, which he did by calling it *Thalassema vulgaris*. He describes it at some length (1809), and refers to the proper figures of Pallas &c. I have therefore followed Forbes and Goodsir in preserving the specific name given it by this eminent naturalist.

land, 1857 ; Diesing, Revis. Rhyng. p. 776, 1859 ; Quatrefages, Hist. Nat. Annelés, tom. ii. pt. 2. p. 593, 1865.

Bonellia fabricii, Diesing, Syst. Helm. ii. p. 75, 1851.

Hab. Greenland (*Fabricius, Rudolphi, Rink*).

4. ECHIURUS LUTKENII.

Echiurus lutkenii, Diesing, Icon. Zoogr. Ferdinand. I. Imperator., Rev. der Rhyng. p. 777, 1859 ; Quatrefages, Hist. Nat. des Annelés, tom. ii. pt. 2. p. 593, 1865.

Hab. Helleboek (*Lütken*).

5. ECHIURUS SITCHAENSIS.

Thalassema no. 1, Mertens, MS. *in l. c. infra*.

Echiurus sitchaënsis, Brandt, Prod. Desc. Anim. a Mertensio obs. fasc. i. p. 62, 1835 ; Lamarck, An. s. Vert. 2nd edit. tom. iii. p. 472, 1838 ; Diesing, Rev. der Rhyngod. p. 777 ; Quatrefages, *l. c.* p. 593, 1865.

Hab. Sitka Sound (*Mertens*).

6. ECHIURUS CARAIBICUS.

Echiurus caraibicus, Diesing, Icon. Zoogr. Ferdinand. I. Imperat., Rev. Rhyng. p. 777, 1859 ; Quatrefages, *l. c.* p. 594, 1865.

Hab. West Indies (*Suenson et Krebs, fide Diesing*).

? 7. ECHIURUS CHRYSACANTHOPHORUS.

Holothuria chrysacanthophora, Couthoy, *fide Diesing*.

Echiurus chrysacanthophorus, Pourtalès, Proc. Amer. Ass. Ad. Sc. v. Meet. 1851, p. 39 ; Diesing, *l. c.* p. 778, 1859 ; Quatrefages, Hist. Nat. Ann. tom. ii. part 2. p. 594, 1865.

Hab. North-American Sea.

? 8. ECHIURUS CHILENSIS.

Echiurus chilensis, Max Müller, Obs. Anat. de Verm. quibusd. Marit. p. 21, 1852 ; Diesing, Revis. *l. c.* p. 778, 1859 ; Quatrefages, *l. c.* p. 594, 1865.

Hab. Coast of Chili.

Fam. III. BONELLIDÆ.

Bonellia, Lacaze, Quatrefages.

Schizorhynchelidea (part.), Diesing.

Genus I. THALASSEMA.

Thalassema, Gärtner, Cuvier, Forbes, M.-Edwards, Farran, Quatrefages, Diesing.

Lumbricus, sp., Pallas, Gmelin.

Thalassina, Montagu.

Ochetostomum, Leuckart et Rüppell, Diesing.

Holothuria, sp., Lesson.

1. THALASSEMA NEPTUNI.

Thalassema neptuni, Gärtner in lit., Pallas, Spic. Zool. tom. i.

fasc. 10. p. 8, 1774; Cuvier, Règn. Anim. tom. iii. p. 244, 1830; Guérin, Icon. R. Anim. Zoophytes, t. 6. f. 2, copied into Griffith's An. Kingd. tom. xii. p. 456, Zoophytes, t. 1. f. 2, 1833; Lamarck, An. s. Vert. 2nd edit. tom. iii. p. 472, 1846; Forbes & Goodsir, Edinb. New Philos. Journ. tom. xxx. p. 370, 1841, and in Froriep's Neue Notiz. tom. xviii. p. 273, 1841; Forbes, Brit. Starfishes, p. 259, fig. append., 1841; Farran, Ann. & Mag. Nat. Hist. 2nd series, tom. vii. p. 156, 1851; Nat. Hist. Review, tom. vi. p. 70, 1859; Diesing, Revis. der Rhyngod. *l. c.* p. 772, 1859; Quatrefages, Hist. Nat. Annelés, tom. ii. pt. 2. p. 594.

Lumbricus thalassema, Pallas, Spic. Zool. tom. i. fasc. 10. p. 8, t. 1. f. 6, 1774; Gmelin, Syst. Nat. p. 3085. no. 10, 1789 (synon. prim. excluso); ?Turton, Linn. Syst. Nat. tom. iv. p. 59; Brit. Fauna, p. 125, 1807 (synon. prim. excluso), descriptions and references copied from Gmelin.

Thalassina mutatoria, Montagu, Linn. Trans. vol. xi. p. 24, t. 5. f. 2, 1815.

Thalassema mutatorium, Cuvier, Règn. Anim. tom. iii. p. 244, 1830; Edwards, Règn. Anim. edit. Crochard, Zoophytes, t. 21. f. 4, 5.

Ochetostomum Gærtneri, Diesing, Syst. Helminth. tom. ii. p. 73. no. 3, and p. 556, 1851.

Ochetostoma mutatorium, Diesing, *l. c.* no. 4.

Hab. Coast of England, Devonshire (*Montagu*); Cornwall (*Cocks, Laughrin, &c.*); Ireland, near Dungarvon (*Farran*). B.M.

2. THALASSEMA BREVIPALPIS.

Thalassema brevipalpis, Quatrefages, Hist. des Annel. tom. ii. pt. 2. p. 595, 1865.

Hab. — ?

3. THALASSEMA PERONII.

Thalassema peronii, Quatrefages, *l. c.* p. 595, 1865.

Hab. Indian seas.

4. THALASSEMA LESSONII.

Holothuria eaouari, Lesson, Cent. Zool. p. 91, t. 31. f. 2, 1830; Guérin, Icon. R. An. Zooph. t. 4. f. 6 (copied from Lesson).

Ochetostomum lessoni, Diesing, Syst. Helminth. ii. p. 73, 1851.

Thalassema lessonii, Diesing, Revis. d. Rhyng. *l. c.* p. 774, 1859; Quatrefages, *l. c.* ii. p. 596, 1865.

Hab. Borabora, Oceania (*Lesson*).

5. THALASSEMA GIGAS.

Thalassema gigas, Max Müller, Obs. Anat. de Verm. quibusd. Marit. p. 14, t. 3. f. 1-12, 1852; Diesing, Revis. d. Rhyngod. *l. c.* p. 773, 1859; Quatrefages, *l. c.* ii. p. 596, 1865.

Hab. Coast of Italy (*Max Müller*).

6. THALASSEMA GROHMANNI.

Ochetostomum grohmanni, Diesing, Syst. Helm. ii. p. 74, 1851.

Thalassema grohmanni, Diesing, Revis. der Rhyngod. p. 773, 1859 ;
Quatrefages *l. c.* p. 596, 1865.

Hab. Sea at Palermo (*Grohmann*).

7. THALASSEMA PELZELNII.

Thalassema pelzelni, Diesing, Icon. Zoogr. Ferdinand. I. Imperat. ;
Revis. d. Rhyng. *l. c.* p. 774, 1859 ; Quatrefages, *l. c.* ii. p. 596,
1865.

Hab. West Indies (*Diesing*).

8. THALASSEMA ERYTHROGRAMMON.

Ochetostoma erythrogrammon, Leuckart & Rüppell, Atlas z. Reise
im nördl. Afric. Zoophytes, p. 7, t. 2. f. 3, 1828.

Ochetostomum erythrogrammon, Diesing, Syst. Helm. ii. p. 72,
1851.

Thalassema erythrogrammon, Max Müller, Obs. Anat. Verm. Ma-
rit. p. 16, 1852 ; Joh. Müller, Müll. Arch. 1854, p. 97 ; Diesing,
Revis. d. Rhyng. *l. c.* p. 774, 1859 ; Quatrefages, *l. c.* ii. p. 599,
1865.

Hab. Red Sea (*Rüppell*).

Genus 2. BONELLIA.

Bonellia, Rolando, Cuvier, Blainville, Edwards, Schmarda, Lacaze
Duthiers, Diesing, Quatrefages, &c.

1. BONELLIA VIRIDIS.

Bonellia viridis, Rolando, Mem. d. Reale Ac. d. Sc. di Torino,
tom. xxvi. pp. 539-556, t. 14. f. 1-3, t. 15. f. 5-7, 1822 ; Isis,
1823, pp. 398-403, t. 5 ; Blainville, Dict. Sc. Nat. art. Vers, p. 576,
Atlas, t. 38. f. 1, 1a-1d, 1828 (copied from Rolando) ; Cuvier,
Règn. Anim. 2nd edit. tom. iii. p. 244, 1830 ; Dujardin, in Lamk.
A. s. Vert. 2nd edit. tom. iii. p. 471, 1840 ; ? Guérin, Icon. Zooph.
t. 6. f. 1 ; Edwards, Règn. An. edit. Crochard, t. 21. f. 3, ? 1840 ;
Diesing, Syst. Helminth. ii. p. 74, 1851 ; Revis. Rhyngod. p. 771,
1859 ; Schmarda, Denkschrift. der Ak. der Wiss. in Wien, tom. iv.
pp. 117-126, t. 4-7, 1852 ; Ærsted, in Krøy. Tidss. tom. iv. p. 579 ;
Lacaze Duthiers, Ann. Sc. Nat. 4th ser. tom. x. pp. 49, 110, t. 1.
f. 1, 2, t. 2 (anatomy), 1858 ; Quatrefages, Hist. Annelés, tom. ii.
pt. 2. p. 597, 1865.

Hab. Mediterranean (*Rolando*).

2. BONELLIA FULIGINOSA.

Bonellia fuliginosa, Rolando, *l. c.* p. 552, t. 15. f. 4, 1822 ; Dujardin,
in Lamk. A. s. Vert. 2nd ed. tom. iii. p. 471 ; Diesing, Syst. Helm.
p. 75, 1851 ; Revis. d. Rhyng. p. 771, 1859 ; Quatrefages, *l. c.*
p. 598, 1865.

Bonellia viridis juvenilis, Blainville, Dict. Sc. Nat. tom. lvii. p. 576,
Atlas, Apodes, t. 1. b, 1828 (*fide* Diesing).

Hab. Coast of Sardinia (*Rolando*).

EXPLANATION OF THE PLATES.

PLATE IX.

- Fig. 1. *Sipunculus angasii*, Baird, nat. size, p. 80.
 2. ——— *deformis*, Baird, nat. size, p. 80.
 3. *Phascolosoma capsiforme*, Baird, nat. size, p. 83.

PLATE X.

- Fig. 1. *Pseudaspidosiphon gracile*, Baird, magnified, p. 103.
 1^a. The same, nat. size, p. 103.
 2. *Phascolosoma perlucens*, Baird, magnified, p. 90.
 2^a. The same, nat. size, p. 90.
 3. *Themiste lageniformis*, Baird, magnified, p. 98.
 3^a. The same, nat. size, p. 98.
 3^b. The same, exsertile portion and crown of cirri, magn., p. 98.
 3^c. " " " " " nat. size, p. 98.

PLATE XI.

- Fig. 1. *Phascolosoma nigriceps*, Baird, magnified, p. 90.
 1^a. The same, nat. size, p. 90.
 2. *Aspidosiphon cumingii*, Baird, nat. size, p. 102.
 3. *Priapulus tuberculato-spinosus*, Baird, nat. size, p. 106.

3. Notes on the Breeding of several Species of Birds in the Society's Gardens during the year 1867. By A. D. BARTLETT, Superintendent of the Society's Gardens.

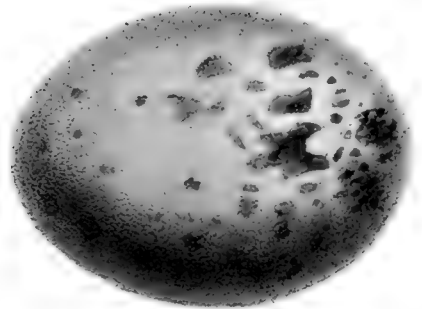
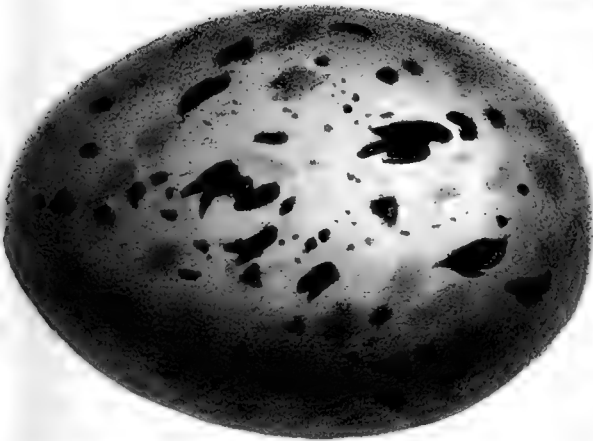
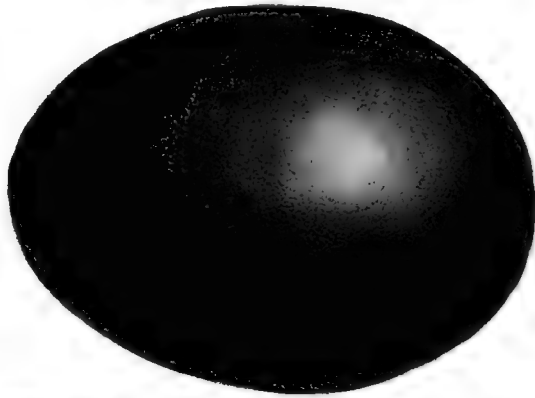
(Plate XII.)

The following list of species of birds bred during the last year will be found to contain several that I believe have never been before recorded as having reproduced in the Society's Gardens; and some of the facts noted are of considerable importance with reference to the habits and affinities of the species to which they belong:—

| | |
|----------------------------------|----------------------------------|
| <i>Impeyan Pheasant.</i> | <i>Rufous Tinamou</i> .*. |
| <i>Pallas' Eared Pheasant</i> *. | <i>Common Cassowary</i> *. |
| <i>Japanese Pheasant.</i> | <i>Black Kite</i> *. |
| <i>Barred-tailed Pheasant</i> *. | <i>Black-crested Cardinal</i> *. |
| <i>Cheer Pheasant.</i> | <i>Turquoise Parrakeet.</i> |
| <i>Swinhoe's Pheasant</i> *. | <i>Dusky Duck.</i> |
| <i>Lineated Pheasant.</i> | <i>Bahama Duck.</i> |
| <i>Purple Kaleege.</i> | <i>Carolina Duck.</i> |
| <i>Black-backed Kaleege.</i> | <i>Ruddy Sheldrake.</i> |
| <i>Bankiva Jungle-fowl.</i> | <i>New Zealand Sheldrake.</i> |
| <i>Talegalla.</i> | <i>Ruddy-headed Goose.</i> |
| <i>Sun-Bittern (Eurypyga).</i> | <i>Ashy-headed Goose.</i> |

The most remarkable of these is perhaps the Rufous Tinamou (*Rhynchotis rufescens*), of which species I am able to state that the male bird incubates, and that one male will attend to two or more

* Those marked thus have bred for the first time.



J. Jemeno del et lith.

M & N Hazhant. imp.

CHICK AND EGG OF TINAMOU &c.



females*. The number of eggs laid by two birds between the 20th of May and the 24th of September was eighty-five; out of this number, upwards of twenty birds were hatched. Many more would have been hatched had it not been for the parent birds, who were guilty of frequently eating the eggs before the young birds had arrived at a perfect state. It was only by removing the eggs to the care of common hens that we succeeded in hatching and rearing sixteen or eighteen young birds.

The male bird would take to the eggs when ten or twelve were laid, and after about fifteen days' incubation was found breaking them up and eating the contents, which in many instances were imperfectly developed young. In no instance did the female attempt to incubate. The period of incubation was twenty-one days. The chick (Pl. XII. fig. 1) much resembles the young of a Rhea, and, from its small size, looks and walks about like a little *Apteryx*; in fact the keepers and others who saw Tinamous for the first time thought they were the young of the former bird. They fed upon worms, chopped meat, boiled eggs, &c.

Of the several species above mentioned some have bred in the gardens many times; but as a few of them have bred for the first time, I beg leave to call particular attention to these.

Perhaps the most valuable addition to the list is the breeding of the Barred-tailed Pheasant (*Phasianus reevesii*). It is most remarkable that the birds arrived on the 22nd of June and commenced laying immediately, and four birds were hatched on the 10th of August. Another singular instance of late breeding occurred with a fine pair of imported Versicolor Pheasants, which arrived from Japan on the 27th of July, and three young birds were produced on the 20th of September. These birds were considered useless and not likely to live; but two of them (hens) are now strong and healthy birds, having perfectly got over their moult during the coldest part of this winter.

Of the *Crossoptilon* or Eared Pheasant of Pallas we have reared nine fine birds, the second hatch, having lost by the gapes the first brood of seven. With reference to this species, I may remark that these birds breed when only one year old. At the first moult the young birds assume the adult plumage, the male and female being exactly alike. They are remarkably hardy, and extremely tame.

In concluding, I beg to call attention to my paper published in the Society's 'Proceedings' for 1862, on the habits and affinities of the Kagu (*Rhinocetus jubatus*). I there gave it as my opinion that this bird was more nearly allied to *Eurypyga* than to any other bird. Again, in the Society's 'Proceedings' in January 1866, at pp. 77 and 78, I stated, after speaking of the egg and young bird:—

“That *Eurypyga* is less a Heron than has generally been thought must now be admitted, and the spotted egg and downy young one abundantly shows. I feel, however, certain that this bird has its nearest ally in the Kagu (*Rhinocetus jubatus*), as already stated (see P. Z. S. 1862, p. 218).” Having stated this so long since, it is

* The eggs are laid on the ground in a hollow formed by the male bird in the sand or mould. No other nest is made.

with great pleasure I have this evening to offer a most striking proof of the correctness of these views, one of the Kagus at the Gardens having had the kindness to lay a very fine egg, which I now place before you. (See Plate XII. fig. 3.) This egg was rendered useless for hatching immediately after it was laid, by being pecked by the bird that laid it, or by some other bird in the aviary. It is, however, a very fine and well-marked specimen, and in many particulars closely resembles the egg of *Eurypyga* (Pl. XII. fig. 4), but perhaps exhibits rather more of the form of the eggs of the Cranes (*Grus*) than of the Rails and Plovers. Moreover the lively movements of the bird as described by me in 1862 fully support its affinities with the Cranes, and show, I think, that it has less affinity to the Ardeine group.

DESCRIPTION OF PLATE XII.

- Fig. 1. Chick of *Rhynchotis rufescens*.
 2. Egg of *Rhynchotis rufescens*.
 3. Egg of *Rhinochetus jubatus*.
 4. Egg of *Eurypyga helias*.

4. Additional Notes on the Ornithology of the Pelew Islands.

By Dr. G. HARTLAUB and O. FINSCH*.

A new collection from the Pelew Islands has been submitted to our examination. This collection was formed by the late Dr. Semper of Altona, and is now deposited in the Museum of that town. It consists of eighteen species, two of which are undescribed:—

1. COLLOCALIA VANICORENSIS, Q. & G.

The only difference between this oceanic species and *C. francica* from the Mascarene Islands consists in the colour of the under tail-coverts, which are of a simple brown colour in *C. vanicorensis*, of a much darker and bronze-glossed hue in *C. francica*.

2. HALCYON SANCTUS, Vig. & H.

Two younger birds, not different from Australian specimens.

3. MYZOMELA RUBRATRA, Less.

4. PSAMATHIA ANNÆ, Hartl. P. Z. S. 1868, p. 5, t. II.

Av. jun. *Supra magis brunnescens, subtus magis in fulvum vergens; subalaribus albo flavoque mixtis; flexura alæ flava.*

5. ARTAMUS LEUCORHYNCHUS, Gm.

Lanius manillensis, Briss. ii. p. 180, t. 18. f. 2. (descr. opt.); Buff. Pl. Enl. 9. fig. 1; Lath. Syn. i. p. 181.

Pie-grièche dominicaine, Sonn. Voy. Nouv. Guin. p. 55, t. 26.

Lanius dominicanus, Gm. S. N. p. 307.

Leptopterus melaleucus, Wagl. Syst. Av. (excl. synonym.); Kittl. Küpfert. t. 30. fig. 1; Hahn, Vög. Ausl. Lief. 19. t. 2. (fig. bon.).

The fact is that there are two species of *Artamus* on the Philip-

* See above, p. 4.

pinces, and more especially on the island of Luzon. One is the old Brissonian *Lanius manillensis*, figured also by Sonnerat. This is the larger species, black above and white below. It is very certainly this species that is also found on the Pelew Islands.

The other is the well-known *Javan* species, a somewhat smaller bird with the upper parts of a more or less greyish or purplish brown. We have examined many specimens from the island of Luzon, where it appears to be more common than *A. leucorhynchus*. The oldest name for this species is *Art. leucorhynchus*, Horsf. (nec Gmelin!); and it is *Art. leucogaster* of Valenciennes.

6. *ZOSTEROPS SEMPERI*, n. sp., Hartl.

Supra olivaceo-flavescens, annulo periophthalmico albo; lineola a naribus ad oculum ducta et toto gastræo citrino-flavis; subalaribus albis, flavo variegatis; remigibus fuscis, dorsi colore limbatis; hypochondriis parum olivascente adumbratis; rostro dilute brunneo, mandibula pallidiore; pedibus plumbeis.

Long. 4", rostr. $4\frac{1}{2}$ ", al. 2" 1", caud. 15", tars. 8".

7. *RHIPIDURA LEPIDA*, Hartl.

8. *MYIAGRA ERYTHROPS*, Hartl.

Both not different from the former specimens.

9. *TEPHRAS FINSCHII*, Hartl. P. Z. S. 1868, p. 6, t. vi.

One adult specimen, in which the wings are more complete than in the type specimen of M. Godeffroy's collection. There is a conspicuous first spurious quill as in the *Sylviadæ* (4" long). The fourth and fifth quills are the longest and of equal length; the third and sixth are a little shorter; the second is of equal length with the seventh. In the type specimen the first spurious quill was wanting.

10. *CALORNIS KITTLITZII*, nob.

11. *CHARADRIUS FULVUS*, Gm.

12. *CHARADRIUS GEOFFROYI*, Wagl.

13. *CHARADRIUS CANTIANUS*, Lath.

Exactly like a Heligoland specimen in winter dress.

14. *RALLUS PECTORALIS*, Less.

15. *PORPHYRIO MELANOTUS*, Temm.

A smaller race of the well-known Australian bird. The largest of four specimens from the Pelews is still considerably smaller than the smallest of the Australian specimens of *P. melanotus* in the Leyden collection. The measurements of the very small specimen of this collection are:—Long. tot. circa 15", rostr. a rict. 1" 3", al. 7" 10", caud. 2" 10", tars. 2" 9".

16. *NYCTICORAX CALEDONICUS*, Gml.

17. *ARDEA SACRA*, Gml.

Three young birds in different states of plumage. In one of these the white colour is interrupted by brown longitudinal spots at the end of the scapulars and wing-coverts. Another is of a dirty olive-brown, intermixed with slate-coloured plumes, and with an indistinct white chin-stripe.

18. *GYGIS ALBA* (Sparrm.).

We add a list of the 41 known species of birds of the Pelew Islands.

- | | |
|---|-------------------------------------|
| 1. <i>Collocalia vanicorensis</i> . | 21. <i>Numenius phaeopus</i> . |
| 2. <i>Halcyon sanctus</i> . | 22. <i>Actitis hypoleucos</i> . |
| 3. — <i>albicilla</i> . | 23. <i>Tringa minuta</i> . |
| 4. — <i>reichenbachii</i> . | 24. — <i>acuminata</i> . |
| 5. <i>Myzomela rubrata</i> . | 25. <i>Strepsilas interpres</i> . |
| *6. <i>Psamathia annæ</i> . | 26. <i>Charadrius fulvus</i> . |
| *7. <i>Tephras finschi</i> . | 27. — <i>geoffroyi</i> . |
| *8. <i>Zosterops semperi</i> . | 28. — <i>cantianus</i> . |
| *9. <i>Rhipidura lepida</i> . | 29. <i>Ardea sacra</i> . |
| *10. <i>Myiagra erythrops</i> . | 30. <i>Nycticorax caledonicus</i> . |
| *11. <i>Rectes tenebrosus</i> . | 31. — <i>goisagi</i> . |
| 12. <i>Artamus leucorhynchus</i> . | 32. <i>Anas superciliosa</i> . |
| 13. <i>Calornis kittlitzii</i> . | 33. <i>Fuligula cristata</i> . |
| *14. <i>Ptilonopus pelewensis</i> . | 34. <i>Puffinus opisthomelas</i> . |
| 15. <i>Carpophaga pacifica</i> . | 35. <i>Sterna lunata</i> . |
| *16. <i>Megapodius senex</i> . | 36. <i>Gygis alba</i> . |
| 17. <i>Rallina fasciata</i> . | 37. <i>Anous stolidus</i> . |
| 18. <i>Rallus pectoralis</i> . | 38. <i>Phaëton candidus</i> . |
| 19. <i>Ortygometra quadristri-</i> <i>gata</i> . | 39. <i>Dysporus piscator</i> . |
| 20. <i>Porphyrion melanotus</i> . | 40. — <i>sula</i> . |
| | 41. <i>Carbo melanoleucus</i> . |

[The eight species marked with an * are exclusively proper to the *Pelew* group.]

5. Observations on Dr. Gray's "Notes on the Arrangement of Sponges, with the Description of some New Genera."
By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.

Previously to criticising the arrangement of the Spongiadæ proposed by Dr. Gray, it would perhaps be as well to take a rapid review of the principles of arrangement adopted by previous writers on the subject, and of the system originally proposed by me in papers on the anatomy and physiology of the Spongiadæ in the 'Philosophical Transactions' for 1857, p. 279, 1858, p. 747, and 1862, p. 1087, and also in my 'Monograph of the British Spongiadæ,' published by the Ray Society for the years 1864 and 1866.

Previous writers on the Spongiadæ have, with very few exceptions,

all adopted the system of division and subdivision of these numerous and protean animals by means of their chemical constituents and their external forms ; and the results of their attempts at classification by such means have universally been unsuccessful in leading students to a ready recognition, or, indeed, to scarcely any recognition at all, of the species described by the authors who have had recourse to such systems. The natural result has been that every naturalist who has attempted to recognize the species of his predecessors has found himself to so great an extent unsuccessful, through the vagueness and uncertainty of the system that was to have been his guide, that he has therefore naturally commenced his career of the study and record of species unknown to him by a new method of arrangement, which, although perhaps sufficient for his own limited circle of subjects, becomes, when applied to a fresh series of them, quite as inapplicable to a general and extended view of these singularly protean forms as those of his predecessors.

This was precisely the condition in which I found myself at the commencement of my own career of investigation ; and I naturally asked myself the question, Is there no means of escape from these various and inefficient modes of registering the examination of these animals, through a natural division of them into classes, orders, and genera, by means of their internal and external organization, after the manner pursued in other departments of zoology, and especially in botany ? Strongly impressed with this idea, I commenced an investigation of a large collection of British and foreign species in my own possession ; and I soon found that sponges, like other organized beings, were always provided with a skeleton, and that, as in other branches of zoology, the materials and mode of its structure varied very considerably in different species, and that those peculiarities of its structure were remarkably uniform and persistent through a considerable number of species in which they occurred. Here, then, was a foundation for the primary division of these creatures, in perfect accordance with the rules of zoological science as established by Linnæus, Cuvier, and other laborious and talented authors of modern times ; and I had the satisfaction of finding that the more widely I extended my observations the more uniform and certainly available these primary parts of the organization became ; and in addition to their characters of uniformity and constancy, there was this strong recommendation of them as bases for the foundation of classes, orders, and genera, that, however imperfect in form or dilapidated by external injuries or partial decomposition, the most persistent and last surviving part of the animal was always the skeleton.

In botany and some branches of zoology the principal difficulty that meets the student is the correct determination of the genera ; but this is not the case to so great an extent in the study of the Spongiadæ when their characters are founded on their structure and organization. As far as the genera have been established on these principles, they are so well marked, both by the material and the peculiar modes of the arrangement of their component parts, that they

are certainly recognized by the aid of the microscope with greater decision and facility than those of many other branches of zoology or of botany.

Having thus assigned the skeleton to the determination of genera, it became a question as to what parts of the organization were the most appropriate to the distinction of the species. Here, again, the lucid example of the great father of systematical botany, Linnæus, naturally suggested the most advisable course of proceeding; and the example that he set botanists in a rigid examination and a compendious nomenclature of those parts of the plant that were rather auxiliary and only occasional in their presence, and not absolutely necessary to the existence of a plant, naturally suggested the course to be pursued with regard to the determination of the species among the Spongiadæ; and first amidst these characters stood forth the spicula, the fit compeers of the leaves of plants in their great variety of form; and, like them, they are as widely distributed and as completely without reference to generic peculiarities. Other subsidiary organs in the sponges have also their value as specific characters, and have been thus applied accordingly; but among these form and colour, the sheet anchors of the old modes of arrangement, are undoubtedly of the least value, from the perfectly protean character of the first, and the variable and evanescent peculiarities of the latter. My first task, therefore, was to acquaint myself, as completely as I possibly could, with the various normal forms, and their varieties, of the spicula and their especial situations and peculiar offices in the animal economy. In aid of this object, I accumulated a vast number of specimens from various quarters of the world; and as each peculiar form of spiculum became known to me I had to record and distinguish it by a name, as I found no such thing as a systematic description or nomenclature of the organisms of the Spongiadæ existing. How far I may have executed this task to the satisfaction of the scientific world I must leave time to decide, and, where necessary, to correct. In thus attempting to establish a nomenclature of parts hitherto undescribed, I have endeavoured to make these terms expressive of the forms and qualities of the organs in the same manner as the designations of leaves more or less describe their forms and the modes of their arrangement. But this one thing is certain, that without a definite nomenclature no descriptive science can hope to progress with any degree of precision or success.

My first application of the nomenclature thus formed was originally published in the 'Philosophical Transactions,' as I have before stated; and it has been applied to the British species of sponges in my monograph of them published by the Ray Society.

This work, Dr. Gray is of opinion, is not sufficiently distinct and definite in its descriptions to answer the required purpose; and he seeks to remedy this defect by his proposed new mode of arrangement, which is based principally on the forms and peculiarities of the spicula, totally ignoring the skeleton as a means of arrangement into orders or genera.

It would require almost a volume to discuss and expose the fallacy

of the whole of the numerous vague and extraordinary alterations in the existing systematic arrangements of the Spongiadæ proposed by him with a degree of hasty inconsideration that has led him into errors of omission and commission too numerous to be mentioned in detail; I will not, therefore, attempt a minute critical examination of his new system of arrangement, but content myself with pointing out the prominent errors and inconsistencies of his plan. Thus, in page 493, he writes:—"The division between the calcareous and siliceous sponges is very distinct and natural; the separation between the siliceous and keratose sponges, on the other hand, is very indistinct and separates nearly allied genera." But he does not state what are the nature of these alliances; nor does he seem to consider that the alliance must really be closer between sponges having spicula with calcareous or siliceous bases than between either and those having no spicula at all. And he then enumerates a series of distinctive characters belonging to the Spongiadæ that are, upon the showing of his own descriptions of them, amply sufficient to establish each as a separate order or genus; and having done this, he concludes the paragraph thus:—"I believe it better to unite the siliceous and keratose sponges of these zoologists into one group or order." He then discusses the skeleton-spicula in the same loose manner, thus:—"The spicula that form the main part of the skeleton of these siliceous sponges are of three shapes:—

"Fusiform (acerate, Bowerb.), more or less cylindrical, and pointed at each end. Needle-shaped (acuate, Bowerb.), cylindrical, blunt at one and sharp at the other end. Pin-shaped (spinulate, Bowerb.), cylindrical, with a more or less spherical head and a tapering point,"—totally omitting to mention the true cylindrical form, plate 1. fig. 12, 'Monograph of British Sponges,' and entirely ignoring the first three primary forms of acerate, acuate, and spinulate, neither of which are fusiform in their typical forms, the fusiformity and the attenuation being merely secondary characters, or variations of the typical forms, and applicable alike to the whole four of them.

The author then describes the whole of the auxiliary spicula of sponges in the same loose and hasty style. He writes—"The stellate are usually scattered in the sarcode; and the three-pronged are what Dr. Bowerbank calls tension and defensive spicula." This is quite incorrect as regards the "three-pronged" spicula, as I have never designated them as tension spicula, but always as defensive ones. He then proceeds thus—"The forms of the spicules are characteristic of the different families, if they are not always peculiar to them. Thus the many-rayed stellate, with rays on all sides, and the three-pronged or three-hooked elongate spicules are characteristic of the *Geodiadæ* and *Tethyadæ*. The anchorate and birotulate spicules and other forms of the series are almost peculiar to the family *Esperiadæ*." These assumptions of Dr. Gray are also, to a great extent, erroneous. In the first place, I totally deny that "the forms of the spicules are characteristic of the different families." On the contrary, the primary skeleton forms are common to all of them; the spicula are not characteristic even to a genus; and in

many cases all the four forms occur in different divisions of the same genus; and in some individuals, as in *Isodictya varians* (Mon. Brit. Spongiadæ, vol. ii. p. 281), as many as three of the primary forms occur mixed in the skeleton; and in *Isodictya infundibuliformis* (Mon. Brit. Spong. vol. ii. p. 317) we have the spicula of the primary lines of the skeleton attenuato-acuate, while those of the secondary lines are acerate, and in many other species we find acerate prevailing in number, but with a considerable admixture of acuate forms, thus totally ignoring the assumptions of Dr. Gray that the forms of the spicula are characteristic of the different families. Neither are "the many-rayed stellate, with rays on all sides, and the three-pronged or three-hooked elongate spicules characteristic of the *Geodiadæ* and *Tethyadæ*." Thus the sphero-stellate form occurs abundantly in *Dictyocylindrus stuposus* (Mon. Brit. Spongiadæ, vol. ii. p. 116) and in many exotic species in no degree allied to either *Geodia* or *Tethea*, and ternate or "three-pronged" spicula are an essential part of the structure in some species of *Dactylocalyx* and other exotic genera. These are not the only crude and inaccurate assertions regarding the general structural characters of the spicula of sponges that are made by the author, but they are sufficient to illustrate the hasty style in which he arrives at his conclusions on these subjects.

Page 499. Dr. Gray states the object of his proposed new system thus:—"I would propose the following arrangement as bringing together the species which seem most allied, and also as facilitating the study of these very difficult and anomalous animals." The author's generalizations in constructing his system are upon a wonderfully expansive scale. Thus his subclass *Porifera silicea*, p. 502, will include at least 99 per cent. of the whole number of known sponges, the calcareous ones as compared with the others being exceedingly few in number.

The first step the author takes in his endeavours to simplify the arrangement of the sponges is to merge in one subclass the two very distinct divisions of Dr. Grant of *Silicea* and *Keratosa*; and the unfortunate result is immediately visible in the same and following pages, 503 and 504, in bringing together groups the species of which are of the most varied and opposite anatomical structure; and the difficulty is increased by the author's descriptions of his orders immediately following, which are so vague and loosely put together as to be nearly incomprehensible, even to naturalists well acquainted with sponges.

The first difficulty occurs in his description of section 1, page 502, "*Malacosporæ* (Soft-spored Sponges). Reproduction by ova contained in a thin membranaceous ovisac not strengthened by siliceous spicules or by gemmules scattered in the substance of the sponge." The author does not seem to be aware that it is comparatively a rare occurrence to find the description of gemmules to which he refers *in situ*, as they only occur thus at certain periods, and then for only a short time; so that in thus making them the sole character of his section 1, *Malacosporæ*, he is placing a complete stumblingblock in

the way of the student, who would naturally conclude they were organs always present in the sponge, while, in fact, he may search for them in many dozen specimens of *Halichondria panicea* and other allied species without once seeing a gemmule *in situ*.

If we may judge of the extent of their distribution by their ascertained presence in various genera, and by the negative evidence afforded by our knowledge of other descriptions of ovaria, it will not be an overestimate if we believe that they will be found in at least 95 or 96 per cent. of the known siliceous and keratose sponges.

Page 502, subsection 1. "Netted sponges (*Dictyospongiae*). Skeleton formed of a continuous siliceous or horny network." This definition embraces so wide a range and such varied modes of structure that it is calculated rather to bewilder the student than to facilitate his researches. It would include rather more than 75 per cent. of the whole number of the British sponges, and also the whole of the author's second, third, and fourth orders, excepting his *Tethyadæ*.

Subsection 2, p. 503. The families included in this section, if distributed in accordance with its wording, might just as correctly be referred to subsection 1, page 502, as to order 4, p. 504, section 2. *Chlamydosporæ* is founded on a misapprehension of the structure of the spicula of the ovaria, which have no defensive characters, but are simply portions of the wall of the ovarium, which is so constructed that the spicula may allow of a slight degree of lateral expansion of that body; their external surfaces in the adult state are flat coincident planes. The sponges having truly armed ovaria or gemmules are entirely excluded by the author from this section, the family *Tethyadæ* being disposed of in his order 4, *Acanthospongia*, p. 504.

In truth, the confusion of ideas existing in the descriptions of these orders is such as to render it perfectly impossible to comprehend the characters by which species are to be referred to any one or the other of them.

This course of proceeding is not divisional arrangement; it is no separation of the multitudes with the members of which we want to cultivate an individual acquaintance. These vague expansive ideas are not definitive or distinctive. What we want in such descriptions is a certain group of characters within a definite circle to be readily separated from other well-defined groups or circles by which they are surrounded, such as we see amidst the natural orders of plants, and not a flow of indefinite verbosity, that leaves us in a labyrinth of words, amidst an impervious cloud of ideas.

The Orders.

The author's orders are seven in number. They are formed principally by an elevation of his own and other writers' genera to that dignified position in science, their characters being constructed by a free version of their previous generic ones; but in many instances these alterations or additions have a very unfortunate result, as they have led to serious errors of description.

In his "1st order, p. 502, *Coralliospongia*. Sponges hard, coral-like, entirely formed of siliceous spicules anchylosed together by siliceous matter into a network. Mass covered by a thin coat of sarcode when alive." This description is eminently incorrect. No one, I believe, ever yet saw the terminations of spicula united into a network through the morbid action of anchylosis by means of siliceous matter. The material by which they are naturally cemented together is keratode. The author does not seem to be aware that, although sponge-fibres always anastomose more or less, sponge-spicula never do so. And in the description of his first family in this order, *Dactylocalycidæ*, page 505, the author distinctly abnegates his own definition of the order by describing the family thus:—"This beautiful family of sponges is at once known by having the skeleton formed of continuous anastomosing fibres formed of concentric lamina of silica, forming a hard brittle network."

Order II. *Keratospongia*, p. 503. In his definition of this order, the author takes an extremely wide range of skeleton-structure, embracing the true sponges, *Dysidea*, *Chalina*, *Phakellia*, and other genera differing widely in their structural peculiarities.

"Subsection 2. Spicular Sponges (*Spiculospongiæ*), p. 503. Sponge fleshy, more or less strengthened by fasciculated or scattered siliceous spicules, the bundles being sometimes slightly covered with a thin layer of horny matter. The sarcode is generally abundant; in some few, as *Euplectella*, it is thin, mucilaginous, and deciduous." This description is decidedly incorrect as regards *Euplectella*, Owen, as that sponge assuredly has a siliceo-fibrous skeleton, and not a spiculo-fibrous one. See Proc. Zool. Soc. 1867, p. 361.

"Order III. *Leiospongia*. Sponge-spicules of only one kind, often varying in size and shape in the same species." This is another exceedingly vague description on which to found an order; and we may reasonably ask whether, if they vary in shape, they can be of only one kind. There are very few species in which the spicules, strictly speaking, would be only of one kind, and in every spiculo-reticulate sponge they are liable to variations in size and shape. The author has placed three families in his version of this order, but in the illustration of each of them he violates his own rules. Thus, in his list of illustrative species of *Halichondria* (p. 519), he includes *H. farinaria* and *distorta*, both of which have two forms of spicula.

The same error occurs in his family *Polymastidæ*,—*Polymastia bulbosa* and *radiosa* each having two forms, and *P. robusta* three forms of spicula.

The like error is also apparent in his family *Clionidæ*, as, according to Mr. Hancock's description of exotic and other species of *Cliona*, several of them have at least two forms of spicula in their structure.

Order IV. *Acanthospongia*. This is a most expansive order, as it would embrace every siliceo-spiculous family excepting those included in the author's order 3. The *Euplectelladæ* are erroneously placed in this order.

I have before stated, in treating of subsection 2, that *Euplectella*, Owen, is not a spiculo-reticulate sponge, but truly a siliceo-fibrous one; but under the head of Dr. Gray's order 4 it will take its place very well, as among its auxiliary spicula it certainly has "spicules of more than one form or kind." This, however, is rather a loose way of disposing of it, and totally ignores the most essential part of its structure, the skeleton.

Order V. *Arenospongia* is formed by the conversion of the author's genus *Xenospongia* into an order. The specimen is in the British Museum, and is described in the Proc. Zool. Soc. for 1858, p. 320.

Section II. p. 504. *Chlamydosporæ*. What the author means by "sponges with armed spores" it is difficult to imagine, unless it be meant to intimate that sponges are vegetable bodies; but as he combines the term spore with that of ovisac, it is probably only an error in his terminology; and this is very likely to be the case, as in order VI. *Sphærospongia*, immediately following, he describes the "ovisac" as emitting ova. The ovaria or "ovisacs" are occasionally armed or constructed with spicula; but the ova, or spores, have never yet been found to contain them.

Order VI. *Sphærospongia*. Both of the author's families *Geodiadæ* and *Placospongiadæ* are misplaced in this order, as the ovaries or "ovisacs," as I have before stated, are in neither case armed, the external surfaces of the adult bodies being perfectly smooth in every species with which I am acquainted.

Order VII. (p. 504) is based on the structural peculiarities of the ovaria of the genus *Spongilla*; but, from the author's vague descriptions of their structures, both "*Tethya*" and *Geodia* would be as naturally referred to this order as to order 6.

The Families.

The families comprised in the seven orders are eighteen in number; they are simply based on the genera established in the works of Dr. O. Schmidt, the 'Monograph of British Spongiadæ,' and a few other authors, including those of Dr. Gray, the characters of the genera being taken by the author and generally altered in the manner of description, but certainly not with the effect of rendering them more definitive or distinctive. I will not discuss their merits *seriatim*, but notice those only in which the errors are of a striking character.

Family 1. *Dactylocalycidæ*, p. 502. In consequence of the inaccuracy of the description of order I. *Coralliospongia*, which is stated to be "entirely formed of siliceous spicula anchylosed together," the family the members of which are siliceo-fibrous, and not spicular, in their skeleton-structures, appears to be entirely misplaced. The author's description of his order should therefore be amended to remedy this discrepancy, or the family removed to another order.

Family 7. *Ophistospongiadæ*, p. 503. This term is an error in spelling, as it is derived from my genus *Ophlitaspongia*, Mon. Brit. Sponges, vol. ii. p. 14.

Family 8. *Phakelliadae*. The author, in endeavouring to vary the mode in which I have described the genus *Phakellia*, states that the "skeleton is formed of closely reticulated horny fibres, forming an expanded mass," &c. This is incorrect, as it is not a kerato-fibrous sponge, but belongs to the order Silicea. See Mon. Brit. Sponges, vol. i. p. 186.

Family 10. *Polymastiadae*, p. 503. "Sponge with tubular fistulous branches; tubes open at the end, and formed of longitudinal and transverse fascicules of fibres."

Here, again, the author has fallen into a great error in describing the "fistulous branches" as open at the end. In no species of *Polymastia* that I have ever seen is that the case. See Mon. Brit. Sponges, vol. ii. p. 73.

Family 12. *Euplectelladae*, p. 504. "Skeleton composed of longitudinal, transverse, and oblique bundles of spicules intersecting each other, and forming a network." This description of the structure of the skeleton of *Euplectella*, Owen, as I have before stated, is incorrect, the whole skeleton being truly siliceo-fibrous.

Family 13. *Esperiadae*, p. 504. "Sponge massive. Skeleton composed of fusiform and linear spicules, interspersed with anchorate, bihamate, or birotulate spicules. Sarcoderm soft."

The description of this family is singularly incomprehensible. "Sponge massive." This character would apply to by far the greater number of sponges in existence. "Skeleton composed of fusiform and linear spicules." All the four primary forms of skeleton-spicula are liable to fusiformity; which of the four forms does the author mean, any one in particular or all of them? And when he names "linear," what form of linear spiculum does he mean? as all straight or slightly curved spicula are linear. "Interspersed with anchorate, bihamate, or birotulate spicules." This embraces a most extensive field of investigation, as we shall presently see. "Sarcoderm soft." All sponge-sarcoderm is soft. Thus it will be seen that every one of the characters assigned by Dr. Gray to the *Esperiadae* are singularly indefinite. Subsequently, at page 532, he divides the family into six sections, which are about as ill-defined as the characters of the family. In the first place, the author designates all the retentive spicula as defensive spicula. The defensive spicula, external and internal, are quite another class of spicula than those peculiar to the sarcoderm. See Mon. Brit. Spong. vol. i. p. 21.

The application of the retentive, or bihamate and anchorate, spicula to the distinction of families or genera is peculiarly unfortunate. I will not trace their occurrence through the exotic genera of sponges, but confine myself to their range among the British genera. They are met with in *Microciona*, *Hymedesmia*, *Hymeniacidon*, *Halichondria*, *Isodictya*, and *Desmacidon*—six genera, containing 126 species; and of this number of species, 51 only have their spicula imbedded in their sarcoderm; and it rarely occurs that a species has only one form, and frequently three forms are present mixed together.

Family 14. *Tethyadae*, p. 504. The author describes the ske-

leton in this family as "consisting of simple filiform spicules, with three prongs or three recurved points at the outer end." This is inaccurate. The skeleton of *Tethea cranium*, Johnston, which the author has selected as the type of his family, is composed of simple fusiformi-acerate spicula, the fusiformi-porrecto-ternate and fusiformi-recurvo-ternate ones being purely external defensive spicula (Mon. Brit. Spon. vol. ii. p. 83).

The Genera.

Having discussed the general principles of Dr. Gray's new systematical arrangement of the sponges in his classes, orders, and families, we will now proceed to consider the mode in which he proposes to establish his numerous new genera; and it will perhaps facilitate our comprehension of his scheme if we first consider the present condition and numbers of the genera in contrast with the characters and numbers of Dr. Gray's new series of them.

The author proceeds in the first place to adopt to a considerable extent the genera established by previous writers on the Spongiadæ, altering the phraseology according to his own ideas of terminology, sometimes omitting, as in his character of *Stematumenia* (p. 511), the most distinctive character of the genus, the fibro-membranous tissues, and then adding a variety of characters derived from the specific ones of the type species of the genus he adopts, thus completing the heterogeneous mixture of descriptions. In this mode the author has adopted sixteen genera from Professor O. Schmidt's 'Die Spongien des Adriatischen Meeres,' twenty-nine from my 'Monograph of the British Sponges,' and seven others from various authors, making a total of fifty-two genera. The number of genera treated of in Dr. Gray's paper is 157, so that we have a total of 105 new genera proposed to be established; and these, we shall find, are based upon the descriptions of species hitherto comprised in the genera of the authors quoted above, with alterations to suit the occasion. And, finally, others are founded on the descriptions of single spicula, described in the anatomical portion of vol. i. of my 'Monograph of British Spongiadæ' as examples of organic form, without the slightest knowledge on his own part of the sponges whence they were derived.

In the construction of his families, we have seen that the course pursued by Dr. Gray has been that of appropriating every known genus within his reach, without the slightest consideration of the different and perhaps discrepant principles on which they have been based by their respective authors. The same mode is adopted by him in his proposed new genera.

Every species having a determinate specific character is at once seized upon by Dr. Gray, and converted into a new genus; and it seems to matter little to him whether the specimen the characters of which are thus appropriated be in his own possession or the property of a private collector, as, in the latter case, it is surreptitiously taken, without the least regard to the owner of the specimen, or

the slightest notice of his intended appropriation of it. Numerous cases of this description occur in his "Notes on the Arrangement of Sponges;" and I cannot give a better instance of it than that of his genus *Astrostoma*, p. 514.

As an example of the facility and inaccuracy with which Dr. Gray propounds a new genus, in part 1 of the Proceedings of the Zoological Society for 1867, in his paper on *Zoanthina*, in treating of *Palythoa*, p. 238, he writes thus:—"Mr. Bowerbank, in his 'British Sponges' (t. 20. fig. 307), figures a very similar body, which he describes as a portion of the dermal surface of an undescribed sponge from the East Indies, having numerous depressed pores, furnished with stomata, like protective organs. Mr. Tyler, F.L.S., has kindly shown me some specimens of the sponge mounted as a transparent and an opaque object; and they are very like a parasitic actinoid polype; but the rays are strengthened with spicules on the surface, and on the tips with some prominent ones (which form a pencil), unlike any *Actinia* I have seen, and so they are perhaps sponges. If so, they ought to form a genus, which may be called *Astrostoma*." Such a mention of a microscopic fragment would certainly never be considered a fit characterization of a new genus; and yet, in his paper on Sponges, part 2 of the Proceedings of the Zool. Soc. for 1867, p. 514, it is quoted thus:—" *Astrostoma*, Gray, P. Z. S. 1867, p. 239." He now proceeds to characterize his new genus as follows:—"9. *Astrostoma*. Sponge solitary, branched; fibres horny, flexible. Oscules? circular, scattered and concave, sunk in the surface, with eight or ten rays, which are covered with spicules. Spicules small, subulate, in corneous fibre." He subsequently writes, "I have been enabled, through Mr. Tyler, to examine the original specimens from which Dr. Bowerbank described this species, which is probably a parasite like the genus *Bergia* of Michelotti."

In every one of these details he is completely wrong. In the first place, what he means by "solitary," as a generic character, I really cannot comprehend; secondly, it is not branched. It is a simple unbranched cylinder, nine inches in length, and three-fourths of an inch in diameter for a considerable portion of its length. Thirdly, it has not a particle of keratose fibre in its structure, being purely spiculo-reticulate; and it is quite inflexible. The author then describes the inhalant areas as oscules, and does not mention the true oscula, although two out of twenty-one of them are figured in a portion of this sponge (Mon. Brit. Sponges, vol. i. plate 20. fig. 308), and are described, along with the inhalant areas, in page 278 of the same work; and lastly, the spicula are not subulate, nor are they "in corneous fibre." Thus there is not a single point in the descriptive character of the author's genus *Astrostoma* that is correct. Nor is Dr. Gray correct in stating that he has "been enabled, through Mr. Tyler, to examine the original specimens from which Dr. Bowerbank described the species," as the original specimen has never been out of my hands, Mr. Tyler having only received from me a small piece from which to mount microscopical specimens. The specimen figured in vol. i. Mon. Brit. Sponges, plate 20. fig. 307,

has never been out of my possession. We may naturally ask what confidence can we place in the system of an author who is so systematically incorrect?

In this style Dr. Gray has described sixty-five sponges in my possession which he has never seen; and of these sixty-five, fifty are the types of a portion of his new genera. The consequences of this mode of proceeding are that he has fallen into some most extraordinary errors. I will not weary my readers by specifying and criticising all the author's efforts of this description; the first one in his list, extracted from the 'Monograph of British Sponges,' will suffice for the purpose. Page 533.—“3. *Ægogropila*. Sponge massive or coating, rugose. Oscules large, dispersed. Skin spiculate. Skeleton reticulated; fibres formed of bungled spicules. Spicules of four kinds:—1. Fusiform, needle-like, or subclavate. 2. contorted and reversed, bihamate. 3. Inequianchorate, bidentate. 4. Fusiform, tricurvedate.”

If this generic character be compared with the specific character of *Desmacidon ægagropila*, Mon. Brit. Sponges, vol. ii. p. 352, it will be at once seen to be almost *verbatim* the same, with the exception of a new generic character of the author's own invention, that of “bungled spicules,” the meaning of which I must leave to the reader's own imagination. There is also an alteration in the name of the author's new genus, which is printed *Ægogropila* in place of *Ægagropila*, the original specific name of Dr. Johnston, sufficiently applicable to the species, but not so as a generic name.

Similar distortions of established generic and specific names occur in several other instances. Thus, in page 507 of his paper, for *Farrea orca*, we should read *F. occa*; pages 503 and 515, for *Ophistospongia* read *Ophlitaspongia*; page 545, 20. *Vibulinus*, for var. *damicenus* read *damicornis*; page 534, *Iophon*, for biplicated read bipocillated; page 527, 2. *Polymastica* read *Polymastia*; page 527, 1. *Pencillaria*, *S. pencillus* should be *S. penicillus*; page 542, 7. for *Eciomemia* read *Ecionemia*; page 532, synopsis of sections of Family II., bi- or triplicated should be bipocillated; there is no such form as tripocillated. Other errors of the same description occur dispersed through the work; but these will serve to display the loose and careless style in which the author has treated his subject.

But these are not the most extraordinary efforts of the author; for in one case he has not only made two new genera and two new species out of one species, but out of one individual of that species, and without having seen the sponge or even the slip of glass containing the spicula from which he derives his two new genera. He bases his new genus *Dymnus*, page 539. no. 27, on the figures of spicula represented in my work on British Sponges, vol. i. pl. 5. figs. 115-117, and his genus *Damo*, page 539. no. 28, on the spicula represented by figures 118-120 in the same plate, not being aware that both forms are contained in the same slide of sponge-spicula, which was prepared from a small fragment of a sponge from

Sicily by Mr. Topping and was presented to me by him. Now the question arises, which of these new genera and species are to stand? are either or neither? Common sense would answer, the latter. One would naturally imagine that this facility in creating genera could not be carried to a more absurd extreme; but, strange as it may appear, under the ingenious manipulation of Dr. Gray, that is really the case, as in page 544, the genera and species, 14. *Acarus innominatus*, and 15. *Fonteia anomala* are actually founded on one form of spiculum hitherto only found on one undescribed species of sponge. *Acarus innominatus* is derived from fig. 292, pl. 18, 'Mon. Brit. Sponges,' representing a portion of the reticulated skeleton of the sponge with the radiating fasciculi of spinulo-quaternate internal defensive spicula *in situ*; while *Fonteia anomala* is based on the figures 73-76, pl. 3, of the same work, representing the various stages of development of the same spinulo-quaternate spicula as those represented *in situ* in pl. 18, and which various forms are described by me in page 239, 'Mon. Brit. Spongiadæ,' as different stages of development of the perfect form represented by fig. 76, and the reader is referred to pl. 18. fig. 92, in the same description, for a view of them *in situ*. Comment on such a case as this is superfluous; and, strange though it be, the author, with their descriptions before his eyes, describes them as "spicules of four kinds." If the author should steadily pursue the course described in the last cases we may ultimately arrive at the unforeseen and rather extraordinary conclusion that not only may single species represent a genus, but an individual may really be composed of a group of genera and species.

I will now endeavour to show the mischievous consequences, to closely allied and well-established genera, arising from Dr. Gray's mode of founding his new genera on peculiarities of form in the various auxiliary spicula of sponges, which are only present in certain species, and which vary more or less in form, combinations, and mode of disposition in almost every species in which they are found, instead of basing his generic characters on the more substantial and enduring characters afforded by the anatomical peculiarities of the skeleton. I will not comment on every instance in which his mode of proceeding has been highly detrimental to our power of discriminating species, but I will select a few only of the most illustrative ones. Thus in the genera *Tethea* and *Geodia* we have two of the most natural and most accordant groups of species among the whole of the Spongiadæ, groups which all naturalists have hitherto concurred in preserving entire. Let us see how the author proposes to treat them.

In the first place, Dr. Gray, in page 543 of his paper, misquotes both Dr. Johnston's 'History of British Sponges,' page 85 (or, more correctly, 83), and my 'Monograph of British Spongiadæ,' vol. ii. page 83, making us each to have adopted the term *Tethya*, whereas both have rejected that name and adopted Lamarck's name *Tethea*, for the very good reasons given by Dr. Johnston in page 83 of his work. Dr. Gray separates Johnston's two species *T. cranium* and *T. lyncurium*, leaving the former as the type of his *Tethya*, page 543,

having previously disposed of the latter as *Donatia aurantium*, page 541, in accordance with the views of Nardo. My two species, Mon. Brit. Spon. vol. ii. pp. 87 & 89, are converted into Collingsias; and *Tethea muricata*, of which he knows nothing, but the form of one sort of retentive spiculum, he transforms into *Thenea muricata*. *Tethea robusta* and *T. ingalli*, of which he knows nothing but the figures of a spiculum of each represented by figures 164 & 165, plate 6. vol. i. Mon. Brit. Spon., he at once consigns to the rejected genus *Cydonium*, Fleming, resuscitated by Dr. Gray to be thus filled by his fertile imagination with species.

Dr. Gray thus disperses the species of one of the most striking genera with which we are acquainted among sponges—so much so that the student who has become acquainted with one species can scarcely fail at the first glance to assign any others he may acquire to their proper genus in existing arrangements.

The author has arranged the *Geodiadæ* in his Order VI. *Sphærospongia*, page 547. In the definition of this order he has two names for the same organ in one sentence. In place of ovarium he has first ovisac-cells and then ova-cells; and in his description of the family *Geodiadæ*, immediately following, there is a third variation, ovisacs.

Instead of placing the type genus of the family, *Geodia*, Lamarck, first, he gives that position to my genus *Pachymatisma*, decidedly an aberrant one, and places *Geodia* second. He then separates all the species of *Geodia* described by Prof. O. Schmidt and by me, and places them under the very doubtful genus *Cydonium*, Fleming, page 548, thus—"2. *Cydonium muelleri* [mülleri], Fleming, B. A. 516," in which Dr. Fleming describes his genus as having "polypi with a central opening and an orifice at the base of each of the eight pinnated tentacula,"—showing either that he had greatly mistaken the nature of *Geodia zetlandica*, Johnston, or that he had described the orange-coloured variety of *Alcyonium digitatum*, Johnston's 'British Zoophytes,' 2nd ed. vol. i. p. 174. The latter appears to be the most probable.

Dr. Gray then, to increase the confusion, adds to the genus *Cydonium* *Tethea ingalli* and *T. robusta*, from the figures of spicula only from each quoted by me in 'Monograph of British Spongiadæ,' vol. i. pl. 6. figs. 164 & 165, leaving Lamarck's genus *Geodia* to be represented by the type species, *G. gibberosa*, and one other, *G. caribea*, Duchass. et Michel. I have had the opportunity of carefully examining Lamarck's type specimen in the Jardin des Plantes, Paris, and am well acquainted with its organic structure; and I will venture to say that no practical naturalist who has had the like advantage and was acquainted with the other well-known species of *Geodia* would for one moment dream of separating them from Lamarck's genus. To complete the confusion of ideas, we then have a specimen of *Pachymatisma*, *P. listeri*, on the faith of the form of one spiculum, figs. 50 & 51, pl. 2, Mon. Brit. Spong., transformed into a new genus, *Triate*, page 549 of the author's paper, and, by the same uncertain means, identified with Prof. O. Schmidt's *Stelletta*

discophora. Dr. Gray, in page 549, "4. *Erylus*," also introduces us to a new form of ovarium thus, "with oblong ovisacs;" but I presume the author means oval ovisacs, not with flat sides and rectangular ends as in an oblong figure.

Dr. Gray's genus *Placospongia*, page 549, described by him in Proc. Zool. Soc. for 1867, p. 128, is neither more nor less than *Geodia carinata*, Phil. Trans. 1858, p. 314, tab. 36. fig. 42. Many years since, I found specimens of this species arranged in the cases at the British Museum among the corals, and I pointed them out to Dr. Baird as placed there in error; and he immediately removed them from the case. I have several specimens based on *Oculina rosea* from the South Seas, and their history in MS. The species is structurally in perfect accordance with the genus *Geodia*, although very discrepant in external form from the majority of the other species of that rather numerous genus. The 18th family in Dr. Gray's proposed arrangement is *Potamospongia*, containing the Spongillidæ, which he treats in his accustomed style, dividing this eminently natural genus into seven divisions and adding to them as an eighth one my genus *Diplodemia*, a sponge of very different organization, the skeleton having an abundance of kerato-fibrous structure in its composition.

Page 557. Fam. 2. *Alcyoncellidæ*. Dr. Gray describes the genus *Alcyoncellum* thus—"Sponge soft, subgelatinous, slightly branched.

"*Alcyoncellum* et *Alcyoncella*, Blainville, Man. d'Actin. p. 529, 1832 (not Milne-Edwards, 1835, Bowerbank, nor Owen, Nardo, nor O. Schmidt).

"*Alcyoncellum gelatinosum*, Blainv. Man. d'Actin. p. 529, tab. 92. fig. 5."

"*Hab.* ———.

B.M.?"

From this quotation we should naturally imagine that all preceding writers who have referred to this genus, as founded by MM. Quoy et Gaimard, were wrong; and that it was originally established by Blainville in his Man. d'Actin., published 1834, instead of by MM. Quoy et Gaimard in their 'Zoology of the Voyage of the Astrolabe,' published in 1830, and that Dr. Gray was the only writer who had attributed the genus to its true founder, M. de Blainville. But on reference to the work of that author, we find that he makes the following observations regarding it in page 529:—

"*Observ.*—Ce genre a été établi par MM. Quoy et Gaimard pour un corps organisé, rapporté dans leur dernier voyage, et qu'ils ont bien voulu soumettre à notre observation," &c. After this, what are we to say to the correctness of Dr. Gray's quotations, and to the laws of nomenclature he would fain establish by his sole declaration? In such matters, and on such authority, are we to submit to his saying, "I am Sir Oracle; and when I ope my lips, let no dog bark"? or are we, in accordance with the excellent and just rules recommended by the committee for nomenclature of the British Association, to render justice to those authors by the permanent adoption of the names they have given to genera and species, which they have been the first to make known to science?

That MM. Quoy and Gaimard did not correctly comprehend the nature and structure of their species, *A. speciosum*, is no reason why the name they assigned to it should be put on one side, and that of *Euptectella*, founded on error by Professor Owen, substituted for it. Or if this want of knowledge of a type specimen be sufficient to abrogate the author's title, then Dr. Gray's genus *Aphrocallistes*, described in Proc. Zool. Soc. 1858, p. 114, as a calcareous sponge, when in reality it is a siliceo-fibrous one, must fall by the same law.

If M. de Blainville has chosen his specimen to illustrate the genus *Alcyoncellum* injudiciously in his 'Manuel d'Actinologie,' that is no reason for abrogating the name originally assigned to their genus by MM. Quoy and Gaimard in their previously published work descriptive of the zoology of the voyage of the *Astrolabe*; and there can be no mistake as to which specimen is really the type of the genus, as they have figured it in the atlas to that work, plate 26, Zoophytes, fig. 3.

Dr. Gray's second subclass, Porifera calcarea, is treated in the same unscrupulous manner, the only species left to represent *Grantia* being *G. ciliata*. *Grantia ensata* is turned into *Ute ensata*; *Grantia compressa* into *Artynes compressa*. *Leucosolenia*, *Leuconia*, and *Lucogypsia* fare better, as they escape alteration.

If the course of proceeding adopted by Dr. Gray in the construction of his proposed new arrangement of the sponges is to be considered legitimate, if it be tolerated that any naturalist shall get sight surreptitiously of the specimens belonging to another, and then describe, name, and publish them, as in the case of his genus *Astrostoma*, page 514, unknown to the owner, and without permission so to use them, if it be considered right that from the figure of a single spiculum of a sponge, published in illustration of organic structural peculiarities by one author, any one has a right to name generically and specifically the specimen whence it is derived and without having ever seen it, and thus to forestall, haphazard, the manuscript descriptions of the owner of the specimens, nothing for the future will be easier than to establish new genera and construct new systems of arrangement; but then the question will naturally arise, of what use are such systems to practical naturalists? This question Dr. Gray himself answers in page 495 of his paper, in treating of Nardo's 'Spongiariorum Classificatio,' where he observes, "Almost all the species mentioned as belonging to the genera are new and not described in this paper; so that it is impossible to determine what they are except for such persons as have specimens named by the author." This observation of Dr. Gray respecting Nardo's species is perfectly correct; but the Doctor does not seem to be aware that it applies quite as justly to the genera and species which he has named in his own paper, without having seen the sponges whence his names are derived. I will not comment especially on the author's choice of generic names, as he has bespoken our indulgence on that subject at page 500; but they strongly remind me of an oral tradition among the old officers of the natural-history department of the British Museum, that in bygone days one of the principals of

that department kept an old hat by him in which a large number of single letters cut out of old catalogues were stored, and that when he wanted a name for a new genus he used to dip his hand therein and take out a pinch of letters, which were scattered before him, and out of which, by a few judicious changes of arrangement, he formed the required name. From the nature of a number of the names of the new genera proposed by Dr. Gray in his arrangement of the sponges, it would appear highly probable that he has found the old hat and its contents in some one of the out-of-the-way corners in his department, and again applied it to its original use.

There are certain animadversions in the author's paper on my own course of proceeding in treating on the sponges both British and foreign, to which I must beg leave to say a few words in reply.

Dr. Gray complains (p. 496) of my not having referred to any of the exotic sponges described by him in the 'Proceedings of the Zoological Society,' and of my not having described the sponges in the British Museum. I have carefully gone over all the British species in that collection, and have referred to them, when necessary, in my 'Monograph of British Sponges' (as, for instance, vol. ii. pp. 275, 277, 279, 281, 364, and elsewhere), and I should have described the sponges which Dr. Gray has written upon with pleasure had he requested me to do so. But all these specimens were described and named by him first and shown to me afterwards, and when I found he was thus skimming the cream of the subject I determined not to accept the leavings. I will not now point out the numerous errors regarding these species into which Dr. Gray has fallen, as it is very probable that I shall have to recur to their descriptions at a future period.

Dr. Gray (p. 500) objects to the large number of species of British Sponges in my genera *Halichondria*, *Hymedesmia*, and *Isodictya*. Had I applied *Halichondria* as Dr. Johnston and previous writers had established it, instead of having 28 species of that genus in my 'Monograph of the British Spongiadæ' there would have been 169 species. The number thus designated in Dr. Johnston's 'History of British Sponges' is 37. The Doctor's objection to the large number of species in the genera he names is plausible; but it is Nature and not I that am answerable for this difficulty; but in stating this objection he does not mention that the species of each of these genera are subdivided, by means of the various forms of the primary skeleton-spicula, into four or five divisions each, and that the greatest number of species in one group is 28 in the genus *Isodictya*. The author even extends his objection to my genus *Dictyoecylindrus*, in which there are 11 species, and these subdivided into 4 groups, the largest of which contains 5 species. The learned author quite forgets that the same inevitable difficulty occurs in botany. In the fourth edition of Babington's 'Manual of British Botany,' we find there are 19 species of *Roses*, 32 of *Salix*, 33 of *Hieracium*, 41 of *Rubus*, and 72 of *Carex*. In all these cases the difficulty is very much lessened by judicious subdivisions of the respective genera. The author also objects to my terminology; but without a definite

name for every part of a sponge we should no more progress successfully in the description of sponge-species than botanists would without their copious and well-considered descriptive language. Now I will venture to say that when the terminology relating to the parts of sponges applied in my 'Monograph of British Spongiadæ' has become familiar to the student, he will find no more difficulty in the recognition of a species of sponge described by means of the appropriate technicalities than a botanist encounters when he works out a species of plant that is new to him; and this is precisely the point at which I have aimed in my sponge-terminology, and by means of which I have described our British species of those animals. I am quite free to acknowledge that in the description of the sponges we are as yet but on the threshold of our structure, and that many new genera must be established to receive the amazing number of exotic species that are still undescribed; and the most that I can hope for in the course of study that I have shadowed forth in my 'Monograph of the British Spongiadæ' is, that it may prove a sound and useful foundation for the labours of future naturalists in this comparatively untrodden path of zoological science. I shall always hail with pleasure the appearance of new students of these extraordinary creatures, whose labours would advance our knowledge of their structural peculiarities and extraordinary habits; but amongst this class of students I cannot recognize the author of the singularly loose and impracticable attempt at a systematic arrangement of them published in the Society's 'Proceedings' for May 1867.

The essential object of all systematic arrangements is that of arriving with facility and certainty at the knowledge of species by characters common to all the individuals of such groups. This end is not attainable among the Spongiadæ by external characters: age, size, colour, and locality modify the external appearances of these animals to so great an extent as to scarcely ever allow of two individuals presenting the same amount of characteristic similarity that is so prevalent among other species of animals. We are therefore driven by necessity to the internal organization to attain the great end of accurate recognition in defiance of all their protean variations in form and colour.

An accurate and extensive knowledge of species should therefore be our first step towards a scientific arrangement of such animals. As the number of species known to us increases, we quickly find that many of them agree in possessing certain structural characters in common, while each of them has some especial organ which is not existent in the others, and this single peculiarity determines the species; or it may be that the determinative points may be more than one, or that in place of organs peculiar to certain species, the character may be stamped by other modifications, such as comparative size and peculiar modes of association or disposition of organs common to many species. In any of these cases the development of these characters is uniform and certain during all stages of the growth of the individual, and, notwithstanding all other intervening difficulties, the discrimination of the species is effective and final.

The nature of these characters is not that of organisms indispensably necessary to the existence of a sponge, but rather of those of an auxiliary description, which one species may require while another may well dispense with them.

As our knowledge of species extends, we quickly find that there are groups existing among them marked by peculiar modifications of the more essential organs of the sponge, such as those of the various modes of arrangement of the mechanical structure of the skeleton, while the material of which it is formed remains the same through a considerable number of such groups. Thus we arrive by a natural process at generic groups, which are on this constructive anatomical system quite as natural as species. Hitherto we have had but few well-defined genera of this description; and these few have been, as it were, thrust upon us by the irresistible evidence of Nature herself. Contrary to the received opinion of many able naturalists, I firmly believe that genera are quite as natural as species, and that it only requires perseverance on our own parts to recognize them, and to define their boundaries with accuracy and certainty. Of course we must expect cases occasionally to arise in which they approach each other by such insensible degrees as to render it extremely difficult to distinguish between the approximating points; but this appears also to be the case in botany, and in other branches of natural history, and may be considered the exception and not the rule of nature. Having thus established a natural foundation to our system of genera, the next step is that of classification; and here the material of which the skeleton is formed becomes a most important point of consideration. We find in the higher classes in zoology the animals of the highest degrees of organization secreting phosphate of lime as the basis of the skeleton; and as we descend in the scale of creation, the phosphate is replaced by carbonate of lime, and the skeleton becomes external instead of internal; the next step downward, and we lose the earthy material, and the keratode skeleton supplies its place; membrane succeeds to keratode; and finally all these substances are wanting, and sarcode becomes the entire animal. But amidst all these changes we find no class of animals secreting siliceous material as the basis of its skeleton; this material is reserved as the great distinguishing character of the class Protozoa.

Among the Spongiadæ we observe a natural simulation, as it were, of this gradational retrogression of organization. None of them secrete phosphate of lime; but the highest organized species secrete carbonate of lime in abundance. The next gradation is the secretion of siliceous material in place of lime, the siliceous material being the predominant material of the skeleton; and to this tribe belong by far the greater number of existing sponges. Then follows an intermediate stage, similar to that of the cartilaginous fishes, where we find the cartilage the predominant material, with included floating or dispersed portions of earthy basis; so in the sponges, as in *Chalina* and other genera, we have keratode the essential portion of the skeleton, with siliceous spicula immersed in the fibres to give additional strength and substance to the structures; and, finally, the skeleton becomes pure keratode, without

any admixture of earthy material. In the mature state I do not believe that there is any species that is destitute of keratode and composed of sarcode only. I have never yet seen such a sponge; but in the young and earliest stages of the development of many species we have them, as in *Spongilla* and others, simply existing as moving masses of sarcode, which I believe have been designated by observers as *Amœba*. In every specimen that I have yet seen that has been designated *Halisarca* I have always succeeded, by the aid of Canada balsam, in detecting minute siliceous spicula *in situ*. As regards the animal or vegetable nature of sponges, I may observe that in our investigations of this subject we must take a broader view than that of the ultimate structures of the animal. It is not a cell or a cilium that will decide that question. Nature is not so widely various in her general plan of operations as the world is prone to imagine. The tree, with its almost unlimited capabilities of propagation by seeds, by roots, or by cuttings, and in some cases even by single leaves, is the fit type of the coral, with its innumerable polypes, in each of which the germ of a separate animal is inherent. So it is with the sponge; each morsel of it is the germ of a separate existence; but the combined compound existences within it is in reality the animal. It is a congeries of existences in one. Not that the uniflagellate cells are to be designated as the animal; they are only vital points within, as seeds, buds, or axillary bulbs in plants. The late eminent Surgeon Liston on one occasion invited me to see the ciliated cells from a polypus in the nose of a patient at University Hospital; but no one in such a case would dream of designating man as a congeries of polyciliated cellular animalcula. Such bodies are more or less incidental to the structure of almost all animals; and in the sponges the living organized mass is the animal, not its incidental parts, as some authors would seem to imply. A knowledge of the structure and offices of such organs in its economy is an important point in the history of the sponge; but it is the combined structures and working together of the whole organized mass that we must look to for the determination of its character, either as an animal or a vegetable; and in the performance of its vital functions we have perhaps the most positive and undeniable evidence of its truly animal nature. Its nutrition is, like that of animals, voluntary and at intervals. It imbibes its food through one set of orifices, digests that which it has received, and excretes the rejected matter by appropriate oscula, while in plants these vital operations are involuntary and continuous.

6. List of Birds collected at Conchitas, Argentine Republic,
by Mr. William H. Hudson. By P. L. SCLATER, M.A.,
Ph.D., F.R.S., and OSBERT SALVIN, F.Z.S.

The authorities of the Smithsonian Institution, Washington, United States, America, have most kindly sent over for our inspection a series of birdskins collected at Conchitas, in the Argentine Re-

public, about twelve miles from the city of Buenos Ayres, by one of their correspondents, Mr. William H. Hudson. We have had great pleasure in determining the species, a list of which is herewith given. Nearly the whole of them are included in the list of the birds of the Argentine Republic given in the second volume of Burmeister's excellent 'Reise durch die La-Plata-Staaten;' but there are many points which call for remarks.

The following is a complete list of the species. The nomenclature used is generally that of Sclater's 'American Catalogue;' but we have also always referred to Burmeister's work above mentioned, which is the best guide to the ornithology of this district.

The number of skins submitted to our inspection is 265, referable to 96 species. Burmeister's list of the birds of the whole Argentine Republic includes 263 species.

Among the 96 species represented in the present collection the following 14 are not included in Burmeister's list:—

| | |
|----------------------------------|-------------------------------|
| <i>Geothlypis velata.</i> | <i>Picus mixtus.</i> |
| <i>Molothrus rufo-axillaris.</i> | <i>Circus macropterus.</i> |
| <i>Synallaxis maluroides.</i> | <i>Columba picazuro.</i> |
| — <i>anthoides.</i> | <i>Ægialitis falklandica.</i> |
| <i>Limnornis curvirostris.</i> | <i>Tringa bonapartii.</i> |
| <i>Myiotheretes rufiventris.</i> | — <i>bairdi.</i> |
| <i>Myiobius navius.</i> | <i>Butorides cyanurus.</i> |

It is most important that this district should be thoroughly worked out, in order that the whole of Azara's species may be re-identified. We trust, therefore, that Mr. Hudson will continue his collections in this interesting locality, and that we may again have the pleasure of calling the Society's attention to this subject.

1. TURDUS LEUCOMELAS.

Zorzal obscuro y blanco, Azara, Apunt. i. p. 341.

Turdus leucomelas, Vieill. N. D. xx. p. 226, et E. M. 644.

Turdus crotopezus, Burm. La-Plata-Reise, ii. p. 474.

Turdus amaurochalinus, Cab. Mus. Hein. p. 568; Scl. et Salv. P. Z. S. 1866, p. 177.

The receipt of this species from this locality, where it is stated to be "resident," appears to settle the question of its being Azara's "*Zorzal obscuro y blanco*." It therefore becomes entitled to bear the name *leucomelas* of Vieillot. We have compared Mr. Hudson's specimens with a typical example of *T. amaurochalinus*, and find them identical.

This Thrush has a wide range in South America. Natterer collected examples at Ypanema in Brazil, one of which is now in the Bremen Museum. Sclater's collection contains specimens from other parts of Brazil, Bolivia, and Cayenne. Bartlett has recently sent specimens from the Ucayali, as we have already noted.

2. TURDUS RUFIVENTRIS (Vieill.); Burm. l. c. p. 474.

3. MIMUS CALANDRIA (Lafr. et d'Orb.); Burm. *l. c.* p. 475.

We are now convinced that *Mimus modulator*, Gould, is identical with this species. Slater's Bolivian *M. calandria* (P. Z. S. 1859, p. 343) seems to differ principally in its smaller dimensions, and is perhaps hardly distinct.

4. POLIOPTILA DUMICOLA (Vieill.).

Culicivora dumicola, Burm. *l. c.* p. 473.

"Resident."

5. ANTHUS CORRENDERA (Vieill.).

A. rufus, Burm. *l. c.* p. 474.

"Resident."

6. GEOTHLYPIS VELATA (Vieill.).

Two specimens of this species, agreeing with Brazilian skins. Not mentioned by Burmeister. "Summer visitor."

7. PROGNE TAPERA (Linn.).

Colyte tapera, Burm. *l. c.* p. 477.

H. fusca, Vieill. ex Azara, No. 301.

Phæoprogne fusca, Baird, Rev. A. B. p. 285.

Several examples of this species, agreeing with specimens so named in Slater's collection. We do not know Baird's *P. tapera* as distinguished from his *P. fusca*.

8. HIRUNDO LEUCORRHOA (Vieill.).

Cotyle leucorrhœa, Burm. *l. c.* p. 478.

Several examples of this distinct species. *H. albilinea* of Lawrence is rightly associated by Baird (Rev. A. B. p. 297) with this species, but is readily distinguishable by its smaller size.

9. TANAGRA CYANOPTERA (Vieill.)

T. sayaca, Burm. *l. c.* p. 479.

Six skins of this species, all marked females, and without the bright blue on the lesser wing-coverts.

10. TANAGRA STRIATA (Gm.); Burm. *l. c.* p. 480.

11. GUIRACA GLAUCO-CÆRULEA (Lafr. et d'Orb.).

Coccyoborus glaucocæruleus, Burm. *l. c.* p. 488.

Two male specimens only of this highly interesting species.

12. ZONOTRICHIA PILEATA (Bodd.).

Z. matutina, Burm. *l. c.* p. 486.

"Resident."

13. POOSPIZA NIGRO-RUFA (Lafr. et d'Orb.); Burm. *l. c.* p. 484.
"Summer visitor."

14. EMBERNAGRA PLATENSIS (Gm.); Burm. *l. c.* p. 485.

15. CHRYSOMITRIS BARBATA (Mol.); Sclater, P. Z. S. 1867,
p. 332=*C. marginalis*, Bp. et Burm. *l. c.* p. 490.

16. SYCALIS ARVENSIS (Kittl.); Sclater, P. Z. S. 1867, p. 323.
S. luteiventris, Burm. *l. c.* p. 489.

It is somewhat doubtful whether *S. luteiventris* is specifically identical with this species, which agrees with Chilian specimens. See Sclater's remarks, P. Z. S. 1867, p. 342.

17. ICTERUS PYRRHOPTERUS (Vieill.).

Xanthornus pyrrhopterus, Burm. *l. c.* p. 493.

18. MOLOTHRUS BONARIENSIS (Gm.); Cassin, Pr. Ac. Phil. 1866, p. 19.

Molobrus sericeus, Burm. *l. c.* p. 494.

19. MOLOTHRUS RUFOAXILLARIS, Cassin, Pr. Acad. Phil. 1866,
p. 23.

Two specimens (both males) of this highly interesting species, which we have not met with before. It seems to have escaped Burmeister's notice.

20. MOLOTHRUS BADIUS (Vieill.); Burm. *l. c.* p. 495.

Dolichonyx badius, Cassin, Proc. Acad. Phil. 1866, p. 15.

Sexes, as determined by Mr. Hudson, *alike*.

21. PSEUDOLEISTES VIRESCENS (Vieill.).

Leistes anticus, Burm. *l. c.* p. 491.

A pair of this species, distinguishable from *P. viridis* by the want of the yellow rump. The female is scarcely different from the male, being only somewhat less bright in colouring.

22. LEISTES SUPERCILIARIS, Bp.

Trupialis guianensis, Burm. *l. c.* p. 490.

23. GEOSITTA CUNICULARIA (Vieill.); Burm. *l. c.* p. 465.

24. FURNARIUS RUFUS (Gm.); Burm. *l. c.* p. 462.

25. CINCLODES FUSCUS (Vieill.).

C. vulgaris, Burm. *l. c.* p. 463.

26. SYNALLAXIS ALBESCENS, Kittl.; Burm. *l. c.* p. 469.

27. SYNALLAXIS MELANOPS (Vieill.); Burm. *l. c.* p. 470.

"Inhabits marshes."

28. *SYNALLAXIS ALBESCENS* (Temm.).

One skin, marked "very scarce," agreeing with South-Brazilian examples of this species. Burmeister's *S. ruficapilla* (*l. c.* p. 468) is probably the same bird; but the true *S. ruficapilla* (Vieill.) seems to be the Brazilian species with the whole head and tail rufous. See Sclater, *P. Z. S.* 1856, p. 97.

29. *SYNALLAXIS MALUROIDES* (D'Orb.).

Not noticed by Burmeister.

30. *SYNALLAXIS ANTHOIDES*, King.

Not mentioned by Burmeister. "Resident: lives on the ground."

31. *ANUMBIUS ACUTICAUDATUS* (Less.); *Burm. l. c.* p. 467.32. *PLACELLODOMUS RUBER* (Vieill.); *Burm. l. c.* p. 467.33. *LIMNORNIS CURVIROSTRIS*, Gould, *Zool. Voy. Beagle*, iii. p. 81, t. 25.

Two skins of this rare species originally obtained by Darwin from reed-beds in the vicinity of Maldonado. Not mentioned by Burmeister.

34. *THAMNOPHILUS ARGENTINUS*, Cab.; *Burm. l. c.* p. 472.

"Summer visitor." Three skins of this species, representing the Brazilian *Th. torquatus*. The female has the tail rufous, and no cross bands on the body below.

35. *MYIOTHERETES RUFIVENTRIS* (Vieill.).

Not mentioned by Burmeister, but obtained by Mr. Darwin at Maldonado and Bahia Blanca, and in Sclater's collection from the Parana.

36. *TÆNIOPTERA CORONATA* (Vieill.); *Burm. l. c.* p. 459.37. *TÆNIOPTERA IRUPERO* (Vieill.).

T. mæsta, *Burm. l. c.* p. 460.

38. *SISOPYGIS ICTEROPHRYS* (Vieill.).

Tænioptera icterophrys, *Burm. l. c.* p. 460.

"Summer visitor." Sexes, as marked, alike.

39. *LICHENOPS PERSPICILLATUS* (Gm.); *Burm. l. c.* p. 457.

Three specimens of this bird in black plumage, and two in the rufous plumage (*L. erythropterus*), which Mr. Darwin* considers to be a distinct species, but which is usually regarded as the same bird in female dress. Two of Mr. Hudson's black-plumaged birds are marked *females*; but so are also both his red-plumaged ones, so that we can offer no additional evidence upon this disputed point. We

* *Zool. Voy. Beagle*, iii. p. 52.

may remark that Azara (Apunt. ii. p. 250) described these two birds as sexes, although he had already described (*l. c.* p. 117) the female as a different species.

40. *MACHETORNIS RIXOSA* (Vieill.); *Burm. l. c.* p. 458.

41. *CENTRITES NIGER* (Bodd.); *Burm. l. c.* p. 458.

42. *SERPOPHAGA SUBCRISTATA* (Vieill.); *Burm. l. c.* p. 454.

43. *SERPOPHAGA NIGRICANS* (Vieill.); *Burm. l. c.* p. 454.

44. *ELAINEA MODESTA* (Tsch.); *Burm. l. c.* p. 454.

Agrees with the Chilian birds. See Sclater's notes upon this species, *P. Z. S.* 1867, p. 327.

45. *PITANGUS BELLICOSUS* (Vieill.).

Saurophagus sulphuratus, *Burm. l. c.* p. 452.

46. *MYIOBIUS NÆVIUS* (Bodd.).

Not mentioned by Burmeister. Larger than, and possibly distinct from, the northern species (in which case it will, perhaps, stand as *M. auriceps*, Gould); but our series of specimens is not sufficient for comparison. "Summer visitor."

47. *PYROCEPHALUS RUBINEUS* (Bodd.).

P. parvirostris, Gould; *Burm. l. c.* p. 456.

"Summer visitor."

After comparing a large series of skins of this form from many parts, we only feel satisfied as to the distinguishability of the northern *P. mexicanus*, which seems always larger in size and paler in colour.

48. *TYRANNUS MELANCHOLICUS* (Vieill.); *Burm. l. c.* p. 452.

"Summer visitor."

49. *MILVULUS VIOLENTUS* (Vieill.).

Tyrannus violentus, *Burm. l. c.* p. 453.

50. *PODAGER NACUNDA*, Vieill.; *Burm. l. c.* p. 449.

51. *STENOPSIS BIFASCIATA*, Gould; Sclater, *P. Z. S.* 1866, p. 140.

Antrostomus longirostris, *Burm. l. c.* p. 450.

A single skin of an immature bird, probably referable to this species.

52. *GUIRA PIRIRIGUA* (Vieill.).

Ptiloleptis guira, *Burm. l. c.* p. 443.

"Iris red."

53. *PICUS MIXTUS*, Bodd. (ex Pl. Enl. 748); Sundeval, *Consp Pic.* p. 20.

Not mentioned by Burmeister.

54. *CHRYSOPTILUS CHLOROZOSTUS* (Wagl.).

Chrysopicus chlorozostus, Malh.

P. chlorozostus, Sund. *Consp. Pic.* p. 75.

Chrysoptilus melanochlorus, Burm. *l. c.* p. 445.

Three specimens. "Frequents the woods on the shores of the Plata." Quite erroneously united by Burmeister with its Brazilian representative *C. melanochlorus*.

55. *MILVAGO CHIMANGO* (Vieill.).

M. pezoporus, Burm. *l. c.* p. 434.

"Resident."

56. *URUBITINGA UNICINCTA* (Temm.).

Asturina unicincta, Burm. *l. c.* p. 436.

"Eye hazel."

57. *HYPOTRIORCHIS FEMORALIS* (Temm.); Burm. *l. c.* p. 437.

"Winter visitor."

58. *TINNUNCULUS SPARVERIUS* (Linn.); Burm. *l. c.* p. 437.

59. *CIRCUS CINEREUS* (Vieill.); Burm. *l. c.* p. 439.

"Inhabits the Southern Pampas."

60. *CIRCUS MACROPTERUS* (Vieill.); Azara, No. 31.

One adult specimen of this Harrier marked ♂, but apparently a female. "Eyes hazel." Not mentioned by Burmeister.

61. *OTUS BRACHYOTUS* (Forst.); Burm. *l. c.* p. 439.

62. *PHOLEOPTYNX CUNICULARIA* (Mol.).

Noctua cunicularia, Burm. *l. c.* p. 440.

63. *ZENAIDA MACULATA* (Vieill.); Burm. *l. c.* p. 497.

64. *COLUMBULA PICUI* (Temm.); Burm. *l. c.* p. 496.

65. *COLUMBA PICAZURO* (Temm.).

Picazuro, Azara, No. 317.

This species is quite distinct from *C. gymnophthalma* (Temm.) and *C. maculosa* (Temm.), with which it has been often confounded. *C. gymnophthalma* has the bill yellow, not black as in this species.

66. *NOTHURA MACULOSA* (Temm.); Burm. *l. c.* p. 499.

67. *THINOCORUS RUMICIVORUS*, Eschsch.; Burm. *l. c.* p. 501.

68. *ÆGIALITIS FALKLANDICA* (Lath.).

One specimen of this bird, which is not mentioned by Burmeister.

69. *VANELLUS CAYENNENSIS* (Gm.); Burm. *l. c.* p. 502.70. *EUDROMIAS MODESTA* (Licht.).

Vanellus modestus, Burm. *l. c.* p. 502.

Four skins of this Plover in winter dress, and one in process of change to summer plumage. "*Chorlito di inverno*: a winter visitor."—W. H. H.

71. *HIMANTOPUS NIGRICOLLIS* (Vieill.); Burm. *l. c.* p. 503.

"Eye red: resident."—W. H. H.

72. *GAMBETTA MELANOLEUCA* (Gm.); Burm. *l. c.* p. 503.

"Summer visitor. *Becassina*."—W. H. H.

73. *GAMBETTA FLAVIPES* (Gm.); Burm. *l. c.* p. 503.

"Summer visitor."—W. H. H.

74. *TRINGA BONAPARTII*, Schlegel; Baird, Rev. A. B. p. 472.

"Winter visitor."—W. H. H. Four skins of this species, which seems to be the "*Chorlito pestorejo pardo*" of Azara. If this be so, the prior names *Tringa fuscicollis* (Vieill.) and *T. campestris* (Licht.) will be applicable to it. Burmeister does not mention it in his 'La-Plata-Reise'; but it may be the *Tringa campestris* of his 'Syst. Ueb.' iii. p. 74.

75. *TRINGA BAIRDI*.

Actodromas bairdi, Coues, Pr. Ac. Phil. 1851, p. 194.

One skin of this species, which appears to be the "*Chorlito lomo negro*" of Azara; if so, Mr. Coues's name will have to give way to *Tringa melanota*, Vieill. (*Tringa dorsalis*, Meyen).

76. *GALLINAGO PARAGUÆ* (Vieill.); Schlegel, Mus. des P.-B. *Scolopaces*, p. 11.

Scolopax frenata, Burm. *l. c.* p. 503.

Schlegel makes this species different from his *Gallinago frenata*. But we may point out that *Scolopax paraguæ*, Vieillot, and *S. frenata*, Lichtenstein, are both based upon Azara's "*Becassina prima*" (No. 387); so that these names cannot be used for different species.

The only two Snipes we have yet met with from La Plata, Patagonia, and Chili are the present species and *G. stricklandi*.

77. *RHYNCHÆA SEMICOLLARIS* (Vieill.).

Rh. hilarii, Burm. *l. c.* p. 504; Azara, no. 405.

One specimen.

78. *ARAMIDES YPECAHA* (Vieill.).

Rallus ypecaha, Vieill. (ex Azara).

Aramides gigas, Burm. *l. c.* p. 504; Schlegel, Mus. d. P.-B. *Ralli*, p. 14.

“*Gallinetta*: eye yellow.” This is certainly Vieillot’s *Rallus ypecaha*, founded on Azara’s *Ypecaha*, and appears to be the species indicated by Schlegel as *A. gigas*. We have not yet met with the allied species, which he calls *Aramides ypecaha*.

79. RALLUS RHYTIRHYNCHUS, Vieill.; Scl. et Salv. P. Z. S. 1867, p. 990.

Aramides rhytirhynchus, Burm. *l. c.* p. 504.

“*Burito*: a summer bird; very scarce.”—W. H. H. Two skins of this species, which we take to be the *Rallus rhytirhynchus* of Vieillot, founded upon Azara’s “*Ypecaha pardo*.” Upon comparing them with Chilian specimens of *Rallus sanguinolentus* and the Peruvian skin of the same species obtained by Whitely (see P. Z. S. 1867, p. 990) it seems necessary to unite them all under the same name. The Chilian bird is certainly larger and has a longer beak; but Whitely’s Peruvian skin is scarcely larger than one of the La Plata birds.

80. FULICA ARMILLATA, Vieill.; Burm. *l. c.* p. 505.

One immature example, apparently, of this species. “*Gallareta*: eye hazel; very common.”—W. H. H.

81. PARRA JACANA, Linn.; Burm. *l. c.* p. 506.

Two examples of this wide-ranging species.

82. CHAUNA CHAVARIA (Linn.); Burm. *l. c.* p. 506.

“*Chaja*.”—W. H. H.

83. BUTORIDES CYANURUS (Vieill.).

Ardea cyanura, Vieill. N. D. xiv. p. 21, et E. M. p. 1120 (ex Azara).

B. scapularis, Bp. Consp. ii. p. 128.

“Summer visitor.” Apparently not mentioned by Burmeister.

84. IBIS FALCINELLUS, Linn.

T. chalconoptera, Burm. *l. c.* p. 511.

“Summer visitor.” Cf. Schlegel, Mus. d. P.-B. *Ibides*, p. 4, et v. Pelz. Novara-Reise, p. 125.

85. PLATALEA AJAJA (Linn.); Burm. *l. c.* p. 511.

86. PHENICOPTERUS IGNIPALLIATUS, Is. Geoffr.; Burm. *l. c.* p. 512.

87. CYGNUS NIGRICOLLIS (Gm.); Burm. *l. c.* p. 512.

88. SPATULA PLATALEA (Vieill.); Burm. *l. c.* p. 517.

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89. *QUERQUEDULA FLAVIROSTRIS* (Vieill.); Burm. *l. c.* p. 516.

Concerning the distinctness of this species from *Q. oxyptera* we have already spoken (P. Z. S. 1867, p. 990).

90. *QUERQUEDULA VERSICOLOR* (Vieill.).

A. maculirostris, Burm. *l. c.* p. 516.

91. *DAFILA BAHAMENSIS* (Linn.); Burm. *l. c.* p. 515.

92. *DAFILA SPINICAUDA* (Vieill.); Burm. *l. c.* p. 515.

93. *METOPIANA PEPOSACA* (Vieill.); Burm. *l. c.* p. 518.

This Duck is not a *Fuligula*, as Burmeister has already shown. Nor can it be placed with *Anas*, as it has a large bulbous expansion in the windpipe, besides the curious bulging forehead. We have therefore adopted for it a generic name invented by the late Prince Bonaparte (C. R. xliii. p. 649).

94. *LARUS CIRRHOCEPHALUS* (Vieill.) (ex Azara, No. 410).

L. maculipennis, Burm. *l. c.* p. 518.

One skin in winter dress.

95. *PODICEPS ROLLANDI*, Q. et G.

A single young specimen. Not mentioned by Burmeister, unless it be the *P. bicornis*, Licht., which we are not at present able to ascertain with certainty.

96. *PHALACROCORAX BRASILIANUS* (Licht.); Burm. *l. c.* p. 520.

7. Notice of *Clymene similis*, a New Dolphin sent from the Cape by Mr. Layard. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Mr. Edgar Layard has sent from the Cape the skull of a Dolphin with the under jaw, which is so like the skull I figured under the name of *Delphinus obscurus* in the 'Zoology of the Erebus and Terror,' t. 16, that I at first regarded it as the same. But having occasion to recompare it to identify the skull of a very young Dolphin that Mr. Layard has since sent from the Cape, I was interested in finding that it showed the same kind of difference in the form of the hinder part of the palate in front of the internal nostrils that I have before observed in some true Dolphins which had very similar skulls in other respects, but which belong to Dolphins very differently coloured, which were obtained in distinct parts of the world.

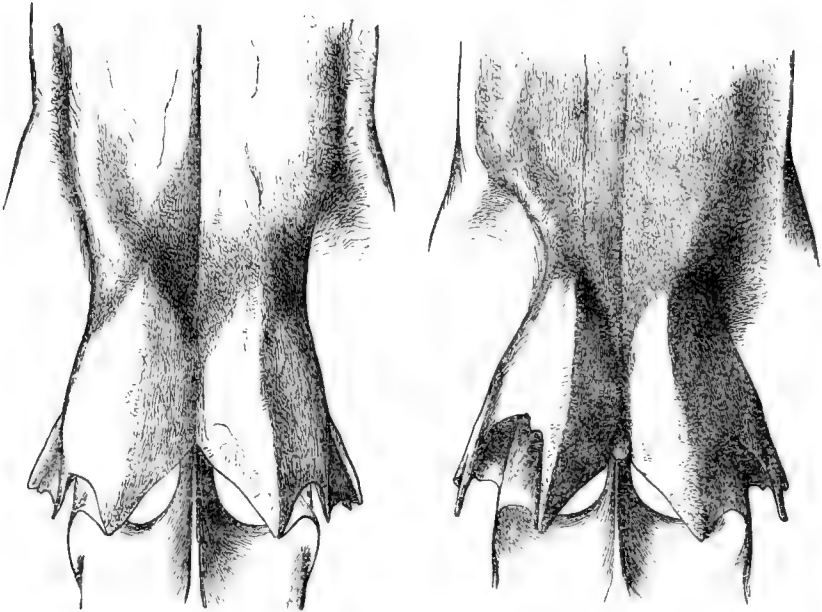
In this case the two skulls both come from animals found at the Cape; but several Dolphins inhabit the seas surrounding that promontory.

I have thought it desirable to distinguish the two skulls by dif-

ferent names, and to give a short diagnostic description of them, and also to figure the differences, and thus draw attention to the fact, leaving it to be verified by future observers under more favourable circumstances; and I have briefly described the skull of the very young specimen, which I believe belongs to one of these species, to show the variation that exists between the skulls of the young and adult animals.

Fig. 1.

Fig. 2.



Pterygoid bones and hinder nasal opening of skull.

Fig. 1. *Clymene obscura*.Fig. 2. *Clymene similis*.

1. CLYMENE OBSCURA, Gray, P. Z. S. 1866, p. 215.

Tursio obscurus, Gray, Zool. Ereb. & Ter. t. 16.

Black. Teeth $\frac{32}{32}$, very slender, rather far apart, five in an inch. The palate in front of the pterygoid bones broad, flat. The pterygoid bones bluntly keeled, with a comparatively shallow broad angular concavity between the ridges.

Hab. Cape of Good Hope.

2. CLYMENE SIMILIS, n. sp.

Black, white beneath. Teeth $\frac{32}{33}$, straight, tapering, rather close together, five in an inch. Palate much contracted in front of the base of the pterygoid bones. Pterygoid bones rather sharply keeled, with a deep angular narrow concavity between the ridges.

Hab. Cape of Good Hope (*Layard*).

This species is chiefly known from the preceding by the larger

size of the teeth, by the palate being contracted behind, and the form of the pterygoid bones.

Mr. Layard sent for examination a full-grown skull of this species, with only a few teeth in the middle of the tooth-line, and without the lower jaw.

He also sent a young animal preserved in salt, which was cut in two parts transversely. The skin has been kept in the British Museum in spirits, and the body has been made into a skeleton. It would appear that the intermaxillary bones become more prominent in the palate as the animal increases in size. In the adult skull they form a distinct part of the palate for about one-fourth of its length. In the skull of the young animal they are scarcely seen, being only visible deep in the suture between the maxillary bones.

In the skeleton of the young specimen the index finger is rather longer than the length of the upper and lower arm-bones and carpal bones. The radius and ulna compressed, close together; the ulna about half as wide as the radius. Carpal bones eight; the two upper hinder ones largest; the rest subequal, oblong. Thumb of two very small rudimentary bones, far apart. Index finger of seven, the ring-finger of six, the middle finger of three phalanges; the upper phalanges of the index and middle fingers very small. The cervical vertebræ separate; but they may become united, as the first vertebra is in so young a state as to be formed of four separate bones.

The skulls of the adult and young are very much alike; but the beak of the adult skull is much longer, compared with the length of the brain-cavity, than that of the skull of the young animal. In the adult the beak is only rather longer than the brain-cavity, as $8\frac{1}{8}$ to $7\frac{1}{8}$. In the young skull the beak is not nearly so long as the length of the brain-cavity, which is $4\frac{1}{2}$ inches long, and the beak only $4\frac{1}{8}$ inches.

The processes of the pterygoid bone, which form the bony sheath of the front of the blowhole inside the pterygoid bone, are well developed, and as long as the pterygoid itself, in the young skull only forming a slightly raised ridge on the inner side of the base of the bones.

As in some specimens of *Lagenorhynchus*, there is a triangular space marked on the hinder part of the palate in front of the palatine bones, which is defined by the impression of blood-vessels; this space is very distinct in the young skull, and not so much so in the older one.

The inner surface of the intermaxillary bones forms a narrow central prominence in the front of the palate in the older skull; these bones are not seen in the palate, being hidden in the inner edge of the suture of the maxilla in the skulls of younger specimens, showing that the presence or the absence of the sight of these bones in the palate, in some specimens at least, depends upon age.

As the three skulls were all obtained from animals inhabiting the seas near the Cape of Good Hope, it has occurred to me that the difference in the form of the pterygoid bones and in the size of the

teeth may be only a sexual character; but they are so similar to the differences that I observed in the skulls of the Dolphins sent from Liverpool that came from different localities, and had such a different system of coloration, that I am inclined to regard them as distinct for the purpose of attracting attention to them, and in the hope that Mr. Layard, or some naturalist in the southern hemisphere, may obtain a series of specimens, and be able to study the question in more detail.

The shorter-beaked species of *Clymene* are chiefly known from *Lagenorhynchus* by the convexity of the upper surface of the beak, and of the intermaxilla above that surface.

8. On some new or imperfectly known Fishes of India.

By FRANCIS DAY, F.Z.S., F.L.S., &c.

ACANTHOPTERYGII.

BERYCIDÆ.

RHYNCHICHTHYS ORNATUS, sp. nov.

D. $12\frac{1}{6}$. P. 15. V. $1\frac{1}{6}$. A. $4\frac{1}{9}$. C. 15. L. l. 36. L. tr. $3\frac{1}{2}\frac{1}{6}$.

Length of specimen $1\frac{5}{10}$ inch.

Length of head $\frac{1}{3}$, of pectoral $\frac{1}{5}$, of base of dorsal spines $\frac{1}{3}$, of base of dorsal rays $\frac{1}{10}$, of base of anal $\frac{1}{7}$, of caudal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{4}$, of body $\frac{1}{3}$, of dorsal spines $\frac{1}{6}$, of dorsal rays $\frac{1}{7}$, of ventral $\frac{1}{6}$, of anal spines $\frac{1}{6}$, of anal rays $\frac{1}{10}$ of the total length.

Eyes. Large, circular, diameter $\frac{2}{9}$ of length of head, rather above $\frac{1}{2}$ a diameter from end of snout, nearly 1 diameter apart.

Appearance percid; the dorsal profile much more convex than the abdominal, which is nearly horizontal from the lower surface of the snout to the inferior margin of the caudal fin.

Mouth below, posterior to the produced and pointed snout. The posterior extremity of the maxilla extends to beneath the centre of the orbit; it is hidden by the præorbital. Præoperculum, its vertical limb with fine but distantly placed serrations; a large and strong spine extends from its angle to the base of the pectoral fin; its horizontal limb strongly denticulated, as is also the lower margin of the interoperculum. Operculum with two spines, the upper the largest, its lower margin denticulated. Præorbital and shoulder-bones serrated. The upper surface of the head roughened by raised longitudinal ridges.

Teeth. Villiform in jaws, vomer, and palatines.

Fins. Dorsal fins connected; spines moderately strong, the second the longest, whence they decrease to the last; interspinous membrane deeply cleft. Pectoral rounded. Ventral arises a little distance posterior to the pectoral, its spine being equal to the second of the dorsal fin in length. Third anal spine longest and strongest, the first very minute. Caudal slightly lobed.

Scales cover the body, and form a partial sheath to the dorsal and anal fins, but there are none on the top of the head. They are strongly ctenoid and in parallel rows.

Lateral line in single tubes, following the curve of the back in the upper fourth of the body.

Colours. Bluish silvery along the back and sides, and rosy along the abdomen. Fins yellowish; dorsal orange; spines black. The interspinous membrane between the first three dorsal spines and also between the sixth and last is deep black.

A single specimen captured at Madras, June 6th, 1867.

PERCIDÆ.

MESOPRION CHIRTAH, Cuv. & Val.

B. vii. D. 11/14. P. 17. V. 1/5. A. 3/9. C. 17. L. 1. 55.
L. tr. 10/25.

Length of specimens from $11\frac{8}{10}$ to 16 inches.

Length of head $\frac{2}{7}$, of pectoral $\frac{1}{4}$, of base of dorsal spines $\frac{2}{7}$, of base of dorsal rays $\frac{1}{5}$, of base of anal $\frac{1}{7}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{1}{4}$, of dorsal spines $\frac{1}{8}$, of dorsal rays $\frac{1}{8}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{6}$ of the total length.

Eyes. Upper margin $\frac{1}{4}$ of diameter from the profile; diameter $\frac{2}{9}$ of length of head, 1 diameter apart, $1\frac{1}{2}$ diameter from end of snout.

Posterior extremity of maxilla extends to nearly beneath the anterior extremity of the orbit. Præoperculum slightly emarginate, smooth superiorly and serrated inferiorly, whilst the posterior portion of its vertical limb has some widely separated denticulations.

Teeth. An external row of conical teeth in the upper jaw, and several rows of villiform ones posterior to it; the same in the lower jaw, except that the villiform ones are only in its central portion. Villiform in vomer and palate.

Dorsal spines weak, the fourth the longest. First anal spine a little above one-third the length of the second, which is much the strongest, but not quite so long as the third. Caudal broad and slightly emarginate.

Colours. Uniform bright rose-colour, with an orange tinge. All the fins have a slightly dark stain at their margins.

Hab. Common in Madras.

I have been so fortunate as to obtain numerous specimens of this fish, from the very young to the adult, and have no hesitation in asserting that the *M. annularis*, C. & V., is the young of this species, and the *M. malabaricus* the semiadult.

Before describing the specimens, it will be necessary to offer a few remarks upon what has been written respecting these fish. Russell was the original observer of the *M. chirtah*, which he figures in his 'Fishes of Vizagapatam;' his specimen was 13 inches long. Dr. Jerdon omits the *M. chirtah* from amongst the list of his fishes of Madras, but states that the *M. annularis* is one of the commonest of the tribe there. Dr. Günther rejects the *M. chirtah*, but remarks that the *M. malabaricus* is perhaps a variety of the *M. annularis*.

The numbers of spines, rays, and scales of the three are identical, whilst the difference in proportion is only such as might be due to age, sex, and accidental circumstances.

The general coloration of these three species is scarlet, with a more or less purplish gloss. In a number of specimens from $2\frac{6}{10}$ inches to 16 inches in length the following variations in colour were noticed.

In the smallest there is a dark mark along the base of the dorsal fin, commencing at the opercles, and a black band across the back, just anterior to the root of the tail, on either side of which and extending over the back it has a white edge. In a specimen a little larger the colours are the same, except that there is a dark line along each row of scales. At $7\frac{3}{10}$ inches in length the band across the back before the tail is still very distinct, but it does not extend quite so far down the sides, and its light edges are not so visible. At $8\frac{2}{10}$ inches the white edging has almost gone. At 9 inches, in one specimen, there is only a very indistinct dark bar across the back; it has, in fact, become the *M. malabaricus*, whilst at $11\frac{8}{10}$ it has assumed the full scarlet colours of the *M. chirtah*. At 16 inches in length the scarlet colours are not so vivid, and the fins are slightly darker than in the young.

MULLIDÆ.

UPENEOIDES FASCIOLATUS, sp. nov.

D. $7\frac{1}{7}$. P. 15. V. $1\frac{1}{5}$. A. $2\frac{1}{5}$. C. 15. L. l. 36. L. tr. $2\frac{1}{2}\frac{1}{6}$.

Length of specimen 3 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of caudal $\frac{1}{6}$, of base of first dorsal $\frac{2}{15}$, of base of second dorsal $\frac{1}{12}$, of base of anal $\frac{1}{12}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of first dorsal $\frac{1}{8}$, of second dorsal $\frac{1}{10}$, of ventral $\frac{2}{15}$, of anal $\frac{1}{10}$ of the total length.

Eyes. Upper margin near the profile; diameter $\frac{2}{7}$ of length of head, 1 diameter from end of snout, 1 diameter apart.

Profile of head rounded.

Posterior extremity of maxilla reaches to beneath the anterior third of the orbital. Interorbital space concave, having a longitudinal groove down its centre. The barbels reach to opposite to the posterior margin of the orbit.

Teeth in several villiform rows in both jaws, and in an uninterrupted semilunar band in vomer and palate.

Fins. Second spine of first dorsal the highest, six rows of scales between the end of first dorsal and commencement of second dorsal. Origin of anal in a line slightly posterior to the origin of the second dorsal. Ventrals reach about halfway to the anus. Caudal deeply forked.

Scales ctenoid over body, cheeks, and head, also over commencement of caudal, besides which there are some minute scales between rays of the second dorsal, anal, and caudal fins.

Lateral line in arborescent form on each scale.

Air-bladder absent.

Colours. Of a reddish chestnut along the back, becoming silvery

along the abdomen. A brilliant golden stripe, two-thirds as wide as a scale, passes from the orbit to the upper third of the tail. Pectoral flesh-coloured. Ventral and anal yellow. Caudal reddish, without bands, tipped with black which is externally edged with white. First dorsal milk-white, edged with black; two horizontal yellow lines along it, which are dotted with very fine black points. Second dorsal milk-white, tipped with black, having one curved horizontal line of yellow, dotted with black points along its centre.

Hab. Madras, in the sea, November 1867.

GOBIUS MADRASPATENSIS, sp. nov.

D. $6\frac{1}{9}$. P. 17. V. $1\frac{1}{5}$. A. 9. C. 13. L. l. 27. L. tr. 11.

Length of three specimens from $2\frac{9}{10}$ to 3 inches. Length of head $\frac{1}{5}$, of pectoral $\frac{1}{6}$, of caudal $\frac{1}{6}$, of base of first dorsal $\frac{1}{7}$, of base of second dorsal $\frac{1}{5}$, of base of anal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of first dorsal $\frac{1}{9}$, of second dorsal $\frac{1}{7}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{7}$ of the total length.

Eyes. Upper margin near the profile; diameter $\frac{1}{4}$ of length of head, $\frac{2}{3}$ of a diameter from end of snout, $\frac{1}{4}$ of a diameter apart.

Cleft of mouth rather oblique, lower jaw the longest, the posterior extremity of the maxilla extending to beneath the anterior margin of the orbit.

Teeth. In several closely set villiform bands in both jaws, with an external somewhat enlarged row in the upper, and also in the anterior half of the lower jaw, having externally a large recurved canine tooth, which is rather nearer the symphysis than the angle of the mouth.

Fins. Dorsal spines flexible, the first with a short filamentous extremity; none of the pectoral rays silk-like. Caudal rounded.

Scales. Finely ctenoid, scarcely lineated; they extend forward to the posterior margin of the orbit, and are smaller on the nape than on the rest of the body. There are seven horizontal rows between the origin of the second dorsal and that of the anal.

Colours. Olivaceous, with irregular brownish ill-defined blotches and dots. From five to eight very fine vertical black lines pass downwards from the back to the abdomen, commencing opposite to the base of the ventral, and ending opposite to the middle of the anal, giving the first the appearance of being banded.

Fins greyish; first dorsal with two rows of dark blotches, second dorsal irregularly blotched and dotted. Pectoral and anal unspotted. Ventral tipped with black. Caudal minutely dotted in rows.

Hab. Backwaters in Madras, probably will be found in the sea; is not a freshwater species.

GOBIUS NEILLI, sp. nov.

D. $6\frac{1}{8}$. P. 15. V. $\frac{1}{5}$. A. 9. C. 13. L. l. 28. L. tr. 9.

Length of specimens from $1\frac{5}{10}$ to $3\frac{2}{10}$ inches.

Length of head $\frac{2}{7}$, of pectoral $\frac{1}{6}$, of caudal $\frac{1}{5}$, of base of first dorsal $\frac{1}{8}$, of base of second dorsal $\frac{1}{5}$, of base of anal $\frac{1}{5}$ of the

total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of first dorsal $\frac{1}{3}$, of second dorsal $\frac{1}{5}$, of anal $\frac{1}{6}$, of ventral $\frac{1}{5}$ of the total length.

Eyes directed upwards and slightly outwards, diameter $\frac{2}{7}$ of length of head, nearly 1 diameter from end of snout, and less than $\frac{1}{4}$ of a diameter apart.

Body somewhat compressed. Head as broad as high.

The posterior extremity of the maxilla extends to beneath the anterior third of the orbit. Cheeks somewhat swollen. Horizontal margin of præoperculum rather longer than the vertical.

Teeth in fine villiform rows in both jaws, and having in the lower jaw an external recurved series, the outer one of which on either side is nearly as large again as the others, and curved outwards and slightly backwards; it is situated nearer to the angle of the mouth than the centre of the jaw.

Fins. First dorsal spines flexible, prolonged, and in the adult a long filamentous termination to the second spine, which, however, is not elongated in the young. Pectoral somewhat pointed, none of its rays silk-like. Ventral reaches to the commencement of the anal. Caudal somewhat pointed.

Scales finely ctenoid, with striæ converging posteriorly. Seven horizontal rows between the bases of the second dorsal and anal anteriorly, and nine between the end of the dorsal and the base of the caudal.

Colours. In the adult pale ochreous, becoming of a dirty-white colour on the abdomen. Upper surface of head, cheeks, and superior two-thirds of the body covered with various-sized rusty-brown dots of irregular shapes, and which form oblique vertical bands on the cheeks and opercles. Pectoral and ventral unspotted, but with a deep greyish edge. First dorsal with a deep-black mark between the first and fifth spine at about half the height of the fin, which above is of a canary-yellow colour, and the ends of the spines black; between the fourth spine and the end of the fin are deep-brown spots. Second dorsal edged externally with brown, and having a yellow band with a black base dividing it from the lower $\frac{3}{4}$ of the fin, which is spotted with light brown. Anal yellow, edged with black in its external half. Caudal barred with eight or nine rows of chestnut spots.

In the young the dorsal fins are spotted with brown, and the black mark in the first dorsal does not generally show itself until the fish is above 2 inches long. Pectoral, ventral, and anal yellow, without any markings.

This very pretty little Goby, which I have named after my friend A. C. B. Neill, Esq., F.Z.S., is not uncommon in the backwaters and along the sea-shore.

The *G. neilli* is allied to the *G. criniger*, C. & V., from which it differs in several points, amongst which are that in the former the neck is scaled $\frac{2}{3}$ of the distance between the base of the first dorsal and the orbits, whilst in the *G. criniger* this part is scaleless.

In the *G. neilli* there is an external enlarged row of teeth in the lower jaw, the external of which is much larger than the others, and

recurved as seen in the *G. venenatus*, *G. viridipunctatus*, and other allied species; but in the *G. criniger* "ses dents sont petites, même les extérieures" (Cuv. & Val). "The teeth are minute, velvety, of nearly equal length" (Cantor). "Teeth small" (Günther).

GوبيUS BIOCELLATUS, C. & V.

Gobius sublitus, Cantor.

D. $6\frac{1}{3}$. P. 19. V. $\frac{1}{2}$. A. $\frac{1}{8}$. C. 15. L. l. 35-38. L. tr. 13.

Length of specimens from 1 to 4 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of caudal $\frac{1}{6}$, of base of first dorsal $\frac{1}{8}$, of base of second dorsal $\frac{1}{6}$, of base of anal $\frac{1}{6}$ of the total length. Height of head $\frac{1}{8}$, of body $\frac{1}{5}$, of first dorsal $\frac{1}{8}$, of second dorsal $\frac{1}{6}$, of anal $\frac{1}{6}$, of ventral $\frac{1}{7}$ of the total length.

Eyes directed upwards and slightly outwards; horizontal diameter $\frac{1}{5}$ of length of head, $\frac{3}{4}$ of a diameter apart, 1 diameter from end of snout.

Teeth villiform in both jaws, except an external slightly enlarged row in the lower jaw, those in which are considerably recurved inwards. A few of those in the outer row in the upper jaw are slightly enlarged.

Fins. First dorsal generally highest anteriorly; but in some specimens the fifth spine is somewhat the longest.

Colours. These vary, generally greyish brown, with some large irregular blotches along the side, and a slight brownish line along the centre of each row of scales. Under surface of cheeks and jaws lined with circuitous brownish lines. Cheeks dark brownish.

Fins. Dorsal generally yellowish, with a greyish tinge, and having several irregular whitish lines along its lower half, also a deep-black blotch with a white margin usually between its fifth and sixth spines. Second dorsal of the same colour, with several rows of irregular white spots. Pectoral, ventral, and anal greyish, the last with some white dots. Caudal dark grey, with some lines of dark spots.

Cantor observes that *G. sublitus* chiefly differs from *G. biocellatus*, C. & V., in its dentition; but I have fortunately obtained a large number of specimens at Madras, and find that the dentition of the two is identical. His other diagnostic sign, namely the filamentous fifth spine of the first dorsal, is accidental in the specimen and by no means uncommon.

One very curious diseased specimen of this species was captured November 15, 1867; it is covered with large, hard tubercles over its body and the base of its fins, also over its tongue.

PHARYNGOGNATHI ACANTHOPTERYGII.

PSEUDOSCARUS RUSSELLII, Cuv. & Val.

D. 9/10. P. 15. V. $1\frac{1}{5}$. A. $2\frac{2}{9}$. C. 13. L. l. 24. L. tr. $\frac{2\frac{1}{2}}{7}$.

Length of specimen 18 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of base of hard dorsal $\frac{1}{4}$, of base of dorsal rays $\frac{1}{5}$, of base of anal nearly $\frac{1}{5}$, of caudal $\frac{1}{7}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{2}{7}$, of dorsal spines $\frac{1}{4}$, of dorsal rays $\frac{1}{11}$, of ventral $\frac{1}{7}$, of anal spines $\frac{1}{16}$, of anal rays $\frac{1}{10}$ of the total length.

Eyes. Upper margins near the profile; diameter $\frac{1}{5}$ of length of head, 2 diameters from end of snout and anterior extremity of teeth, $1\frac{1}{2}$ diameter apart.

Teeth. Two in either jaw; their inferior edges slightly serrated.

Fins. Dorsal spines nearly as high as the rays. Pectoral moderately rounded. Ventral pointed. Caudal cut nearly square.

Lateral line proceeds straight to beneath middle of dorsal rays, then curves slightly downwards for two scales; anterior to this termination, and beneath the eighth dorsal ray, the lateral line is continued along the middle of the side to the tail. The last two scales of the upper branch of the lateral line are above the two first of its lower branch.

Air-bladder rather thick.

Colours. Sea-green, each scale, except those on the chest, having a reddish semilunar-shaped base, equal to about half its width. The scales between the base of the ventral and anal fins reddish. Head rosy. Eye hazel, with a few short blue lines radiating from its lower margin; anteriorly one passes to the upper margin of the tip, which it encircles. Dorsal fin bluish green, edged with light blue; an irregular reddish line extends along its centre, another passes along its base, and a third below its blue edge. Caudal reddish, with four or five irregularly vertical bluish-green bands. Anal of a lightish blue. Pectoral and ventral reddish, the outer ray blue.

This description is taken from a female specimen which was captured at Madras on July 12th, 1867.

It is said by the fishermen to be very rarely met with.

SILURIDÆ.

SILURUS PUNCTATUS, sp. nov.

B. xii. D. 5. P. $\frac{1}{10}$. V. 8. A. 58-62. C. 19.

Length of specimens from 4 to $8\frac{1}{10}$ inches.

Length of head $\frac{1}{7}$, of pectoral fin $\frac{1}{10}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{2}$, of caudal $\frac{1}{10}$ of the total length. Height of head $\frac{1}{3}$, of body $\frac{1}{8}$, of dorsal fin $\frac{1}{16}$, of ventral $\frac{1}{16}$, of anal $\frac{1}{3}$ of the total length.

Eyes small, their covering continuous with the skin of the head; they are situated above the level of the angle of the mouth, $2\frac{1}{2}$ to 3 diameters from the end of the snout, and 5 diameters apart.

Head wide, depressed; neck not elevated, upper profile of head horizontal. Body strongly compressed.

Mouth wide, cleft narrow; posterior extremity of the upper jaw extends to beneath the posterior extremity of the orbit. Lower jaw elevated at its centre, and slightly shorter than the upper. Crown

of head smooth, covered by skin. Nostrils some distance apart, the anterior between the orbit and the snout, and covered by a thick strong cirrus, which reaches to $\frac{3}{4}$ the length of the pectoral fin. Mandibular cirri situated one anterior to the other, at a distance equalling the diameter of the orbit; both of them extend nearly as far as the base of the pectoral fin. Gill-openings wide, central cleft extends to above the isthmus.

Teeth. Numerous rows of fine sharp villiform ones in both jaws, and two oval patches, one on each side of the vomer, divided by a small interspace. None on the palate.

Fins. Dorsal small, without any spine, situated anterior to the origin of the ventral; no adipose dorsal. Pectoral with a very short but strong spine, ending in a short termination. Ventrals extend to the origin of the anal, which last is slightly joined to the caudal, the latter being rounded or rather emarginate.

Air-bladder present.

Lateral line straight, ceasing just anterior to the base of the caudal fin.

Colours. Leaden, becoming purplish beneath, covered all over with minute black points, which form an irregular dark finger-mark on the shoulder. Caudal in some specimens yellowish.

Mr. Burnett was good enough to send me several specimens of this interesting fish, which he captured in the Wynaad, in a stream about 3000 feet above the level of the sea. Some were full of ova. The fish does not appear to grow above 12 inches in length.

February 27, 1868.

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

The following extract was read from a letter addressed to the Secretary, by Mr. W. G. Blanford, Corr. Memb., dated "Annesley Bay, Feb. 3rd:"—

"I have got *Pectinator spekei*, or else a second species of the same genus. It abounds up the passes, living amongst the rocks, and it is, without exception, the most tender-skinned mammal I ever tried to preserve. It is rather a pretty little beast, fond of lying out on lumps of rock, and feeding upon green leaves, though I have never seen one on a tree. It is constantly out in the morning and evening, but I fancy it only feeds at night.

"I have also two species of *Hyrax* (one from the passes, a second from the shores of Annesley Bay), a species of Ground-Squirrel (*Xerus*), which does not agree in colour with any of those described in Dr. Gray's list, and a few other things. The Jackal is quite different

from the Indian species ; but I cannot get hold of a specimen. The only Antelopes here are two species of Gazelle—one of the Spring-bok type, living in large herds, the other of the Indian type, like *Gazella bennettii*, solitary or in pairs, more rarely three or four occurring together ; this is perhaps Blyth's *G. spekii*. I have good horns of both male and female, but no perfect specimen. Besides these there is the little Beni-Israel, which I suppose is *Antilope saltiana*, a beautiful little animal, with somewhat the appearance and habits of a Hare. It is almost always met with solitary or in pairs ; more rarely three or four occur together. Above 3000 feet on the passes is an Antelope with somewhat the habits of a Chamois. I have not seen a specimen dead, nor yet a perfect skin ; the hair is singularly coarse. I cannot ascertain what animal this is. A species of Koodoo also occurs in the higher ranges, and, I believe, one or two other animals ; but I have only the accounts of sportsmen, and they are not very trustworthy. A species of Wart-Hog (*Phacochoerus*) abounds. The birds are more Indian than the mammals. Land-shells very scarce ; indeed I have seen none down here."

Dr. J. Murie exhibited some specimens of young Anthropoid Apes (the Gorilla, Chimpanzee, and Orang), and made remarks upon them and their different varieties.

The following papers were read :—

1. Remarks on a Rat lately living in the Society's Gardens.

By JAMES MURIE, M.D., Prosector to the Society.

The specimen which I exhibit before the present meeting is one of three presented to the Society, by Mr. F. Bond, in July 1867.

The information first derived was to the effect that they had been brought by a ship from Manilla.

Further inquiry, however, led to the following information from Mr. Bond. The rats had been caught on board a ship, which had sailed from London direct to Sydney, N.S.W., thence to Hong Kong, where she lay some weeks in the port. Afterwards, on the voyage home, the vessel called at Manilla to provision, but anchored at a considerable distance from shore, the only communication with the land being by means of small boats.

It would thus seem that if the rats were from a foreign port, it is more likely that it was Sydney or Hong Kong than Manilla. If from the first, then the chances would be in favour of their being but a pale-coloured variety or example of albinism in *Mus rattus*. If from China, where European shipping is so numerous, they might still be the same, although it is possible a light species of rat may exist in that land.

The peculiarity of colouring and somewhat obscure history determined me upon making a comparison of the specimen with some of

the East-Indian species in the British Museum. No specimen in that collection agrees with them in tint.

The Black Rat, *Mus rattus* (var. *niger*), approaches nearest in form and general appearance. *Mus rufescens* or *indicus* (*Mus kok*, Gray) is considerably darker and rufescent in shade. The *Mus darwini*, Waterh., P. Z. S. 1837, p. 28, besides differing in colour and size, has a much broader, leaf-like ear, although the specimens in question have it nearly as long.

Whether considered merely as a pale variety of the Black Rat, or as indicating a variation towards separation into a specific type, I may be justified in placing on record a description of the external characters.

Hair fine. Tail clothed with very short, close-set, white hairs. Ears large and somewhat leaf-like, naked and of a pinkish or flesh-colour. Sides of body of a light-yellowish hue. Forehead and back inclining to a more brownish tinge. Nose and rump of a purplish-grey colour. Under parts of body white. Whiskers long, fine, and black.

The size, somewhat naked tail, and other characters show it to be a true rat, and not belonging to the group of mice. The admeasurements of one specimen are as follows:—

| | inches. |
|---|---------|
| Length from snout to tip of tail | 11·3 |
| ——— of head | 1·6 |
| ——— of body | 4·8 |
| ——— of tail (partly injured, probably an inch longer) . . | 4·9 |

Ears in length 1 inch, greatest breadth 0·7 inch.

Length of sole of foot 1 inch, and including toes 1·3 inch.

2. On the Nocturnal Ground-Parrakeet (*Geopsittacus occidentalis*, Gould). By JAMES MURIE, M.D., F.L.S., Professor to the Society.

Of this singular “*Strigops*-looking” Parrakeet, first made known to ornithologists through Mr. Gould’s description (P. Z. S. 1861, p. 100) from a skin sent him from Perth, in Western Australia, nothing further has been learned until lately.

No living specimen had been seen by naturalists in this country, when Dr. Mueller, of Melbourne, our active and obliging Corresponding Member, transmitted to this country a specimen of parrot-like bird, which proved to be the Western or Nocturnal Ground-Parrakeet of Mr. Gould, *Geopsittacus occidentalis* *.

In a letter to Dr. Sclater, it is described by Dr. Mueller as inhabiting the Gawler Ranges in South Australia, and in some respects to be a night-bird, like the Nightjars and Owls.

During the short period it remained in the Gardens, its habits

* Gould, ‘Handbook to Birds of Australia,’ 1865, vol. ii. p. 88; and the ‘Birds of Australia,’ Suppl. part iv. pl. 2, and text, 1867.

were carefully watched by our Superintendent, Mr. A. D. Bartlett. He arrived at the same conclusion as Dr. Mueller, namely, that it is chiefly a nocturnal bird. As the results of Mr. Bartlett's observations have already been stated* I need only add two facts mentioned by him:—one, that it showed a preference for green food; the other, that its voice was a double note, harsh and loud.

My own observations, although limited, would incline me to agree with the above-mentioned gentleman. While I saw the bird during the day it remained motionless on its tuft of grass, and only became lively towards sundown. In daylight the eye had a singular expression, reminding one of the appearances characteristic of the Owls, Lemuroids, and such like night-feeding animals. The eye, however, did not look excessively large in proportion to the head.

Toward the end of January, the weather having become changeable, the bird took what appeared to its keeper a fit of sneezing, and died within a day after.

Examination of the viscera showed that death had been caused by an acute pneumonic attack. This had affected both lungs. The other internal organs were much congested with blood, and their texture softened. This softening may have been due to a fatty degeneration of the tissues.

The body was so fat and oily that it was only with difficulty that Mr. Bartlett took off the skin in safety. Of the allied form of Ground-Parrakeet, *Pezoporus formosus*, Mr. Gould says that "its flesh is excellent, being delicate in flavour, and equalling, if not surpassing, that of the Quail and Snipe"†. Although I myself did not taste the flesh of the present nocturnal species, I have no doubt, from the delicacy of its appearance, that it would form quite as good food as its congener.

Upon carefully comparing our bird with Mr. Gould's type specimen (an indifferent skin) and his description, I could find no points, either in the marking or colouring, worthy of special notice. The sex of his specimen not being known, it becomes the more important to mention that the Society's bird was a male, and doubtless adult.

The typical skin has lately been presented to the British Museum by Mr. Gould; and our mounted bird has now been added to the same collection.

I regret that the amount of fat and the greasy nature of the skin quite stood in the way of examination respecting the pterylosis of this interesting Psittacine form.

The subjoined are the only notes I was enabled to make. The greatest stretch of the wings, *i. e.* from tip to tip, is 18 inches. The shape of each wing itself is also peculiar, and not unlike that of the night-flying birds. From base to apex it presents a regular elongated cone, the tips of the feathers being subequal.

The primaries are ten in number, the second of which is probably the longest. There are nine or ten secondary feathers.

* By Mr. Sclater, P. Z. S. 1867, p. 891.

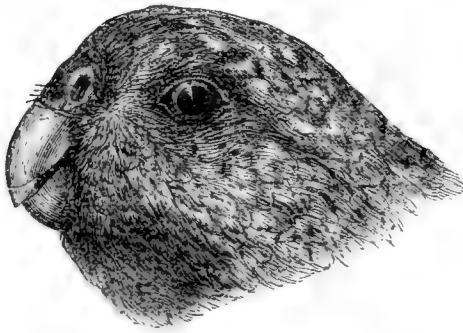
† Handbook, already cited, vol. ii. p. 87.

The tail, $4\frac{1}{2}$ inches in greatest length, possesses 12 rectrices, each of an acuminate form. The four middle feathers are barely so long as the two outside of them. The remaining outermost ones decrease from within outwards, so that the posterior terminal edge of the tail has a rounded or deep-arched contour.

Notwithstanding the scantiness of material originally at his command, Mr. Gould nevertheless had felicitously caught the main characters of this somewhat remarkable, or, as he termed it, "anomalous bird." In his later 'Supplement to the Birds of Australia,' he has given a very charming figure of it from the living specimen, and by his own pencil. This delineation, in other respects excellent, seems to me to have the head and body rather fuller than natural; in this way the resemblance to *Pezoporus* is not so striking as under more favourable circumstances it might be.

Of course one cannot well judge or compare living animals with stuffed specimens; but as far as my examination extends, excepting, it may be, in the length of tail, there is a much nearer likeness in form between these birds than Mr. Gould has admitted in his text.

Fig. 1.



Head of *Geopsittacus* (*Pezoporus*) *occidentalis*. Nat. size. Drawn from the bird immediately after death.

Besides colour and build of body, the beak and legs, among the external characters, are worthy of especial remark.

The upper mandible is thick-set, and projects quite beyond the lower; it is 5'' long and 3'' deep at its basal end. The culmen is broad, which gives the beak a flattened appearance anteriorly. The lateral tooth-like expansion near the angle of the gape, present in many genera of Parrots, is here wanting, as is the case in *Pezoporus* and the genus *Platycercus* generally.

The cere, even for a Parrot, is unusually large, full, and fleshy. It is slate-coloured. Gould describes it as large and grey. The opening of the nostrils is wide, roundish, and directed upwards and outwards (see fig. 1).

In front and below the cere there is a small pencil of elongated bristle-like hairs. These are directed forwards and outwards.

As the bird is seen standing on the ground, the legs appear rela-

tively longer than is common to the Parrot tribe. They are clothed with small hexagonal scales, closely set together, which upon the toes, on their upper surface, are gradually altered into narrow partially transverse scutella (fig. 2).

Fig. 3.

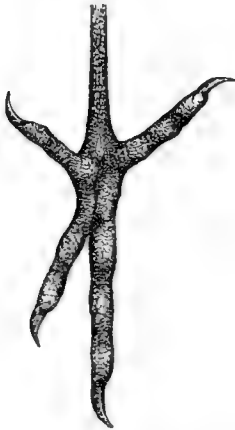


Fig. 2.

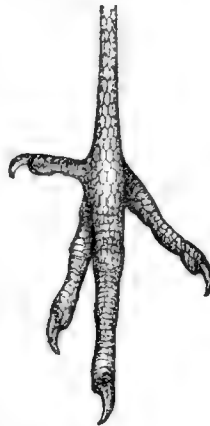


Fig. 2. Left foot of *G. occidentalis* (dorsal surface).
3. Plantar surface of right foot. (Both nat. size.)

The claws are moderately strong and curved.

A better idea may be formed of any differences, if they exist, between this nocturnal species and the Ground-Parrakeet by a tabular view of the limb-proportions. I have added also the measurements of specimens of two other genera, not very distantly related, and from birds nearly equivalent in general size.

Comparative lengths of the tarsus, digits, and claws in four genera of Parrots.

| | <i>Geopsittacus.</i> | <i>Pezoporus.</i> | <i>Platycercus.</i> | <i>Euphema.</i> |
|---|----------------------|-------------------|---------------------|-----------------|
| Length of tarsus | 1.0 | 1.0 | 0.8 | 0.5 |
| 1st digit (inner hind toe), length to root of claw..... | 0.35 | 0.3 | 0.35 | 0.22 |
| Length of the claw | 0.2 | 0.2 | 0.24 | 0.2 |
| 2nd digit (inner front toe), length to root of claw | 0.4 | 0.3 | 0.5 | 0.3 |
| Length of the claw | 0.2 | 0.3 | 0.3 | 0.21 |
| 3rd digit (outer front toe), length to root of claw | 0.7 | 0.7 | 0.7 | 0.5 |
| Length of the claw | 0.3 | 0.4 | 0.3 | 0.3 |
| 4th digit (outer hind toe), length to root of claw | 0.5 | 0.5 | 0.65 | 0.48 |
| Length of the claw | 0.5 | 0.4 | 0.33 | 0.21 |

It will be seen from the above that *Geopsittacus* and *Pezoporus* resemble each other closely so far as the length of the tarsus

and the digits are concerned. The first form is no doubt the stouter-limbed of the two. *Platycercus* approaches nearer to them than does *Euphema*.

The same remarks apply to the claws. Curiously enough, the claw of the fourth digit in *Geopsittacus* slightly surpasses in length that of *Pezoporus*, although the remaining claws are the shortest.

While discussing the external characters, I shall just add a few remarks bearing somewhat upon the physical contour of *Geopsittacus*.

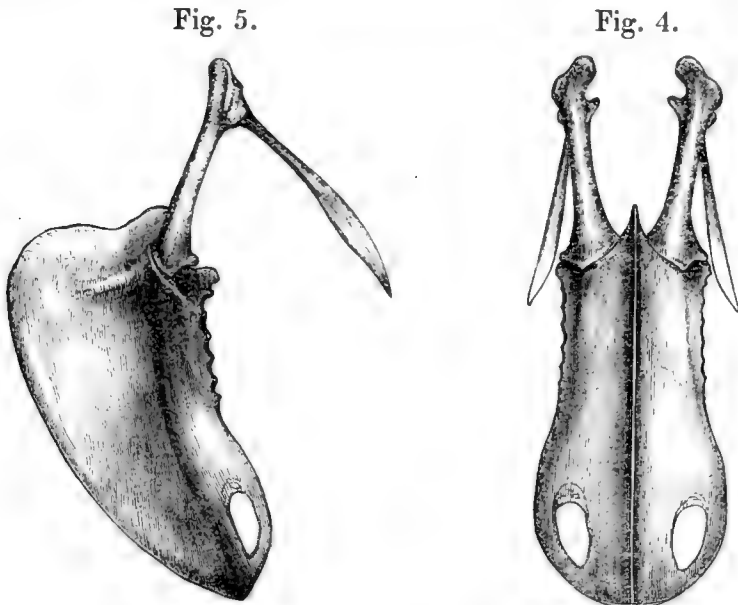
I had the opportunity of comparing the body of this bird, when disrobed of skin and feathering, side by side with those of *Platycercus flaveolus*, *Lorius chlorocercus*, and *Calopsitta novæ-hollandiæ* in a similar condition. It then appeared that *Geopsittacus* and *Platycercus* were nearly alike with regard to their muscular development and proportions of depth to length of body and keel. The former, however, had very slightly the advantage over the latter in vertical depth posteriorly. *Lorius chlorocercus*, with a much longer body than any one of the other species, had less vertical depth anteriorly than *Platycercus* and *Geopsittacus*, and only slightly more than *Calopsitta*. On the other hand, while the three last-mentioned genera more nearly agreed in the depth of the body behind, *Lorius* differed from them all in its being much greater.

These limited observations would seem to indicate that the chest or wing-giving power is greatest and nearly alike in *Geopsittacus* and *Platycercus*, whereas *Lorius* and *Calopsitta* are stronger relatively towards the rump and in the abdominal region generally. Expressed in antithesis it points to volatorial powers *versus* scanorial habits.

Circumstances, I regret, only permitted me to examine the osteology through the sternum, which possesses characters in common with those of the Parrot tribe. Its body is elongated in shape (1''·7), narrowest (0''·65) and deepest forwards, shallowest and expanded (0''·85) behind. The middle xiphoid region* shows a tendency to be produced; but this is so slight as barely to break the regularity of the arch of the posterior border. There is a large fenestra on each side, of an oval figure. These, in the specimen in question, have an irregular margin, from partial filling-in of delicate osseous material. At an earlier stage, therefore, the fenestræ must have been proportionally larger and more ellipsoid in contour. The keel is large and deep (0''·6 anteriorly) and has a gentle but not greatly projecting anterior curvature, fashioned after the manner of the prow of a steam-ram.

There are six pointed serrations, or costo-condyles, for the attachment of as many sternal ribs.

* In the description of the sternal bones, I have throughout followed the terms adopted by Mr. Parker in his recent "Monograph on the Structure and Development of the Shoulder-girdle and Sternum in the Vertebrata," Ray Soc. 1868. The breadth of his researches and the sequence in the developmental condition of the parts examined by him give us a more trustworthy basis than heretofore.



Figs. 4 & 5. Ventral and lateral views of the sternum of *G. occidentalis*.
Nat. size.

The rostrum projects rather upwards than forwards; its anterior groove is shallow.

The coracoids are moderately long and stout, the epicoracoids well-defined.

The furcula, or conjoined clavicles, is absent.

The mesoscapular segment is of fair dimensions, and partly conjoined with the mesocoraco- and mesoscapular spurs.

Each scapula is of considerable length, strong, though only of moderate thickness; its upper ensiform-shaped half is terminated by a sharp point.

As regards the visceral anatomy of *Geopsittacus occidentalis*, I shall proceed simply to describe the several parts and organs examined by me, leaving structural comparisons for after-consideration.

At the angles of the gape, but within the buccal cavity, two unusually large lobe-like flaps are observed. These folds correspond to the *glandulæ anguli oris*, said to be found in some birds of prey. Whether identical with what Tiedemann has taken to be the parotid gland or not, the above exist in all the Parrots I have examined, but are unusually large in *Geopsittacus*.

Their minute structure I have only examined sufficiently to ascertain they are tolerably vascular and covered with tough cuticle. No doubt they serve an important office in deglutition, or may possibly be tactile organs.

The tongue has a number of minute longitudinal striations upon its upper surface, disposed in such a manner that the elevations and furrows resemble a diminutive fan. The narrow end of these is

hindermost, and the median smaller ones are outflanked by a considerable broader ridge.

As in the greater number of the genera of Parrots, the tongue is bulbous, short, thick, and fleshy.

Towards the root, at the chink of the glottis, I observed indications (the parts having been slightly injured in the operation of skinning) of a transverse lappet or fringe, whose free posterior margin was tipped with papillary projections directed backwards.

The aperture of the *rima glottidis* is, comparatively speaking, short and wide. The trachea, including its bronchial portion, measures 2·7 inches in length: it is slightly wider at the top; but the diminution in calibre is very gradual indeed until approaching the lower larynx, where it is sensibly reduced in diameter.

From the noiseless diurnal habits of *Geopsittacus* it might be supposed the larynx would offer some important variations from its noisy *confrères*. True to its Psittacine character, however, it possesses the usual three pairs of lower laryngeal muscles, namely, two tensors and one laxator on either side. Of these, in the specimen under consideration, it appeared as if the laxator was unusually, or at least well developed, while the uppermost tensor was remarkably sparse in fleshy fibre.

The digestive tract is truly Psittacine in its nature, as the following description shows.

The upper portion of the œsophagus and the crop unfortunately were partially destroyed during the process of skinning. The proventriculus is moderately developed, and its glandular structure minute.

The gizzard is roundish in outline and somewhat flattened antero-posteriorly; it is tolerably muscular, and has a broad central tendon. At its lower border (the part which corresponds with the great flexure of the stomach in human anatomy) there is a deep incision. The moiety which lies in front, or to the left side of the duodenum, descends rather the lower of the two. The gizzard is about 0·6 of an inch in its greatest diameter. Towards, but above the pyloric aperture, where the intestine is given off, there is a prominent bulging or sacculus. Internally the gizzard is lined with a thick, soft, tough, white-coloured membrane, disposed in longitudinal rugæ. It contained only comminuted quartz grit, but no remains of food.

The intestines have a total length of 16 inches; and their calibre, which is but very moderate, has nearly a uniform diameter.

As usual in the *Psittacidæ*, cæci are absent.

The liver, kidneys, and other internal organs presented no points of interest worth recording.

Having thus anatomically described this, in some respects, aberrant form of Parrot, it remains to be considered whether its characters, external and internal, warrant its being retained as the type of a separate genus, and what are its nearest allied forms.

In his technical description, Mr. Gould leaves it open for naturalists to adopt his generic name. M. Otto Finsch, in his recent volume on the group of Parrots, gives the genus *Pezoporus* with two





J. Wolf lith

M & N Harshart imp

1. EUSCARTHMUS IMPIGER.
2. SUBLEGATUS GLABER.

species, *P. formosus* and *P. occidentalis*, from which we may infer he does not intend, in his succeeding yet unpublished volume, to give *Geopsittacus* as a distinct genus.

If external markings and colour reveal affinity, then *Geopsittacus*, *Pezoporus*, and *Strigops* are nearly allied. Osteological characters come to divide the two former from the latter.

While admitting that the shorter tail, rather stouter body, and the want of the red frontal band sufficiently define *G. occidentalis* from *P. formosus* specifically, these points, I am inclined to believe, are not of sufficient value or equal import when considered generically.

Admitting that the nocturnal habits of *Geopsittacus* vary from those of *Pezoporus*, this itself would throw the balance in favour of its separation as a genus.

Through the kindness of Mr. Flower I have been enabled to compare the sternum of the latter with the former bird. Excepting the relation of size, *Pezoporus* being the smaller and altogether the more slender of the two, there is essentially no difference in structure.

In the genus *Platycercus*, altogether a group of ground-loving birds, there is a close resemblance to the two last-spoken-of forms; but they differ not only in colour, but structurally, as regards the sternum and other anatomical characters.

Of *Strigops* that intense similarity in outward aspect to *Geopsittacus* and *Pezoporus* is outweighed when its osteology is compared. Yet, notwithstanding its almost keelless sternum, I cannot help believing its real affinities are with the nocturnal Parrakeet, and that some intermediate form may one day be found.

Platycercus and *Strigops* are the extremes of a Psittacine group (it may be subfamily). *Pezoporus*, including *Geopsittacus* under that genus, is the central type of the same group.

3. On Venezuelan Birds collected by Mr. A. Goering. By P. L. SCLATER, M.A., F.R.S., and OSBERT SALVIN, F.L.S. —Part I.

(Plate XIII.)

Mr. Anton Goering, of Saxe-Altenburg, who accompanied Dr. Burmeister as *préparateur* during his travels through La Plata, left England, in September 1866, to collect objects of natural history in Venezuela. Mr. Goering reached Carupano (*viâ* Trinidad) on the 30th of November of the same year. From Carupano he made an excursion of several months into the interior, visiting Caripé, several caves inhabited by the Guácharo (*Steatornis caripensis*) in that neighbourhood, and Pilar, and collecting extensively. Unfortunately a large part of these collections were lost by an accident during his return back to Carupano. From Carupano Mr. Goering proceeded to Caraccas, where he arrived in the latter part of last summer.

The collection we now bring before your notice contains 173 skins, collected mostly at Carupano, Pilar, and Caraccas. They are referable to 126 species. Three of these we have described as being probably new to science, namely *Basileuterus griseiceps*, *Euscarthmus impiger*, and *Sublegatus glaber*. The last two are obscure species belonging to difficult groups, and may have received prior names; but we have not succeeded in finding them.

Although some well-known collectors have visited Venezuela (Mr. Dyson, M. Sallé, and others), and many extensive collections have been formed in that country and transmitted to Europe, there has been hitherto no attempt made to give a connected account of its rich avifauna. We trust that Mr. Goering, who is now exploring the country to the interior of Puerto Cabello and the Lake of Valencia, will continue his successful researches, so as to enable us to supply this deficiency.

We first give the names of the entire set of species, adopting generally the nomenclature of Sclater's 'American Catalogue,' and then add notes upon such of them as appear to call for observation. The exact localities are added when they are stated on the specimens.

| | Caripé. | Pilar. | Carupano. | Caraccas. |
|---|---------|--------|-----------|-----------|
| TURDIDÆ. | | | | |
| †1. <i>Catharus aurantirostris</i> | * | | | |
| 2. <i>Turdus fumigatus</i> | .. | * | | |
| 3. <i>Mimus melanopterus</i> | .. | .. | * | |
| 4. <i>Rhodinocichla rosea</i> | .. | .. | .. | * |
| TROGLODYTIDÆ. | | | | |
| †5. <i>Henicorhina leucosticta</i> | .. | .. | .. | * |
| 6. <i>Thryothorus rutilus</i> | .. | .. | .. | * |
| 7. <i>Troglodytes parvus</i> | .. | .. | * | |
| SYLVIIDÆ. | | | | |
| 8. <i>Polioptila buffoni</i> | * | | | |
| SYLVICOLIDÆ. | | | | |
| 9. <i>Parula pitiayumi</i> | * | | | |
| †10. <i>Basileuterus griseiceps</i> , sp. n. | * | | | |
| 11. <i>Setophaga verticalis</i> | * | .. | .. | * |
| 12. — <i>ruticilla</i> | | | | |
| VIREONIDÆ. | | | | |
| 13. <i>Cyclorhis flavipectus</i> | .. | .. | * | |
| †14. <i>Hylophilus acuticauda</i> | .. | .. | .. | * |
| CÆREBIDÆ. | | | | |
| †15. <i>Diglossa similis</i> | .. | .. | .. | * |
| 16. <i>Chlorophanes atricapilla</i> | .. | * | | |
| 17. <i>Cœreba cyanea</i> | .. | * | | |

| | Caripé. | Pilar. | Carupano. | Caracas. |
|---|---------|--------|-----------|----------|
| 18. <i>Cœreba carulea</i> | .. | * | | |
| 19. <i>Certhiola luteola</i> | .. | .. | * | |
| TANAGRIDÆ. | | | | |
| 20. <i>Procnias occidentalis</i> | * | | | |
| 21. <i>Euphonia nigricollis</i> | * | .. | .. | * |
| 22. — <i>trinitatis</i> | .. | .. | .. | * |
| 23. <i>Calliste cyanoptera</i> | * | | | |
| 24. <i>Compsocoma sumptuosa</i> | .. | .. | .. | * |
| 25. <i>Tanagra olivicyanea</i> | .. | .. | .. | * |
| 26. <i>Ramphocœlus venezuelensis</i> | | | | |
| 27. <i>Pyrranga ardens</i> | * | | | |
| 28. <i>Tachyphonus melaleucus</i> | .. | | * | |
| 29. — <i>luctuosus</i> | .. | * | | |
| 30. <i>Nemosia ruficeps</i> | .. | .. | .. | * |
| 31. <i>Buarremon semirufus</i> | .. | .. | .. | * |
| 32. <i>Saltator olivascens</i> | .. | .. | * | |
| 33. — <i>maculipectus</i> | .. | .. | .. | * |
| FRINGILLIDÆ. | | | | |
| †34. <i>Cardinalis phœniceus</i> | .. | .. | * | |
| 35. <i>Oryzoborus torridus</i> | .. | * | | |
| 36. <i>Spermophila minuta</i> | * | | | |
| 37. <i>Volatinia jacarina</i> | * | .. | * | * |
| 38. <i>Phonipara omissa</i> | .. | .. | * | * |
| 39. <i>Coryphospingus pileatus</i> | .. | .. | * | |
| 40. <i>Coturniculus manimbe</i> | .. | .. | .. | * |
| 41. <i>Embernagra conirostris</i> | .. | .. | * | |
| 42. <i>Chrysomitris cucullata</i> | .. | .. | * | * |
| 43. — <i>columbiana</i> | .. | .. | .. | * |
| ICTERIDÆ. | | | | |
| 44. <i>Icterus auricapillus</i> | * | | | |
| 45. — <i>giraudi</i> | .. | .. | .. | * |
| 46. — <i>xanthornus</i> | .. | .. | * | |
| 47. — <i>vulgaris</i> | .. | .. | * | |
| 48. <i>Lampropsar guianensis</i> | .. | .. | * | |
| 49. <i>Molothrus</i> , sp. ind., ♂ jun. | .. | .. | .. | * |
| 50. <i>Sturnella meridionalis</i> | * | | | |
| CORVIDÆ. | | | | |
| 51. <i>Cyanocorax incas</i> | * | | | |
| DENDROCOLAPTIDÆ. | | | | |
| 52. <i>Synallaxis albigularis</i> | .. | .. | .. | * |
| 53. — <i>inornata</i> | .. | .. | .. | * |
| 54. — <i>terrestris</i> | * | | | |
| †55. <i>Philydor columbianus</i> | .. | .. | .. | * |
| 56. <i>Dendrocincla meruloides</i> | .. | * | | |
| 57. <i>Xiphocolaptes promeropyrynchus</i> | * | | | |
| 58. <i>Dendroornis susurrans</i> | * | | | |
| 59. <i>Dendroplex picirostris</i> | .. | * | | |
| 60. <i>Picolaptes albo-lineatus</i> | .. | * | * | |

| | Caripé. | Pilar. | Carupano. | Caracas. |
|---|---------|--------|-----------|----------|
| FORMICARIIDÆ. | | | | |
| 61. <i>Thamnophilus major</i> | .. | .. | * | |
| 62. — <i>atricapillus</i> | .. | * | | |
| 63. — <i>doliatus</i> | .. | .. | * | |
| 64. <i>Dysithamnus semicinereus</i> | * | | | |
| 65. <i>Myrmotherula</i> , sp. ind., ♀..... | * | | | |
| 66. <i>Formicivora intermedia</i> | .. | .. | * | |
| 67. <i>Chamaeza olivacea</i> | .. | .. | .. | * |
| TYRANNIDÆ. | | | | |
| †68. <i>Ochthoeca setophagoides</i> | .. | .. | .. | * |
| 69. <i>Sayornis cineracea</i> | .. | .. | .. | |
| 70. <i>Fluvicola pica</i> | .. | .. | .. | |
| 71. <i>Machetornis rixosa</i> | .. | .. | .. | * |
| 72. <i>Todirostrum cinereum</i> | .. | .. | * | |
| †73. <i>Euscarthmus impiger</i> , sp. n. | .. | .. | .. | * |
| 74. <i>Phyllomyias semifusca</i> | .. | .. | .. | * |
| 75. <i>Myiozetetes guianensis</i> | .. | .. | * | |
| †76. <i>Sublegatus glaber</i> , sp. n. | .. | .. | .. | * |
| 77. <i>Rhynchocyclus sulphurescens</i> | * | | | |
| 78. <i>Pitangus rufipennis</i> | .. | .. | .. | * |
| 79. <i>Myiodynastes audax</i> | .. | * | | |
| 80. <i>Megarhynchus pitangua</i> | .. | .. | * | |
| 81. <i>Myiobius naevius</i> | .. | .. | * | |
| 82. — <i>vieillotides</i> | * | | | |
| 83. <i>Empidonax</i> , sp. ind. | .. | * | | |
| 84. <i>Contopus brachytarsus</i> | .. | * | .. | * |
| 85. <i>Myiarchus ferox</i> | .. | .. | .. | |
| 86. — <i>nigriceps</i> | * | | | |
| 87. <i>Tyrannus melancholicus</i> | .. | .. | .. | |
| COTINGIDÆ. | | | | |
| 88. <i>Tityra cayana</i> | .. | * | | |
| 89. <i>Pachyramphus albogriseus</i> | .. | .. | .. | * |
| 90. <i>Pipra aureola</i> | .. | * | | |
| 91. <i>Chiroxiphia lanceolata</i> | .. | * | | |
| †92. <i>Pipreola formosa</i> | * | | | |
| †93. <i>Chasmorhynchus variegatus</i> | .. | .. | .. | |
| GALBULIDÆ. | | | | |
| 94. <i>Galbula ruficauda</i> | .. | .. | * | |
| BUCCONIDÆ. | | | | |
| 95. <i>Bucco bicinctus</i> | .. | * | | |
| TROGONIDÆ. | | | | |
| 96. <i>Trogon viridis</i> | .. | .. | .. | |
| 97. <i>Trogon</i> , sp. ind. (jr.) | * | | | |
| TROCHILIDÆ. | | | | |
| 98. <i>Phaethornis guyi</i> | .. | .. | .. | |
| 99. <i>Dolerisca fallax</i> | .. | .. | .. | |

| | Caripé. | Pilar. | Carupano. | Caraccas. |
|--|---------|--------|-----------|-----------|
| 100. <i>Campylopterus lazulus</i> | | | | |
| 101. — <i>ensipennis</i> | | | | |
| 102. <i>Lampornis mango</i> | | | | |
| 103. <i>Spathura underwoodi</i> | | | | |
| 104. <i>Lesbia forficata</i> | | | | |
| 105. <i>Mettallura tyrianthina</i> | | | | |
| 106. <i>Heliothrix auritus</i> | | | | |
| 107. <i>Petasophora cyanotis</i> | | | | |
| 108. <i>Lampropygia coeligena</i> | | | | |
| CUCULIDÆ. | | | | |
| 109. <i>Diplopterus navius</i> | * | | | |
| RAMPHASTIDÆ. | | | | |
| 110. <i>Aulacorampus sulcatus</i> | * | | | |
| PICIDÆ. | | | | |
| 111. <i>Celeus cinnamomeus</i> | | | | |
| 112. — <i>citrinus</i> | | | | |
| 113. <i>Chloronerpes rubiginosus</i> | ... | ... | ... | * |
| 114. <i>Centurus tricolor</i> | | | | |
| PSITTACI. | | | | |
| 115. <i>Cornurus wagleri</i> | | | | |
| 116. — <i>cyanopterus</i> | * | | | |
| 117. <i>Pionus sordidus</i> | * | | | |
| 118. <i>Urochroma melanoptera</i> | ... | ... | ... | * |
| 119. <i>Psittacula guianensis</i> | ... | ... | * | |
| ACCIPTRES. | | | | |
| †120. <i>Asturina nitida</i> | | | | |
| 121. — <i>magnirostris</i> | | | | |
| 122. <i>Ictinia plumbea</i> | | | | |
| RALLI. | | | | |
| 123. <i>Crex schomburgki</i> | * | | | |
| GRALLÆ. | | | | |
| 124. <i>Actiturus bartramius</i> | ... | ... | ... | * |
| 125. <i>Totanus solitarius</i> | | | | |
| 126. <i>Ægialites wilsonius</i> | ... | ... | * | |

The following notes refer to the species marked †:—

1. *CATHARUS AURANTIROSTRIS.*

Turdus aurantirostris, Hartl. R. Z. 1850, p. 158, et Contr. Orn. 1851, p. 80, t. 72.

Catharus immaculatus, Bp. Consp. p. 278.

C. aurantirostris, Scl. P. Z. S. 1859, p. 323.

One example from near the cave of Caripé. Female: iris brown.

We have long wished to see this species. It is very closely allied to *C. melpomene*, but apparently sufficiently distinct to be recognizable, being generally more olivaceous above, showing less cinnamonaceous colouring, particularly on the wings, and having the whole bill bright orange.

5. *HENICORHINA LEUCOSTICTA*.

Cyphorinus leucostictus, Cab.

Heterorhina leucosticta et *H. prosthelauca*, Baird, Review, p. 117.

Microcerculus leucostictus, Scl. et Salv. P. Z. S. 1864, p. 345.

Baird's term *Heterorhina* for this group having been employed in the Coleoptera by Westwood in 1845, we propose to change it into *Henicorhina*.

10. *BASILEUTERUS GRISEICEPS*, sp. nov.

Supra flavicanti-olivaceus : capite toto griseo, pileo summo nigricantiore, superciliis brevibus albis : subtus unicolor aureo-flavus : rostro nigro, pedibus flavis : long tota 5·3, alæ 2·5, caudæ 2·2.

Hab. Venezuela, in sylvis Caripensibus (*Goering*).

Mr. Goering obtained only a single individual of this well-marked species, in the neighbourhood of Caripé in June last. It is marked "male: iris reddish-brown. Very rare."

Sclater has given a synopsis of the known *Basileuteri* in P. Z. S. 1866, p. 282. The present bird may be arranged in the first section, next after the red-headed species *B. mesochrysus* &c., from which it is at once distinguished by its grey head. Besides the 15 species there given, Sclater has recently obtained a specimen of *B. hypoleucus* (Bp. Consp. p. 313) from Brazil.

14. *HYLOPHILUS ACUTICAUDA*, Lawrence, Pr. Ac. Phil. 1865, p. 37.

One skin, apparently of this species, but not in very good condition. It is most nearly allied to *H. insularis*, Sclater, and may eventually turn out to be the same.

15. *DIGLOSSA SIMILIS*.

Agrees with Bogota specimens of this species. It follows that *D. hyperythra*, Cab. Mus. Hein. i. p. 97, is a synonym of *D. similis*.

34. *CARDINALIS PHŒNICEUS*, Gould.

"Found only on the coast, and not met with a few leagues in the interior."—A. G.

55. *PHILYDOR COLUMBIANUS*, Cab. et Hein. Mus. Hein. ii. p. 29.

One example from Caraccas of this species, which is allied to *P. rufus*, and more remotely to *P. panerythrus* of Bogota.

68. *OCHTHOËCA SETOPHAGOIDES*.

Tyrannula setophagoides, Bp. Att. Sc. It. vi. p. 405.

Mecocerculus leucophrys, Scl. Cat. A. B. p. 199.

Ochthoëca setophagoides, Cab. et Hein. Mus. Hein. ii. p. 48.

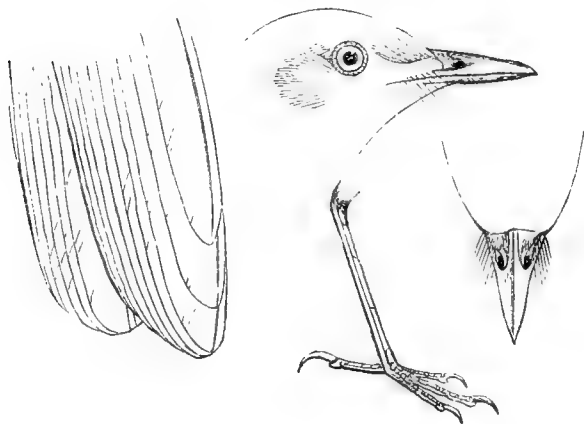
Nearly agrees with Bogota skins of this species. We have already corrected the error of referring *Ochthoëca leucophrys* (Lafr. et d'Orb.) to this species. See P. Z. S. 1867, p. 986.

73. **EUSCARTHUS IMPIGER**, sp. nov. (Pl. XIII. fig. 1.)

Supra murino-brunneus, uropygium versus olivaceus, alis caudaque nigricantibus olivaceo limbatis, alarum tectricibus fulvescenti-olivaceo bifasciatis: campterio et subalaribus flavidis: subtus albus, lateraliter murino perfusus, gutture et pectore murino substriatis; hypochondriis et crisso olivaceo perfusus: rostro et pedibus carneis: long tota 4.2, alæ 2.1, caudæ 1.6, tarsi 0.8, rostri a rectu 0.6.

Hab. Venezuela et Nova Granada.

Fig. 1.



Euscarthmus impiger.

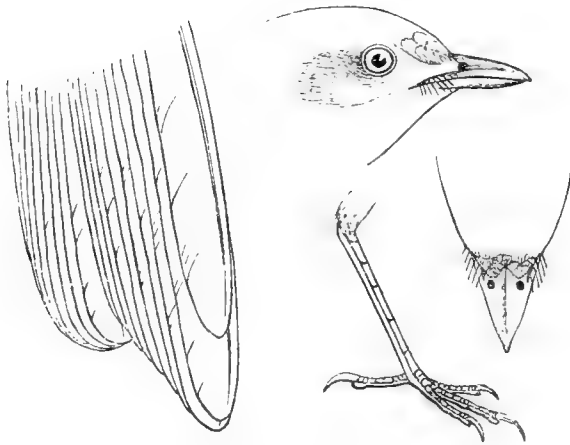
Mr. Goering's single skin, obtained near Caraccas, agrees with a Bogota specimen in Sclater's collection. The species seems to be most nearly allied to *E. margaritaceiventer* (Lafr. et d'Orb.), but differs in its olivaceous lower back and the obscure flammulations below. These two species have to be added to the list of the genus given in Sclater's 'American Catalogue,' p. 208, and may stand after *E. orbitatus*.

Mr. Goering notes the irides of this bird as "white."

76. **SUBLEGATUS GLABER**, sp. et gen. nov. (Pl. XIII. fig. 2.)

Apparently the adult of the bird numbered 1340a in Sclater's 'American Catalogue.' It is not quite a *Legatus*, and in some respects comes nearer to *Elainea*; but we are not able to refer it satisfactorily to any other genus.

Fig. 2.

*Sublegatus glaber.*

We propose, therefore, to give it a new name, with the following characters:—

SUBLEGATUS, gen. nov.

Habitus generalis Elaineæ, sed narium aperturis seorsum versis, rotundatis et omnino patentibus. Rostrum aliter fere sicut in genere Legato, sed magis depressum. Rictus setis paucis et inconspicuis armatus. Alæ subbreves: remige tertio quarto et quinto æqualibus et longissimis, primo nonum fere æquante: secundo sextum paulo excedente. Cauda longa, fere quadrata. Tarsi sicut in Elainea, sed robustiores.

SUBLEGATUS GLABER, sp. nov. (Pl. XIII. fig. 2.)

Supra ex olivaceo murinus, pileo obscuriore: alis et cauda nigricanti-fuscis, tectricum alarum et secundariorum marginibus sordide albescentibus: subtus pallide flavicans, gutture albo in pectore in cinereum trahente: subalaribus flavidis: rostro corneo, pedibus nigris: long. tota 5·5, alæ 2·8, caudæ 2·6, tarsi 0·75, rostri a rictu 0·6.

Hab. in Venezuela (Goering).

Mus. P. L. S.

92. PIPREOLA FORMOSA.

Ampelis formosa, Hartl. Rev. Zool. 1849, p. 493, t. 14.

Pyrrhorhynchus formosus, Bp. Consp. p. 177.

Euchlorornis formosa, Cab. et Hein. Mus. Hein. ii. p. 103.

A pair of this beautiful species from the dark forest near Caripé, alt. 3000 feet. "Iris red brown."

93. CHASMORHYNCHUS VARIEGATUS.

An adult male of this species from "the dark forest of Casuaré, Nueva Andalucia." See Sclater's remarks on the geographical dis-

tribution of this group in 'Ibis' 1866, p. 406, and the 'Intellectual Observer,' vol. x. p. 401 (1867).

120. *ASTURINA NITIDA* (Lath.).

One example, rather pale in colouring. North of Panama this species is replaced by *Asturina plagiata*, Schlegel (Mus. des P.-B. *Asturinae*, p. 1), which has hitherto been usually miscalled *A. nitida**.

4. On Peruvian Birds collected by Mr. H. Whitely. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.L.S.—Part II.†

The present paper contains a list (accompanied by critical notes) of the species of birds contained in Mr. Whitely's second collection. This was entirely formed in the valley of the Tambo (which flows into the Pacific, about thirty miles south of the port of Islay) in the months of October and November last. The collection contains about 100 specimens, which are referable to 28 species.

1. *ANTHUS RUFUS*.

Alauda rufa, Gm. (ex Pl. Enl. 738. fig. 1),

Anthus rufus, Baird, Rev. A. B. p. 156.

Anthus parvus, Lawrence, Proc. Ac. Phil. 1865, p. 106; Salvin, P. Z. S. 1867, p. 135.

Anthus chii, auct. plur.

Specimens of this Pipit agree with a large series in Sclater's collection from different parts of South America, viz. Panama (*M'Cleannan*), Trinidad, Mexiana (*Wallace*), Rio, Lima (*Nation*); and we are inclined to agree with Professor Baird in adopting *rufus*, as its oldest specific designation, although Burmeister has assigned that name to the larger *A. correndera*. Salvin's specimens from Veragua are also referable to the same species, which appears to be very widely distributed.

2. *SPERMOPHILA TELASCO* (Less.); Sclater, P. Z. S. 1867, p. 341.

3. *VOLATINIA JACARINA* (Linn.).

4. *XENOSPINGUS CONCOLOR*.

Sylvia concolor, Lafr. et d'Orb. Syn. Av. in Mag. de Zool. 1836, p. 20; d'Orb. Voy. Ois. p. 216, t. 18. fig 1.

Xenospingus concolor, Cab. J. f. Orn. 1867, p. 347.

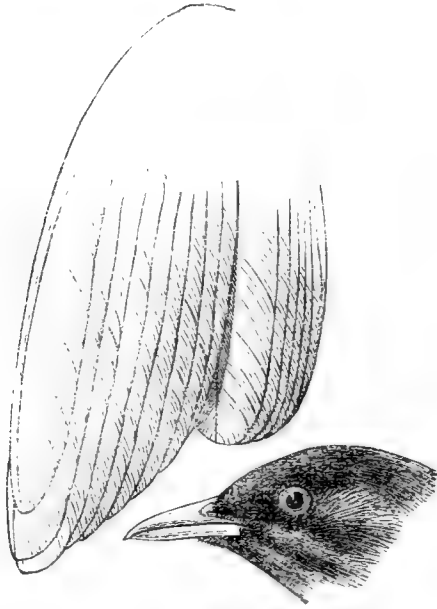
Specimens of both sexes of this remarkable bird, which we agree with Dr. Cabanis in considering to be undoubtedly a Fringilline form. It seems to us to be most nearly allied to *Phrygilus*, but to differ in

* Cassin, in Baird's B. N. A. p. 35, et Sclater et Salvin, Ibis, 1859, p. 217.

† See P. Z. S. 1867, p. 982.

its elongated and much attenuated bill, and in its longer and more graduated tail.

Fig. 1.



Xenospingus concolor.

The sexes may be diagnosed as follows:—

♂. *Cinereus: subtus dilutior, magis albicans: fronte et loris nigris: rostro et pedibus flavis: long. tota 6·0, alæ 2·8, caudæ rectr. med. 2·9, later. 2·5, rostri a rictu 0·6, tarsi 0·95.*

♀. *Fuscescenti-cinerea, subtus valde dilutior, fere albicans, obsolete fusco striata: rostro et pedibus fuscis.*

D'Orbigny obtained a single specimen of this species in the valley of Arica. Mr. Whitely has sent us six examples from the more northern valley of Tambo.

5. ELAINEA ALBICEPS.

Muscipeta albiceps, Lafr. et d'Orb. Syn. Av. i. p. 47; d'Orb. Voy. Ois. p. 319.

This bird, from the locality, we have little hesitation in referring to the present species. Sclater's *E. albiceps*, Cat. A. B. p. 217. sp. 1325 (from Ecuador) is of larger size, and probably distinct. D'Orbigny procured this bird at Tacna.

6. MYIOBIUS RUFESCENS, Salvadori.

M. rufescens, Salvadori, Atti Soc. It. vii. p. 152(1864).

M. nationi, Sclater, P. Z. S. 1866, p. 99, t. xi. fig. 1.

Dr. Salvadori having most kindly sent over the types of the American species described in his recent papers in the seventh and eighth volumes of the 'Atti della Società Italiana di Scienze Naturali' for

our inspection, we have convinced ourselves that his *M. rufescens* is the same as *M. nationi*, Sclater. The locality given by Dr. Salvadori, however, is erroneous, the bird being probably restricted in its range to the western coast-region of Peru*.

7. PYROCEPHALUS RUBINEUS (Bodd.).

A pair of this widely spread species, accompanied by a specimen of the form called *P. obscurus* by Gould and *P. atropurpureus* by Cabanis (Tsch. F. P. *Aves*, p. 156), which we are now inclined to regard as in all probability a melanism of the same bird.

8. CERYLE CABANISI (Tsch.).

Originally described from specimens obtained by Tschudi in the vicinity of Lima. This is the most southern locality we have yet met with for this western representative of *C. americana*, which ranges northwards up to Texas. We have seen specimens from Panama, Costa Rica, Guatemala, and Mexico.

9. CHORDEILES PERUVIANUS.

Chordeiles pruinosus, Tsch. Consp. Av. p. 8, et F. P. t. 6. fig. 2.

Chordeiles semitorquatus, Tsch. F. P. *Aves*, p. 130.

Chordeiles peruvianus, Peale, Zool. U. S. Expl. Exp. Birds, p. 172 (1848).

Chordeiles acutipennis, Cassin, *ibid.* ed. ii. p. 189 (1858).

Caprimulgus exilis, Less. Rev. Zool. 1839, p. 44 (?).

An adult male of this interesting species, which turns out after all to be quite distinct from the eastern *C. acutipennis*. It is easily distinguishable by the white bars on the inner webs of the rectrices, which are five or six in number besides the white subterminal bar, which crosses both webs. It is besides much whiter and paler underneath generally.

10. CROTOPHAGA SULCIROSTRIS, Sw.

This is, again, a purely western species, extending hence, which is the most southern locality hitherto noted for it, through Central America into Southern Mexico.

11. PHOLEOPTYNX CUNICULARIA (Mol.).

12. URUBITINGA UNICINCTA (Temm.).

* Concerning other American species described by Dr. Salvadori (*l. c.*), we have arrived at the following conclusions from examination of his typical specimens:—*Rhynchocyclus cerviniventris*, Salvad. Att. S. It. vii. p. 153 = *Contopus pallidus* (Gosse); *Anæretes cristatellus*, Salvad. *l. c.* p. 153 = *Serpophaga subcristata* (Vieill.); *Thamnistes affinis*, Salvad. *l. c.* p. 154 = *Thamnomanes glaucus* ♀; *Myrmotherula minor*, Salvad. *l. c.* p. 157 = *M. brevicauda* (Sw.); *Myrmeciza marginata*, Salvad. *l. c.* p. 158 = *M. ruficauda* (Max.). *Porphyriops leucopterus*, *op. cit.* viii. p. 382, is different from *Porphyriops melanops*, but may be probably identical with Tschudi's *Crex femoralis*. There is a specimen of this bird in the Derby Museum, Liverpool, from Bogota. It seems to be a good second species of the genus *Porphyriops*.

13. *TINNUNCULUS SPARVERIUS* (Linn.).

14. *ZENAIDA AURICULATA*, Des Murs.

15. *CHAMÆPELIA CRUZIANA* (d'Orb.).

16. *THINOCORUS RUMICIVORUS*, Eschsch.

17. *ÆDICNEMUS SUPERCILIARIS*, Tschudi; Scl. et Salv. Ex. Orn. p. 59, t. xxx.

A single adult specimen of this fine and distinct species, differing from the individual figured in our plate in the absence of the black stripe behind the eye, the greyer colouring of the head and neck, and the absence of the rufous edgings to the wing-coverts. In the present bird also the crissum is nearly pure white, and the bill is mostly black, the base of the mandible only being greenish.

18. *CHARADRIUS VIRGINICUS*, Borck.

19. *ÆGIALITES VOCIFERUS*.

Three specimens of this well-known species, apparently birds of the year.

20. *ÆGIALITES NIVOSUS*, Cassin.

Two male specimens of this species in adult plumage. They serve to confirm our former impression* that Schlegel has made a mistake in uniting this Plover to the European *Æ. cantianus*. The lores of the American bird are pure white; in the European there is a black line between the eye and the base of the bill.

21. *CALIDRIS ARENARIA* (Linn.).

22. *TRINGA BAIRDI*, Coues; Sclater, P. Z. S. 1867, p. 322.

A single specimen, apparently in full winter plumage.

23. *NUMENIUS HUDSONICUS* (Lath.); Sclater, P. Z. S. 1867, p. 333.

24. *GALLINULA GALEATA* (Licht.); Tsch. F. P. *Aves*, p. 302.

“Shot on the lake at Tambo.”

25. *FULICA CHILENSIS*.

Fulica chilensis, Gay, Faun. Chil. Atlas, t. 10; Hartl. J. f. O. Extrah. 1854, p. 81.

One example from the Laguna of Tambo. “Bill lavender-colour; eye bright red; crown of head [*i.e.* shield?] white; legs and toes lavender. Large numbers of this Coot were seen, but they are shy and difficult to shoot.”

This skin we have no hesitation in referring to *F. chilensis*, as described by Hartlaub (*l. s. c.*). A similar specimen is in the British Museum (marked 1850/7/14/8), but has the head-shield bright

* See P. Z. S. 1867, p. 331.

red, having probably been obtained in the breeding-season. This species is at once distinguishable by the under tail-coverts being black with a slight white margin on each side, and the broad elevated frontal shield, which is divided from the base of the bill by a distinct line * (see fig. 2). It may probably be the *F. ardesiaca* of Tschudi; but it is impossible to state this with certainty, without reference to the original type. It appears to be uncertain whether this species has ever been met with in Chili, although it is called *chilensis*,—both the specimens described by Hartlaub being from Bolivia, and the only other recorded locality being Ecuador (Fraser) †.

Fig. 2.

*Fulica chilensis.*

Dr. Schlegel ‡ has united *F. chilensis* with *F. stricklandi* (Hartlaub), which is a very different bird, and seems to have thrown back the whole genus into the confusion from which it was rescued by Dr. Hartlaub's admirable memoir.

26. ERISMATURA FERRUGINEA, Eyton.

Eye dark hazel; upper mandible cobalt blue, lower purple; legs and feet black. One male example from the Laguna de Tambo.

27. PODILYMBUS ANTARCTICUS.

Podiceps antarcticus, Less. R. Z. 1842, p. 209.

* "Durch eine deutliche Furche von der Schnabelwurzel getrennt" (Hartlaub, *l. c.* p. 81).

† See Sclater, P. Z. S. 1860, p. 821.

‡ Mus. des P.-B. *Ralli*, p. 63.

Podilymbus antarcticus, Hartl. Naum. 1853, p. 218; Sclater, P. Z. S. 1867, p. 337.

P. brevirostris, G. R. Gray, Gen. of B. iii. t. 172: Cassin in Gilliss's Exp. ii. p. 205.

One adult example of this species. We have not yet had an opportunity of comparing it with Brazilian skins which are commonly referred to the northern species*.

28. LARUS BONAPARTII, Richardson.

A single skin in winter dress, apparently referable to this species.

Blasius (Cab. J. f. O. 1866, p. 371) refers Temminck's *Larus melanorhynchus*, described from a Chilian specimen, to *Larus bonapartii*, as does also Schlegel (Mus. des P.-B. *Lari*, p. 41). There is a specimen of this bird marked *Larus melanocephalus* in the British Museum, from Chili.

5. Description of Six New Species of Shells.

By EDMUND THOMAS HIGGINS, F.Z.S. &c.

(Plate XIV.)

Fam. CYPRÆIDÆ.

LUPONIA CASTANEA, n. sp. (Pl. XIV. figs. 1, 1 a, 1 b.)

L. testa pyriformi-ovata, tenui, polita, in medio ventricosa, antice attenuata, latere dextro marginata, subtus convexa, lineis prominulis distinctis cincta, luteo-carnea, ad marginem carnea; basi pallidior; supra rufo-fulvo vel castaneo oblita et variegata; spira immersa, paulum concava; apertura angusta, flexuosa, antrorsum subdilatata; columella irregulariter dentata, dentibus antice elongatis validis, in medio alternantibus, postice minutis vix obsoletis; labro postice producto, valde 24-dentato, interstitiis excavatis.

Long. 46, diam. 25 mill.

Hab. South-eastern Africa.

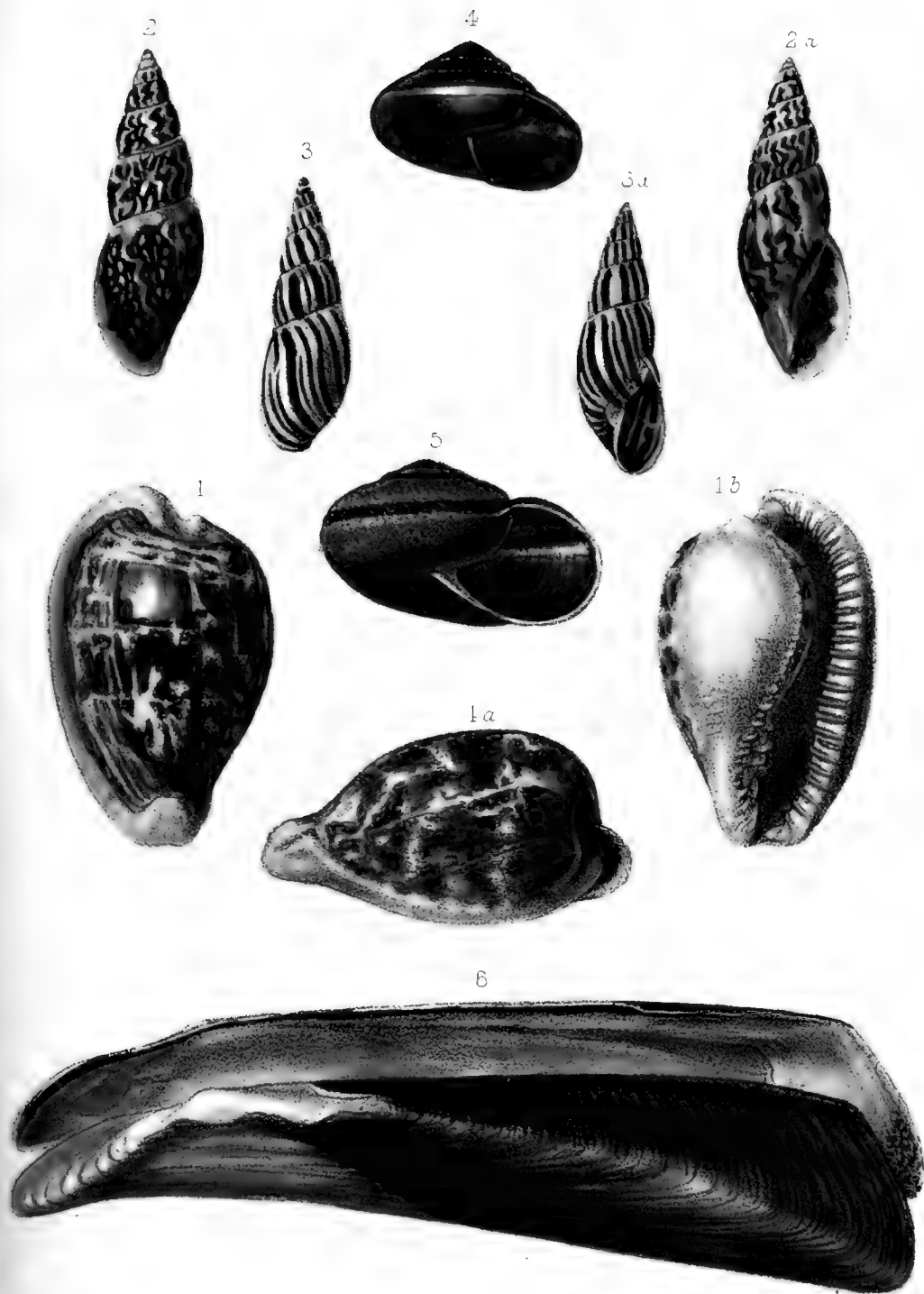
Of this fine *Luponia* I only know one other example, a very bouldered specimen, in the magnificent collection of *Cypræa* belonging to Miss Saul. In general appearance it somewhat approaches *L. similis*, but differs from it and every other known species of the genus by its rich chestnut-brown colour in blotches, and by the peculiar alternate arrangement of the central teeth on the columella.

Fam. HELICIDÆ.

BULIMUS (OTOSTOMUS) RUBROVARIEGATUS, n. sp. (Pl. XIV. figs. 2, 2 a.)

B. testa rimata, oblonga, fusiformi, tenuiuscula, leviter plicato-striata, laevigata, rubro albo variegata, strigis latis, irregulari-

* Cf. Max. Beitr. iv. p. 830, et Burm. Syst. Ueb. iii. p. 463.



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bus, interdum subinterruptis, nigricanti-castaneis, albo punctatis picta; spira elongato-conica, acutiuscula; anfractibus 8, planiusculis, basi attenuato; columella subtorta; apertura verticali, elongato-ovali; perist. simplici, recto, margine dextro superne sinuato, columellari breviter reflexo, appresso.

Long. 37, diam. 13 mill.; apertura 17 mill. longa, $6\frac{1}{2}$ mill. lata.

Hab. Huamachuco, Peru.

Several specimens of this very exquisite shell were found by Mr. Farris.

BULIMUS (OTOSTOMUS) LAMAS, n. sp. (Pl. XIV. figs. 3, 3 a.)

B. testa subperforata, oblongo-turrita, tenui, sublævigata, irregulariter leviter striata, albida, strigis castaneis ornata; spira elongata, apice acuto; anfractibus 7, planiusculis, ultimo basi rotundato; columella substricta; apertura parum obliqua, ovali, intus castanea; perist. simplici, recto, margine columellari superne reflexo, subadnato.

Long. 33, diam. 10 mill.; apertura 14 mill. longa, 5 mill. lata.

Hab. Jouctabamba, Peru.

Fam. HELICINIDÆ.

NANINA (XESTA) DE-CRESPIGNII, n. sp. (Pl. XIV. fig. 4.)

N. testa anguste perforata, turbiniformi, tenui, polita, pellucida, castanea, leviter radiato-striatula; spira elevata, convexo-conica, vertice obtuso, sutura impressa, vix albo marginata; anfractibus 6, convexiusculis, ultimo non descendente, periph. rotundato, medio fascia albida cincto, basi convexo; apertura parum oblonga, rotundato-lunari; perist. recto, acuto; margine collumellari declivi, leviter arcuato, superne dilatato, supra perforationem reflexo.

Diam. maj. 25, min. 22, alt. 18 mill.

Hab. Labuan.

This very distinct *Xesta* was found in tolerable abundance by Lieut. De Crespigny.

HELIX (AGLAIA) FARRISI, n. sp. (Pl. XIV. fig. 5.)

H. testa umbilicata, orbiculato-depressa, solidiuscula, striata et indentata, olivaceo-fusca, fascia fusca cincta; spira paulum elevata, sutura impressa; anfractibus $4\frac{1}{2}$, convexiusculis, ultimo descendente, basi convexo; apertura valde obliqua, ovali; perist. albo, breviter reflexo, marginibus conniventibus, columellari umbilicum fere tegente.

Diam. maj. 32, min. 26, alt. 18 mill.

Hab. Huamachuco, Peru.

Discovered by Mr. Farris, after whom I have named it.

Fam. MYCETOPIDÆ.

MYCETOPUS FALCATUS, n. sp. (Pl. XIV. fig. 6.)

M. testa maxime elongata, falciformi, tenui, valde inæquilaterali,

antice producta, angusta, rotundata, postice lata, angulata, oblique truncata; margine ventrali concavo, anteriore hiante, margine dorsali arcuato; superficie valvarum irregulariter concentricè striata, epidermide olivacea induta, ad umbones erosa; umbonibus parvis, anterioribus ad $\frac{1}{2}$ longitudinis testæ positis; intus margarita luteo-alba, versus marginem ventralem cærulescente.

Long. 135, alt. sub umbones 15, ad partem posteriorem 28, lat. 14 mill.

Hab. Forest-streams, near Chyavetas, Upper Amazons.

This exceedingly beautiful species was discovered by Mr. E. Bartlett.

DESCRIPTION OF PLATE XIV.

- Fig. 1. *Luponia castanea*, p. 178.
 2. *Ostomus rubrovariegatus*, p. 178.
 3. — *lamas*, p. 179.
 4. *Xesta de-crespignii*, p. 179.
 5. *Aglaiia farrisi*, p. 179.
 6. *Mycetopus falcatus*, p. 179.

6. Notices of a New Species of *Colobus* and of another Monkey from Zanzibar. By Dr. J. E. GRAY, F.R.S., V.P.Z.S.

(Plate XV.)

Dr. Kirk has kindly sent to the British Museum a series of animals in spirits, from Zanzibar—amongst them some species which, I believe, have not before been described, and some other specimens which will enable known species to be better understood. I will, on a future occasion, as soon as I have been able to examine them more carefully, send an account of these specimens to the Society. My object now is to lay before the Society a notice of a new species of *Colobus*, which I propose to call

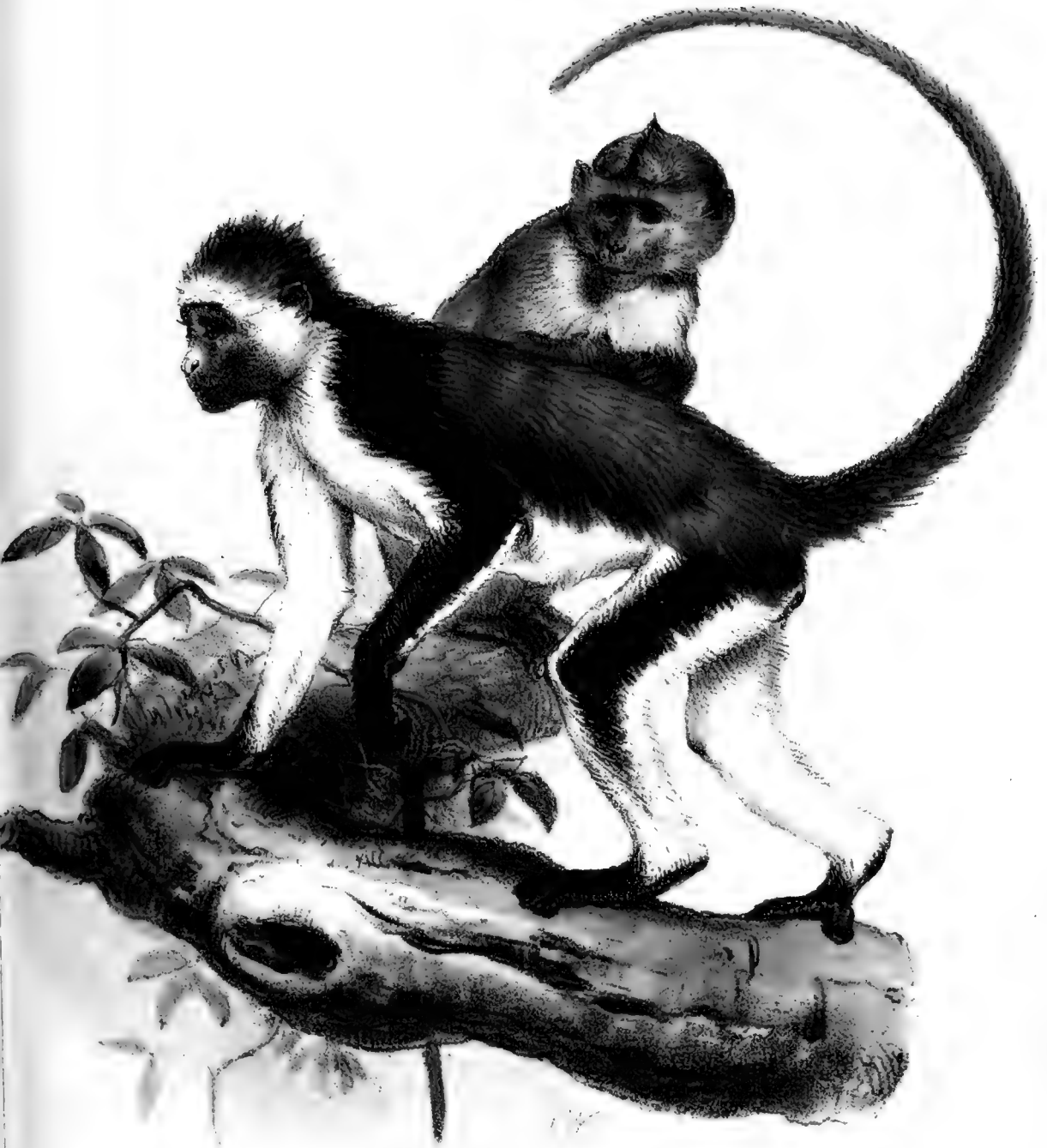
COLOBUS KIRKII, sp. nov. (Pl. XV.)

Head with long divergent hairs, forming a kind of cap, bent back over the forehead. The crown of the head, back, and tail red brown, end of tail rather paler; the nape, upper surface of hands and feet, and outside of the upper and forearm and of the thighs blackish; the forehead, cheeks, throat, side of the neck, chest, underside of the body, inner side of the limbs and the hind legs, and the hinder edge of the arms and thighs greyish white; a few bristly hairs on the eyebrows black.

Hab. Zanzibar (*Dr. Kirk*).

The British Museum contains specimens of all the known species of *Colobus*, except *Colobus verus* of Van Beneden. This new species is quite distinct from them, and cannot be confounded with the above species described and figured by Van Beneden.

It is most like *Colobus ferrugineus*, but is quite distinct from all the



J Wolf lith.

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COLOBUS KIRKI.



varieties of that species. The long hair of the head shows its alliance to *C. vellerosus*.

The species of the genus may be thus defined :—

1. *COLOBUS SATANAS*, Waterhouse.

Crown crested; whiskers elongated, expanded. Black; hairs long and coarse, of crown and sides of face elongated, crisp, forming a wide, high-spreading crest, with the tips recurved forwards.

Fernando Po.

B.M.

2. *COLOBUS POLYCOMUS*, Geoffr.

Crown of head and sides of face and throat with elongated hairs, forming a mane; tail-end slightly tufted. Black; forehead, circumference of face, and mane whitish; tail white.

Var. *ursinus*, Ogilby. Tail all white; mane greyish.

Fernando Po.

B.M.

3. *COLOBUS ANGOLENSIS*, Sclater, P. Z. S. 1860, p. 245.

Crown of head, the sides of face, and throat with elongated hairs, forming a mane; tail-end slightly tufted. Black; sides of mane and end of tail white.

Angola.

B.M.

4. *COLOBUS BICOLOR*, Wesmael.

Crown of the head with reflexed hair; hair of forehead, sides of face, and chin long, expanded. Black, shining, silky; hair of forehead and side of face and chin white; tail white; haunches grey.

West Coast of Africa.

B.M.

5. *COLOBUS KIRKII*.

Crown of head with reflexed hair, rather radiating in front of forehead; circumference of face and chin smooth, baldish. Back and tail red brown; nape, feet, outside of arms, and thighs black; forehead, cheeks, underside and inner side of limbs whitish.

Zanzibar.

B.M.

6. *COLOBUS FERRUGINEUS*, Kuhl.

Crown of head with reflexed hair, rather radiating in front of the forehead; circumference of face and chin smooth. Blackish grey; sides of neck, cheek, throat, forehead, legs, and feet red-bay; nape and base of tail above reddish.

Gambia.

B.M.

Var. 1. *rufoniger*, Martin. The black and red more intense and bright; tail black, red near the base.

B.M.

Var. 2. *pennantii*, Waterhouse. Like *rufoniger*, but feet and tail blacker; nape not red.

Gambia.

B.M.

In this species the thumb varies in development; it sometimes has a claw.

7. *COLOBUS CRISTATUS*, Gray.

Crown of the head with short reflexed hair, with two whorls in front, and a low, narrow, central, erect, longitudinal crest. Yellowish brown; front part of the body, shoulders, and outside of the fore legs greyer; throat, chest, belly, inner side of the limbs, and feet greyish white.

West Africa.

B.M.

8. *COLOBUS VERUS*, Van Beneden.

Crown of the head with short reflexed even hair; chest with elongated spreading hair. Olive-brown; hair finely ringed with black; whiskers whitish; chin and beneath pale greyish.

Mus. Paris.

Van Beneden's figure and short description seem to indicate that this species is very like the preceding, but that the head shows no indication of a crest or whorl of hair on the forehead.

9. *COLOBUS GUEREZA*, Rüppell.

Crown-hair short; back with a line of long produced hair forming a kind of mantle; end of tail tufted. Black; end of tail, circumference of face, and mantle white.

Abyssinia.

B.M.

Along with the *Colobus* there was sent the skin, with the skull and bones of the limbs, of a young specimen of *Cercopithecus albogularis*, Sykes. It differs from *C. samango* by being grizzled and yellow-brown-washed, and the base of the tail grizzled and the hinder half pure black. This is also probably from Zanzibar.

The *Cercopithec*i in the British Museum may be thus divided:—

- a. Nose blue, whiskers yellow. 1. *C. cephus*, B.M.
- b. Nose covered with white hairs. 2. *C. petaurista*, Erxl., B.M.
3. *C. melanogenys*, Gray, B.M. 4. *C. martinii*, Waterh., B.M. 5. *C. nictitans*, Erxl., B.M. 6. *C. ludio*, Gray, B.M.
- c. Nose and ears covered with red hairs. 7. *C. erythrotis*, Waterh., B.M.
- d. Nose coloured like the body.
 - * Haunches with a white streak. 8. *C. diana*, Erxl., B.M.
 - 9. *C. leucampyx*, Martin, B.M.
 - ** Haunches with a white spot. 10. *C. mona*, Erxl., B.M.
 - 11. *C. grayii*, Fraser.
 - *** Haunches without streak or spot.
 - † Head with a black temple-streak. 12. *C. pogonias*, Bennett, B.M. 13. *C. erzlebenii*, Dahlbom, B.M. Var. *nigripes*, Du Chaillu, B.M. 14. *C. pluto*, Gray, B.M. 15. *C. erythrogaster*, Gray, B.M.
 - †† Head without any black streak. 16. *C. campbellii*, Waterh., B.M. (*C. burnettii*, Gray). 17. *C. albogularis*, Sykes, B.M. 18. *C. saimango*, Sundevall, B.M.

March 12, 1868.

George Busk, Esq., F.R.S., V.P., in the Chair.

Mr. P. L. Sclater exhibited a stuffed specimen of a Monkey (*Cercocebus albigena**) from Mr. J. J. Monteiro's collection, which had been procured by that gentleman from Cabinda, north of the river Congo. The only exact locality previously recorded for this species was stated to be Gaboon (*Du Chaillu*), whence it would appear to extend down the northern bank of the Congo.

An extract was read from a letter addressed to Mr. Sclater by Dr. W. Peters, For. Memb., stating that a skull of the singular Rodent lately described by M. Alphonse Milne-Edwards under the name *Lophiomys imhausii*, in the zootomical collection at Berlin, had been obtained by Dr. Schweinfurth from the tombs of Maman, northwards of Kassalá in Upper Nubia.

Mr. Sclater remarked that this fact was of great importance as giving an indication of the true *patria* of this Mammal, which was unknown to M. Milne-Edwards, and stated that he had particularly called the attention of Mr. Jesse, who was accompanying the Abyssinian Expedition, to the desirability of obtaining specimens of it.

A letter was read from Prof. Spencer F. Baird, For. Memb., dated



Cathartes californianus, jr.

* *Presbytes albigena*, Gray, P. Z. S. 1850, p. 77, t. 16; Murie, P. Z. S. 1865, p. 740.

Washington, January 31st, 1868, announcing that he had forwarded to the Society, on behalf of the Smithsonian Institution, an electrotype copy of a drawing on wood of a young Californian Vulture (*Cathartes californianus*), in return for a similar copy of the woodcut of the adult of the same bird in the Society's 'Proceedings' for 1866.

The woodcut had been taken from a photograph of the same individual (which was now living in the Society's Gardens, having been presented by Dr. Canfield in June 1866) when quite young and in the down. It was stated that the details of the bill were perhaps not quite accurate.

The following extracts were read from a letter addressed by Dr. Robert O. Cunningham, Naturalist to the Magellan Straits Survey Expedition, to Professor Huxley, and communicated by him to the Meeting.

"H.M.S. 'Nassau,'
Rio de Janeiro,
September 23rd, 1867.

"MY DEAR SIR,—When I had the pleasure of calling on you rather more than a year ago, before proceeding to the Straits of Magelhaens, as Naturalist to a Surveying Expedition under the command of Captain Mayne, you were kind enough to invite me to write to you when I felt so disposed, and now, after my first year's experience of the Strait, I send you a few notes principally relating to its zoology. We left England last September, and, after visiting Madeira, St. Vincent (Cape de Verdes), Rio de Janeiro, Monte Video, and Maldonado, arrived at our destination near the end of December. There, with the exception of a visit to the Falkland Islands to provision and coal, we remained till about the middle of June, when, the severity of the weather putting an end to surveying-operations, we moved northwards, and arrived at Rio in the beginning of July. Our work, except a cruise of a few days, when we were engaged piloting H.M.S. 'Zealous' through the northern portion of the Strait, has lain between the Chilian settlement of Sandy Point and the eastern entrance, and consequently has embraced some of the wider portions of the Strait. The country on either side of this tract is for the most part formed of low-lying undulating plains, the geological formation being almost exclusively boulder-clay, and presenting but few eminences of any considerable elevation, at all events near the sea. These plains are covered with grass and occasional barberry-bushes; and it is not till we reach Cape Negro that the wooded country, which is of a more elevated character, begins. Thence to the westward the woods increase in thickness till they become almost impenetrable in their character. The climate of this eastern portion may be described as remarkably fine, the atmosphere being singularly bright and clear, and the rainfall very small, the principal drawback being the prevalence of wind. This latter circumstance, and the great force and rise and fall of the tides, constituted two of the chief difficulties with which we had to contend during our sojourn last season, and made a heavy demand on our

patience. The following brief observations, you will perceive, relate almost entirely to the zoology of the eastern part of the Strait.

“The Puma (*Felis concolor*) must be tolerably plentiful in the open plains, as I met with several skulls and portions of skeletons in various localities, and I saw two live young ones which the Patagonians had captured and presented to the Governor of Sandy Point. Like Mr. Darwin, I have seen numerous skeletons of Guanacoës with their necks dislocated, apparently from the attack of the Puma. Two species of Fox are abundant, a grey and a tawny-coloured one, I presume the *Canis azaræ* and *C. magellanicus*. The Skunk or Zorrillo is also frequently met with, and is much valued by the Patagonians for its beautifully striped skin. The smell of one that was killed on one occasion when I was camping out reminded me of strong assafœtida. I did not attempt to skin it, as I should have been regarded in the light of a leper for days afterwards. Several species of Seal occur in the Strait; and Dungeness Point seems to be a favourite resort of the Sea-Lion (*Otaria jubata*), as we came across numerous putrefying specimens, in addition to seeing several live individuals off that locality. Of Cetacea there are also several species, among which the *Delphinus bivittatus* is conspicuous from its black and white bands. Guanacoës we met with in abundance both on the Fuegian and Patagonian sides of the Strait; on the latter side especially we saw some very large herds. I observed a black-faced variety at Philip Bay, on the Fuegian coast. I have nothing to add to our knowledge of the habits of this interesting animal. Like Mr. Darwin, I have noticed the combination of shyness and wariness with great curiosity in its character, and I have also frequently observed their habit, noticed by him, of dropping their dung on successive days in the same defined heap. Their flesh, which we ate on several occasions, is white and good, though not equal to that of the Rhea, which we highly appreciated. I met with several species of Rodents, all of them *Muridæ*; and, the most abundant by far, the Tucu-Tucu (*Ctenomys magellanicus*), which tunnels great tracts of ground in the open country. The innumerable hillocks resulting therefrom render walking very fatiguing, owing to their giving way under the feet when trod on. The animal itself I frequently heard giving vent to its peculiar sonorous sound in its subterranean retreat, and one bright sunny day, when taking a walk in the neighbourhood of Cape Gregory, I saw many specimens basking in the heat at the mouth of their holes.

“I shall say nothing about the birds here, as I have made them the subject of a letter to Prof. Newton of Cambridge. Of reptiles I have only encountered one species, a small Lizard, which exists in tolerable plenty on the flat open country on both sides of the Strait, one specimen having been also procured in a wood at Sandy Point. I have not been very successful as regards the fishes. A *Myxine* occurred rather plentifully at Sandy Point, where I also got a small *Raia*; and an *Acanthias* was caught off Dungeness. The above mentioned, with a fish allied to *Uranoscopus* obtained at Port Gallant, and various species found in rock-pools in various localities,

constitute the sum total of the fishes obtained last season. I trust, however, that in succeeding seasons I may be more fortunate. I have procured a considerable number of mollusks. The only Cephalopod seen was a species of *Octopus*, specimens of which were dredged at Sandy Point, St. Jago Bay, &c. These were all of small size; but I saw much larger mutilated specimens lying on the beach at Sandy Point on one occasion, having been cast up by a severe gale. Gasteropoda—species of *Trophen* (*Trophen magellanicus* is one of the commonest Strait shells), *Fusus*, *Buccinum*, *Turbo*, *Voluta*, *Crepidula*, *Fissurella*, *Emarginula*, *Calyptræa*, *Patella*, *Acmaea*, *Chiton*, &c. occurred to me. I never succeeded in dredging live specimens of *Voluta magellanica*, though the dead shells existed in great numbers, almost all my live ones having been found on the beach at Sandy Point after a gale. The body of the animal is of a fine purple colour, as is also that of a second species of *Voluta* I found at Cape Possession burrowing in the sand, and apparently feeding on the mussels on the rocks after the manner of our British *Purpura lapillus*. I met with no land Mollusca, and only a single freshwater species, a *Lymnæa*. The *Chitones*, *Patellæ*, and *Fissurellæ* were of large size. Among the Lamellibranchiata of the Strait I may mention species of *Pecten*, *Mytilus*, *Pullastra*, *Mactra*, *Solen*, &c. The Brachiopods are represented by one, if not two, species of *Terebratula*, of which much the finest specimens were procured by means of the dredge in Possession Bay, one or two measuring more than $1\frac{1}{2}$ inch long. The Strait appears to be rather rich in Tunicata, both simple and compound, many species of both sections of the class attaining a very large size, specimens of the former sometimes measuring 5 or 6 inches from the base to the apertures, and those of the latter frequently attaining a length of 2 or 3 feet. Of *Polypæa* I obtained several species. Then, as to Crustacea, I have been more fortunate as respects the sessile-eyed than stalk-eyed species, having met with but few of the latter. Two species of *Lithodes* are tolerably abundant, and two or three *Brachyura*; but I have met with only one small Macrurous Decapod. The most striking of the Sessile-eyed Crustacea observed was the *Sardis fabricii*, which was taken in great numbers in the sea at Sandy Point. Of Annelids I have obtained a considerable number, most of them belonging to British types. The insect-fauna of the Strait is, I need scarcely say, very poor. Of Coleoptera I found six or eight species, including one or two *Curculionidæ*, a small Longicorn, one or two *Carabidæ*, &c. The Orthoptera were represented by two species of Grasshopper; the Hymenoptera by an orange-coloured Humblebee, found at Port Gallant, and a few Ichneumonflies; the Neuroptera by two Dragonflies, one got at Possession Bay, the other at Port Gallant; the Diptera by a few obscure species; and the Lepidoptera by four species of Butterflies and a few Moths. Of Echinodermata I procured species of *Asteriadae* (including species of *Asterias* and *Genatha*, *Aphiuridæ*, *Echinidæ*, and *Halthuridæ*). Several large species of Acalophæ were obtained, and a variety of Hydroidea and Porifera.

“On our way down to the Strait last year, in the course of our voyage between St. Vincent and Rio, a series of soundings were instituted for the purpose of endeavouring to find the Jaseur bank, a bank discovered by the ‘Jaseur’ in 1825, and, I believe, not examined since then. The latitude of the bank in question is 20' 36" 30" south, and the longitude 35° 47' west; it is 60 miles from the Victoria Bank and 360 from Trinidade. The search was rewarded with success, and a sample of its composition at 30 fathoms obtained by means of a Fitzgerald sounding-apparatus. This I examined, and, at Captain Mayne's request, drew up a short note on its nature, which he forwarded to the hydrographer. As, however, I do not know whether my remarks met the eye of any one occupied with science, I may briefly mention the results obtained. The deposit was composed exclusively of animal and vegetable organisms, and no fragments of any rock or mineral were present. The vegetable organisms consisted of fragments of an incrustated *Melibesia*, and a small portion of the frond of an *Ulna*. The animal organisms, which were all dead and maimed, *en masse* presented a chalky-white appearance; they consisted principally of great numbers of Foraminifera, most of which seemed to belong to the genus *Amphistegina*, and numerous small portions of delicate corals of various species. A very few shells of Mollusca were present, the only ones discerned being a minute *Oliva*, a small *Lima*, a minute *Pecten*, and a small shell numbered 4 in the rough sketch I send you. The only other animal specimens observed were the fragments of a *Serpula*, and a spine and portion of the dental apparatus of a small *Echinus*.”

The following papers were read:—

1. On the probable Identity of the Fin-Whales described as *Balænoptera carolinæ*, Malm, and *Physalus sibbaldii*, Gray. By W. H. FLOWER, F.R.S. &c.

The Library of the Zoological Society has, within the last few days, received a very handsomely printed folio work, entitled ‘*Monographie illustrée du Baleinoptère trouvé le 29 Octobre 1865, sur la côte occidentale de Suède*,’ by A. W. Malm, published at Stockholm in 1867. It is illustrated by numerous photographs and woodcuts, and contains an extremely careful and detailed description of the external characters, the skeleton, and many other portions of the organization of the animal. As far as the individual specimen was concerned, nothing appears to have been left undone, that the most painstaking industry could compass, to render the monograph exhaustive, except, perhaps, that some further photographic illustrations of the vertebral column and of the cranium would have been acceptable.

As this work will certainly long be regarded as one of standard authority in cetology, it is important that the correct appellation and synonymy of the species of which it treats should be determined with

certainty; and it is on this subject that I propose to address a few remarks to the Society. The author has evidently taken pains to compare his specimen with most of the more or less accurate descriptions of Fin-Whales previously published, and has come to the conclusion that it belongs to a species unknown to science, and has accordingly designated it by a new specific name, *Balænoptera carolinæ**.

That it was not the common Fin-Whale (*Physalus antiquorum*, Gray, *Pterobalæna communis*, Esch., and *Balænoptera musculus*, auct.) there could be no doubt, although belonging to the same genus. The possibility of its being of the same species as the whale of which the skeleton is preserved in the Museum at Hull, and on which Dr. Gray founded his *Physalus sibbaldii* (P. Z. S. 1847, p. 92), did not escape the author's notice†. Not having had access to the more recent volumes of the 'Proceedings' of this Society, he had only the original very brief description upon which to base his judgment—a description from which I also failed to recognize the species when I found an example of it in the museum of the late Professor Lidth de Jeude at Utrecht, and redescribed it under the name of *Physalus latirostris* (P. Z. S. 1864, p. 410)‡.

After an examination of the Hull skeleton in 1865, its identity or close affinity with the last-named specimen became apparent, and the characters in which these two skeletons agreed, and by which they could be distinguished from *P. antiquorum* were pointed out (P. Z. S. 1865, p. 473). In nearly all of the special characteristics of *P. sibbaldii* the whale described by Malm agrees.

I may particularly mention the breadth of the middle of the rostral part of the skull, which, as compared with the entire length of the cranium, is in the Hull Whale as 26 to 100, in the Utrecht Whale as 27 to 100, in Malm's as 26·4 to 100, while in six specimens of *P. antiquorum* it varies between 18 and 21 to 100. Another important character is the extremely rudimentary size and simple oval form of the sternum, in which Malm's Whale agrees perfectly with the Utrecht skeleton, and differs completely from all known examples of *P. antiquorum*. A third striking difference between *P. sibbaldii* and *P. antiquorum* is the greater length, relatively and absolutely, of the metacarpals and phalanges; in this character the new specimen corresponds exactly with the others. Among other characters in which a similar correspondence exists are the form of the nasal bones, of the heads of the anterior ribs, of the spinous process of the axis, and the uniform dark colour of the baleen.

* Being dedicated "à la femme, tendrement chérie et hautement appréciée par nous, à laquelle nous sommes uni par les liens de mariage."

† Malm, speaking of this skeleton, says, "Si néanmoins il devait appartenir à la même espèce de notre exemplaire, nous ne voudrions pas pourtant adopter la dénomination de *sibbaldii*, cette dénomination ayant déjà été en 1808 employée par Neill (Trans. Wern. Soc. vol. i. p. 201) pour un autre baleinoptère." I think this must be a mistake, as I am unable to find any such denomination used by Neill in the paper referred to.

‡ This skeleton is now in the British Museum.

The number of the vertebræ in the two previously known skeletons of *P. sibbaldii* is sixty-four. Malm gives sixty-three as the number in his specimen, a very small bone corresponding to the last caudal of the other two being apparently absent. The number of the vertebræ in *P. antiquorum* appears never to exceed sixty-two.

From the coincidence of these and other minor characters, for which I must refer to the work itself, it appears to me highly probable that the Gothenburg Whale is a third example of *P. sibbaldii*.

To the previously known osteological characters we are now enabled to add a description of the external appearance of the species. It differs notably from *P. antiquorum* in colour, being described by Malm as of a deep slate-colour, dashed with washes of a paler hue, and gradually passing to a lighter shade below, with scattered small spots of milk-white on the inferior surface. The inner sides of the pectoral fins are white, and the under surface of the lobes of the tail approaching to that colour.

Like the other two known examples of the species, the present specimen was not a full-grown animal; it measured 53' 10" long in a straight line. The skull is 10' 2" in length. The skeleton, prepared skin, and portions of the viscera are preserved in the Museum at Gothenburg, of which Prof. Malm is the superintendent.

2. On the Seals of the Falkland Islands. By Captain C. C. ABBOTT. Communicated, with Notes, by P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society*.

Sealskins and Seal-oil are two of the principal products of the Falkland Islands. The boats employed in collecting these articles of commerce are usually from 20 to 30 tons in measurement, and are manned by four or five men. They are sent out laden with provisions, casks for the oil, and salt for preserving the sealskins; they are frequently out for months together, cruising about the islands, and seldom return without a full cargo.

I only know of four varieties of Seals being found among these islands. These are:—1. The Sea-Elephant; 2. The Sea-Lion; 3. The Fur-Seal; and 4. The Sea-Leopard.

1. THE SEA-ELEPHANT. (*Morunga elephantina*.)†

This Seal is called the "Sea-Elephant" from the prolongation of

* My friend Capt. C. C. Abbott, who was formerly resident in the Falkland Islands, and has contributed so largely to our knowledge of its ornithology (see his articles in the 'Ibis,' for 1860 and 1861), has kindly drawn up this article at my request. We know so little of the habits and localities of the marine Carnivora that the value of such notes of a practical observer cannot be estimated too highly.—P. L. S.

† There can be no question of this being the *Morunga elephantina* (Mol.); Gray, Catal. of Seals and Whales (1866), p. 39. Dr. Gray must have made some mistake when he says (Ann.Nat.Hist. March 1868, p. 215) that Capt. Abbott informed him that this animal has become extinct in the Falklands.—P. L. S.

its upper lip, which is somewhat like a diminutive proboscis. It is not at all common in this group of islands, and comparatively few of the skins are brought in by the sealers; it is, however, frequently seen in one or two of the bays on the north shore of East Falkland, where it is little disturbed, owing to the sealing-boats being unable to approach the shore. In these bays the Sea-Elephants breed in some of the many caverns, the only entrances to which are by water. I have never met with this Seal alive, but I have examined the skins and skulls which have been brought in by the sealers; its hair is very coarse, and its hide very thick. This Seal is by far the largest of all the four kinds inhabiting the Falkland Islands, its skull being one-third larger than that of the next species.

2. THE SEA-LION. (*Otaria jubata*.)*

I presume that this Seal derives its name from the roar that the male makes when disturbed or fighting, and from the long mane-like hair which covers his neck and shoulders. It is very common in the Falklands, being found plentifully on many of the islands, and even on the north shore of West Falkland; here also it breeds, being little disturbed by the sealing-boats. There is a remarkable disparity in size between the male and female of this Seal. The male is as large as a bullock in circumference, while the female is no bigger than a calf. At one time only the female was killed by the sealers, as the skin of the male was considered to be of little value; and this may account for the preponderance of males which I have observed.

* This is *Otaria jubata* (*Phoca jubata*, Schreb., from Forster's "Sea-Lion." *Otaria leonina*, Péron; Gray, Catal. of Seals and Whales, p. 59). Capt. Abbott's skin and skull of this animal are now in the British Museum; so that there can be no doubt about their identity, although they are not included in Dr. Gray's latest enumeration of the specimens of this portion of the collection.

The older authors (Schreber, Gmelin, &c.) confounded under the name *Phoca jubata* the present animal and the Sea-Lion of the Northern Pacific (*Leo marinus* of Steller = *Phoca stelleri*, Fischer = *Arctocephalus monteriensis* et *Otaria stelleri*, Gray = *Eumetopias californiana* Gill). I agree with Dr. Peters (Monatsb. Berl. Ac. 1866, p. 274) in thinking it best to reserve the name *jubata* for the southern species, and to call the northern one *stelleri*. I consider *O. leonina*, F. Cuv., to be probably the same as *O. jubata*, as appears to be admitted by Dr. Peters in his last paper (*l. c.* p. 670). The fine series of the skulls of *O. jubata* in the Museum of the College of Surgeons has lately been increased by the receipt of a skull of an adult male of this species obtained by Dr. Cunningham at Dungeness Point, in the extreme south of South America.

Since the death of our Sea-Bear in the Gardens I have had an opportunity of examining its skull, and have now to confess that I have been wrong in determining it to be *O. hookeri*. The skull certainly belongs to the long-palated series, and is not distinguishable from specimens in the Museum of the Royal College of Surgeons, which are believed to be females or young individuals of *O. jubata*. Nor is this animal distinguishable externally by any marked characters from Capt. Abbott's skin in the British Museum. I am therefore disposed to agree with Dr. Peters's views (*l. s. c.* p. 666) and Dr. Gray's opinion (Ann. Nat. Hist. ser. 4. vol. i. p. 108) that our beast was only a stunted male of *O. jubata*. In this case, however, the animal must be some years in coming to its full stature, and the mane (whence it has received its name) only apparent when the beast is fully adult.—P. L. S.

Now, however, the skin of the latter is considered the more valuable of the two. During the breeding-season the males fight most desperately, and I have seen them covered with scars from old wounds. When these Seals are on the shore they appear to have a great disinclination to go to sea. I recollect on one occasion, accompanied by a friend, rolling stones down from above on some that were lying on the beach. When one was hit, he gave a roar and rushed at his nearest companion, fancying no doubt that he had attacked him; others swallowed the stones thrown at them. This dislike to going into the water may have arisen from their laying up to change their coats. Although these animals are so unwieldy in appearance, they have wonderful powers of climbing, chiefly by means of their flippers, and can ascend rocks that are almost perpendicular. I recollect once watching a number of Seals from the top of a very steep ledge of rocks about 20 feet high, when, upon hearing our voices, a large Sea-Lion gave a sudden roar and rushed up the rock to where I was sitting. Having no weapons of defence it did not take me long to beat a retreat. I fancy that it was on account of a female companion near him that he made this attack, as among about fifteen males there appeared to be only two females.

On one occasion I made an excursion to the north shore to procure the skull of a Sea-Lion. On finding about a dozen of these animals basking on the shore, I fired both barrels loaded with bullets into the shoulder of one lying about 5 yards off, but with no effect, for he only gave a roar and shuffled into the water. I then reloaded, and going close to another fired at him, but without doing him any apparent harm. Upon this the others took the alarm and retired into the water, whence I could see them gazing at me, their bodies half-raised up out of the sea, perfectly motionless, like large rocks, the water being quite smooth. I was afterwards more successful; for finding two Sea-Lions with two females and their cubs in a small cave, I killed one of Sea-Lions with a bullet through the ear, and wounded the other badly; but the latter animal managed to escape into the water. I then drove out the females and secured the cubs. Wishing to have the skull of the Sea-Lion that I had killed, I sent the Gaucho, who accompanied me, for a lasso, which we made fast round his head (his body being half in the water) and proceeded to haul him out.

I have never taken the dimensions of a Sea-Lion; but I once skinned a large one, and it was as much as the man who was with me and myself could do to carry only the skin across the bay and up the hill to my tent; on returning to the settlement I found the weight of the skin to be 240 lb. The hair of both sexes is very coarse, that of the female being somewhat the finest. The young ones also have coarse hair, and are much darker in colour than the old ones, being almost black. I have seen hundreds of skins, and never saw on any of them anything approaching to fur. The skin and skull of the Sea-Lion that I shot are now in the British Museum.

3. THE FUR-SEAL*. (*Otaria falklandica*.)

This is one of the Fur-Seals of commerce, of which I fancy there are many varieties. It is not uncommon in the Falkland Islands, but, as it is much sought after on account of the value of its skin, only frequents places difficult of access. A favourite locality is the Volunteer Rocks, at the northern entrance to Berkeley Sound, these rocks, owing to the heavy swell, being inaccessible, except in fine weather and after many days of calm. I once procured a specimen from this place, but it was only half-grown. Others full-grown were killed at the same time; and, on measuring one of the latter, the skin appeared to be about the same size as that of the common English Seal. The largest skin I have ever seen I do not think measured more than 4 feet in length, perhaps hardly as much. The hair differs in colour, being sometimes grey, and at other times of a brownish tint; that of the young is of a dark or brown colour. In speaking of the hair of this Seal, which gives the colour of the skin, it must be understood that the fur lies underneath, and the coarse hair is removed in the process of preparing the skins for the various purposes for which they are now used, such as ladies' cloaks, &c. The skin and skull of my half-grown specimen are now in the British Museum.

4. THE SEA-LEOPARD†. (*Stenorhynchus leptonyx*.)

This Seal is so scarce in the Falkland Islands that I have little to say in reference to it. I once saw a specimen which had been washed ashore dead near Port Louis; and afterwards the sealers brought me a skin, but, as they had neglected to preserve the flippers, it was of no use as a specimen. The spots on the skin render it easily distinguishable from other species.

3. On some New Fishes from Madras.

By Surgeon FRANCIS DAY, F.L.S., F.Z.S.

The following fishes have either been personally collected in the Madras, Coimbatore, and Kurnool collectorates, or received from

* On accompanying Capt. Abbott to the British Museum in order to identify his specimen of this animal, we found it labelled *Otaria jubata*, as Dr. Gray has already mentioned (Ann. Nat. Hist. Feb. 1868, p. 104), having been supposed to be the young of the same animal of which he had sent the adult! Dr. Gray has now identified this specimen, and, I believe, correctly, with his *Euotaria nigrescens* (l. c. p. 106). I am, however, inclined to doubt whether there is really more than one species of Fur-Seal in the Falkland Islands, which should be called *Otaria falklandica*, being the *Phoca falklandica* of Shaw (from Pennant). I do not deny that Dr. Gray's *Arctocephalus falklandicus* (l. c. p. 103) may be different from his *Euotaria nigrescens*; but there may have been some error in the locality of his specimen.—P. L. S.

† A fine skull of this Seal, now in the Museum of the Royal College of Surgeons, was presented by the Directors of the Falkland-Island Corporation, having been obtained in the Falklands, and sent to England by their Manager at Port Stanley.—P. L. S.

Mysore, where they were obtained by Major Puckle of the Mysore Commission.

The first is a small species, which appears to be rare at Madras, and of which I have only succeeded in obtaining two specimens, both of nearly the same size. It is a percoid fish, but one which I have been unable to identify with any of the acknowledged genera.

Its appearance is that of a small *Serranus*, having teeth in the jaws and palate, and also canines, whilst the lower margin of the præoperculum is smooth; but it not only has a large serrated spine at the angle of the præoperculum, but the ventral spine is likewise serrated internally. The genus *Priacanthus* contains fishes with a spine, occasionally serrated, in the same situation; but it has no enlarged teeth in its jaws, and the ventral spine is smooth internally (in some species rugose externally), and only six branchiostegals. I therefore propose to create a new genus for its reception, and, from its affinity, to designate it

Genus PRIACANTHICHTHYS.

Seven branchiostegals. Teeth villiform, with an external enlarged row; canines in both jaws. Teeth on palatine bones. Tongue smooth. One dorsal with eleven spines, anal with three. Ventral with one serrated spine and five branched rays. Operculum with strong spines. Præoperculum serrated in its vertical limb, with a long serrated spine at its angle. Præorbital narrow and entire. Scales small, ctenoid. Lower jaw with a rather prominent chin. Eyes large.

PRIACANTHICHTHYS MADERASPATENSIS, sp. nov.

B. vii. D. 11/12. P. 17. V. 1/5. A. 3/7. C. 15. L. l. 70. L. r. upwards of 100.

Length of specimens from $1\frac{6}{10}$ to $1\frac{7}{10}$ inch.

Length of head $\frac{2}{7}$, of pectoral $\frac{1}{6}$, of caudal $\frac{1}{6}$, of base of dorsal spines $\frac{2}{7}$, of base of dorsal rays $\frac{1}{6}$, of base of anal $\frac{1}{8}$ of the total length. Height of head $\frac{1}{5}$, of body $\frac{1}{3}$, of dorsal spines $\frac{1}{8}$, of dorsal rays $\frac{1}{8}$, of ventral $\frac{1}{6}$, of anal spines nearly $\frac{1}{8}$, of anal rays $\frac{1}{11}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, $\frac{2}{3}$ of a diameter from end of snout, $\frac{2}{3}$ of a diameter apart.

Appearance that of a *Serranus*, except in the præopercular and ventral spines.

Lower jaw the longest, the posterior extremity of the maxilla extends to beneath the posterior third of the orbit. Præoperculum with its vertical limb evenly serrated, and having a very strong spine at its angle directed backwards and extending almost to the base of the pectoral fin, its upper edge is serrated in its whole extent; lower limb of præoperculum smooth. Præorbital very narrow and entire. Operculum with one strong central spine, and a small one above and another below it. Tongue smooth. Some pores on inferior surface of lower jaw.

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Teeth villiform, with an external band of recurved ones; a large canine on either side of upper jaw near the mesial line; and similar teeth, but with smaller canines, in the lower jaw. Teeth in vomer and palate in a recurved row.

Fins. First dorsal one-third as long as the second, which is the longest; interspinous membrane slightly emarginate. Second anal spine strongest and longest. Caudal rounded; ventral spine nearly twice as long as highest in dorsal fin, and strongly serrated internally.

Colours. Dark violet, with two bluish bands, one passing from the lower margin of the orbit to the centre of the caudal fin, the other from the summit of the orbit to the centre of the soft dorsal; anterior portion of the base of the dorsal white, also the interspinous membrane between the fifth and seventh spines; the rest of the fin violet. Ventral yellowish. Caudal yellowish, with a vertical violet band in its posterior third, whilst in its anterior half the violet bands from the body cease, forming two large blotches.

Hab. Madras, in the sea during the cold months of the year. Is said never to attain a large size.

UPENEOIDES CÆRULEUS, sp. nov.

B. iv. D. 7 $\frac{1}{8}$. P. 15. V. $\frac{1}{5}$. A. 7. C. 19. L. 1. 32.
L. tr. $\frac{3}{5}$.

Length of specimens from $1\frac{5}{10}$ to 3 inches.

Length of head $\frac{1}{5}$, of pectoral $\frac{2}{5}$, of caudal $\frac{1}{6}$, of base of first dorsal $\frac{1}{9}$, of base of second dorsal $\frac{1}{10}$, of base of anal $\frac{1}{10}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{4}$, of first dorsal $\frac{1}{7}$, of second dorsal $\frac{1}{10}$, of ventral $\frac{1}{10}$, of anal $\frac{1}{10}$ of the total length.

Eyes. Upper margin near the profile; diameter nearly $\frac{1}{3}$ of length of head, 1 diameter apart, and the same distance from end of snout.

Form as in the other species.

Maxilla broad at its posterior extremity, where it extends to beneath the anterior third of the orbit. The barbules do not extend so far as to beneath the angle of the præoperculum.

Teeth in fine villiform rows in both jaws, and in a single row in vomer and palate.

Scales. Ctenoid, eight rows between the two dorsal fins.

Lateral line in a single tube in each scale, which gives only one branch from its upper side.

Air-bladder present.

Colours. Leaden superiorly, becoming dirty white below. The first dorsal has a black tip, a whitish light band along its centre, and a badly marked one on its base. The second dorsal is darkish, with a band along the centre. The extremity of the caudal is stained with black, and there is a band along the upper lobe. Pectoral, ventral, and anal yellowish.

This species is said never to grow to more than 3 or 4 inches in length. It is very common at Madras during the hot months, especially in June and July.

Gobius bleekeri, sp. nov.

B. iv. D. 6 | $\frac{1}{9}$. P. 16. V. 1/5. A. 1/8. L. l. 33. L. tr. 15.

Length of specimen $2\frac{8}{10}$ inches.

Length of head rather more than $\frac{1}{6}$, of pectoral $\frac{1}{5}$, of base of first dorsal $\frac{1}{6}$, of base of second dorsal $\frac{1}{4}$, of base of anal $\frac{1}{6}$, of caudal $\frac{1}{6}$ of total length. Height of head $\frac{1}{7}$, of body $\frac{1}{6}$, of first dorsal $\frac{1}{5}$, of second dorsal $\frac{1}{7}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{7}$ of total length.

Eyes directed upwards and slightly outwards, closely approximating superiorly; diameter $\frac{1}{3}$ length of head, $\frac{2}{3}$ of a diameter from end of snout.

Body subfusiform. Cheeks much puffed out. Mouth antero-superior. Lower jaw the longest. Cleft of mouth oblique; the posterior extremity of the maxilla reaches to beneath the anterior third of the orbit.

Interorbital space very narrow, and concave; præoperculum as broad as high.

Teeth in numerous sharp villiform rows in both jaws, with an external conical series in the upper jaw, the largest of which are in the centre of the jaw. In the anterior half of the lower jaw there is an external enlarged row of about twelve, the outer tooth of which is much the largest, being a recurved conical canine.

Fins. Dorsal spines fine, with hair-like prolongations. Two rows of scales between the extremity of the first and the commencement of the second dorsal, the posterior rays of the latter fin are its longest. The centre rays of the pectoral have silk-like prolongations. The ventral does not reach as far as the origin of the anal. The anal is similar to the second dorsal. Caudal wedge-shaped, with the centre rays the longest.

Scales. Ctenoid, extended as far forwards as the posterior margin of the orbit. None on the cheeks or the base of the pectoral; those anterior to the dorsal fin are rather smaller than the remainder. There are eleven rows of scales between the origin of the second dorsal and the origin of the anal fins.

Colours. Olivaceous, clouded with darker blotches and irregular spots, very fine black dots on the scales. First dorsal dusky in its upper half, with a large bluish spot extending from the first to the fourth spine, and a light mark along its base from the fourth to the sixth. The spines orange. The second dorsal nearly black from a number of fine points, which are most numerous towards its base; the first half minutely edged with white, and some blue spots on its posterior half. The anal covered with minute black dots. The pectoral orange, having a large blue ocellus on the upper half of its base; the lowest ray also deep blue. Ventral blackish. Caudal nearly black, but with from three to four rows of bluish-white spots between each ray.

Hab. Madras backwater. Rare.

I have named this pretty species after Dr. Bleeker, the celebrated ichthyologist of the east.

BROTULA MACULATA, sp. nov.

B. viii. D. 115. V. 1. A. 107.

Length of specimens up to $3\frac{1}{10}$ inches.

Length of head $\frac{1}{6}$, of pectoral $\frac{1}{8}$, of base of dorsal $\frac{2}{3}$, of base of anal $\frac{1}{2}$, of caudal $\frac{1}{16}$ of the total length. Height of head $\frac{1}{10}$, of body $\frac{1}{6}$, of dorsal $\frac{1}{5}$, of anal $\frac{1}{5}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of the length of head, $\frac{2}{3}$ of a diameter from end of snout, $\frac{1}{3}$ of a diameter apart.

Body eel-like, compressed. The posterior extremity of the maxilla extends to beneath the centre of the orbit. A strong spine at the operculum; two smaller ones at the angle of the præoperculum. Cirri two on the snout, and two on either side of the upper jaw; three pairs on the lower jaw, making in all six pairs.

Teeth in fine sharp rows, becoming single posteriorly; a small patch on the vomer, and a single row on the palate.

Fins. Not enveloped in skin. Dorsal, caudal, and anal joined. Dorsal commences over the base of the pectoral. Ventral two-thirds as long as the head, bifid at its extremity, and reaching beyond the base of the pectoral. Pectoral under the operculum.

Scales minute, covering body and head.

Air-bladder large and rounded posteriorly.

Colours. Of a light dirty greenish brown, with a few reddish-brown spots about the body, and a round blackish mark behind the eye. Muzzle and cirri of upper jaw blackish. Fins greyish, external portions deep black.

Three specimens, captured in the sea at Madras in November 1867.

Rather closely approaches *Brotula ensiformis*, Günther; but in that species the snout is longer than the eye, in this one-third shorter. The maxilla in *B. maculata* does not extend so far backwards as in the former species.

PUNTIUS (CAPOETA) LEPIDUS, sp. nov.B. iii. D. 3/8. P. 15. V. 9. A. 2/5. C. 19. L. 1. 21.
L. tr. 5/3.

Length of specimens from 1 to $4\frac{4}{10}$ inches.

Length of head $\frac{1}{5}$, of pectoral $\frac{1}{7}$, of base of dorsal $\frac{1}{7}$, of base of anal $\frac{1}{6}$, of caudal $\frac{1}{4}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{3}$, of dorsal fin $\frac{1}{5}$, of anal $\frac{1}{8}$ of the total length.

Eyes. Diameter $\frac{2}{5}$ of length of head, nearly $\frac{2}{3}$ of a diameter from end of snout, 1 diameter apart.

Body strongly compressed; in appearance resembling the young of the *Puntius (Leuciscus) filamentosus*, C. & V.

Lower jaw slightly shortest. Snout somewhat obtuse. Maxillary cirri thin, and extending to under the centre of the orbit.

Fins. Upper surface of dorsal fin concave; it commences midway between snout and base of caudal fin; first undivided ray short, the third cartilaginous and articulated. None of the fin-rays elongated. The caudal deeply lobed.

Scales on body large, those on the chest small; rather a high row along the bases of dorsal and anal fins.

Lateral line slightly concave to opposite end of dorsal fin, whence it is straight.

Colours. Silvery white, with a greenish back and a diffused black spot on the lateral line from the fourteenth to the eighteenth scale. Caudal red, tipped with black.

Hab. Bowany, at Mettapolliam.

This species was overlooked in my collection last year, being so very similar to the young of the *P. filamentosus* that the two had become mixed together, the only apparent difference being in the presence of maxillary cirri. One of this species was taken at Kurriapudnam in the Cochin state, 1862; but the cirri became destroyed, and the specimen then was identical in appearance with the young of the other species; consequently I did not describe it, being unable to obtain another specimen. It appears to be a small species.

PUNTIUS (CAPOETA) PUCKELLI, sp. nov.

B. iv. D. 2/7. P. 15. V. 1/8. A. 3/5. C. 19. L. l. 24. L. tr. 4/3.

Length of specimen 3 inches.

Length of head $\frac{1}{5}$, of pectoral $\frac{2}{15}$, of caudal $\frac{1}{6}$, of base of dorsal $\frac{1}{10}$, of base of anal $\frac{1}{15}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{2}{9}$, of dorsal fin $\frac{1}{6}$, of ventral $\frac{2}{15}$, of anal $\frac{2}{15}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, 1 diameter from end of snout, $1\frac{1}{2}$ diameter apart.

The form of this fish is more that of a *Rasbora* than of a typical *Puntius*; its thickness equals its height; its dorsal and abdominal profiles are about equally convex; and both are broad.

Mouth almost anterior. Lower jaw slightly shortest, no tubercle; but its extremity is not covered by lip. The maxilla only extends backwards to half the distance between snout and anterior margin of the orbit; it has a thick fleshy cirrus at its angle, which extends to below anterior margin of orbit. Snout rather fleshy, no glands; summit of head convex.

Teeth. Pharyngeal teeth plough-shaped, 5, 3, 2 / 2, 3, 5.

Fins. Dorsal commences midway between end of snout and base of caudal fin, and in advance of the ventrals. Anal midway between the posterior extremity of the operculum and the posterior extremity of the caudal fin, which last is lobed in its last half. Dorsal undivided; rays cartilaginous and articulated.

Scales with from four to ten divergent striæ on each, placed in horizontal parallel rows. There are no scales along the base of either dorsal or anal fins; it can therefore scarcely be considered a typical *Puntius*.

Lateral line has a very slight descent for three scales, and then passes along the middle of the side of the body to the caudal fin.

Colours. Greenish yellow along the back, silvery on the abdomen, with a golden and scarlet mark on the operculum, and a scarlet

stripe extending along the middle of the body to the centre of the caudal fin. Fins diaphanous. Dorsal, pectoral, and caudal stained with greyish; a deep-black mark on the dorsal fin from the base of the third to the base of the sixth branched ray. Very fine dark dots over scales, especially at their bases. An indistinct black mark on lateral line from nineteenth to twenty-first scale. Eye golden.

Hab. Bangalore.

I have named this species after Major Puckle, who has been good enough to collect for me about thirty species of fishes from Mysore. This has enabled me to identify many of Cuvier and Valenciennes's species, which I otherwise should not (at least at present) have been able to effect.

PUNTIUS (PUNTIUS) STIGMA.

Leuciscus stigma, C. & V. xvii. p. 93, pl. 489.

Systomus sophore, McClelland, Asiatic Researches, xix. pp. 285, 382.

B. iv. D. 3/8. P. 17. V. 9. A. 3/5. L. l. 25. L. tr. 5/4.

Pharyngeal teeth spoon-shaped, summits 5, 3, 2 / 2, 3, 5.

This species has been fully described by Valenciennes and McClelland; it only, therefore, remains to observe upon its colours and habitat.

Colours. In the breeding-season the female has a scarlet line along the side of the body, and a golden spot dashed with crimson on the operculum, also a diffused badly marked spot on the side of the tail on the twenty-first and twenty-second scales of the lateral line. Dorsal fin with a black band passing along the base of the rays from the third to the seventh.

As the breeding-season passes away the scarlet line partially, in some entirely, disappears; but it seems that the well-marked lateral blotch is only seen in the males. In some the mark on the dorsal fin is seen with difficulty.

Out of ten specimens sent from Mysore by Major Puckle, one was without the scarlet stripe, but the two black marks were very distinct; in another the lateral blotch was scarcely to be distinguished.

It was pointed out by Valenciennes that the species of *Puntius* named *sophore* by Ham. Buchanan had four cirri, and that McClelland's species had none; consequently the fish he described was distinct.

I have taken the *Puntius stigma*, C. & V., at Madras, also at Kurnool; it appears to be a very widely diffused species. I should observe that the first undivided ray in the dorsal fin is very minute, and liable to remain undetected.

DANIO LINEATUS, sp. nov.

B. iii. D. 2/7. P. 13. V. 8. A. 3/12. C. 19. L. l. 26-28. L. tr. 6.

Length of specimens from 1 to $1\frac{3}{10}$ inch.

Length of head $\frac{1}{5}$, of base of dorsal $\frac{1}{5}$, of base of anal $\frac{2}{13}$, of cau-

dal $\frac{1}{4}$ of the total length. Height of head $\frac{1}{4}$, of body $\frac{1}{4}$, of dorsal fin $\frac{2}{3}$ of the total length.

Eyes. Diameter nearly $\frac{1}{3}$ of length of head, $\frac{1}{2}$ a diameter from end of snout, 1 diameter apart.

Profile of back nearly horizontal, having only a slight elevation to the dorsal fin. Abdominal profile convex. Upper surface of head compressed.

Mouth closed antero-superior; when closed the end of the lower jaw forms part of the dorsal profile; tip of the lower jaw thin and not covered by lip. The nasal cirrus is short, whilst the maxillary extends as far as the operculum.

Teeth. Pharyngeal teeth in three rows, crooked and pointed, 5, 3, 1/1, 3, 5.

Fins. Dorsal commences opposite to the anal and slightly in advance of the centre of the total length; there are fourteen rows of scales between its origin and the head. Caudal deeply lobed. Dorsal and anal highest anteriorly. Pectoral reaches as far as origin of ventral.

Lateral line absent.

Colours. Metallic dark blue with brilliant reflections, divided along the body by four horizontal white lines, whilst there is a greenish tinge along the back; the blue of the body is continued on to the tail, where it forms three bands. Dorsal with a dark blue edging. Anal with three horizontal blue bands.

Hab. Ennore, near Madras. A number of these little fishes were kept some months in an aquarium, but did not increase in size. They prefer swimming close to the surface, and eat meat more readily than vegetable food.

I have placed this fish as a *Danio* as defined by Dr. Bleeker.

4. Synopsis of the Species of *Saccomyinae*, or Pouched Mice, in the Collection of the British Museum. By Dr. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

The family of Pouched Mice is well characterized by Dr. Spencer Baird in his work on the 'Mammalia of North America,' p. 403; and he has carefully described the North-American species which came under his observation.

The family, as far as is known, is confined to North and Central America and the West-India Islands.

Unfortunately the British Museum wants several of the species found in the northern part of the United States; so I have only been able to refer to Dr. Spencer Baird's description of them.

It contains several species of Spiny Rats that were sent to the Museum from Paris under the names used in Dr. Baird's work; but they are evidently not the species to which they have been referred, as they differ in the form of the upper cutting-teeth.

The *Sacomyinae* are divisible into two tribes by the form of the grinders. The coloration of the species of each tribe is so much alike that it is almost impossible to distinguish them except by other characters.

The species of *Heteromyina* are only to be separated by the form and surface of the upper cutting-teeth and the form of the hairs of the fur, and the comparative length and hairiness of the tail.

It would be well if the hairs of the fur of each of the species of *Heteromys* and *Perognathus* were figured under the microscope; but I will leave that to be done by some younger zoologist.

There is considerable difference in the form and size of the ridges of the crowns of the grinders in the different species, which require to be figured and described at length.

1. *Grinders rootless; upper cutting-teeth with a longitudinal groove. Fur soft, long, without any bristles. Dipodomysina.*

1. DIPODOMYS, Gray.

Dipodomys, Gray, Ann. & Mag. N. H. 1846, p. 521; Aud. & Bachm. N. A. Quad. iii. 137, 1853; S. Baird, Mamm. N. A. 406.

? *Macrocolus*, Wagner, Wieg. Arch. i. 176, 1846; Abhand. K. B. Akad. Münch. 1848, x. t. 7.

Wagner says his animal has no external cheek-pouches; but, as Dr. Baird observes, "the coincidence in every other respect is so intimate as to render it almost certain that the cheek-pouches must have been overlooked, especially as we are particularly informed that the specimen was in a very defective condition as preserved in alcohol."—*Spencer Baird, Mamm. N. A.* 409.

1. *DIPODOMYS PHILLIPSII*, Gray, Ann. & Mag. N. H. vii. 521, 1840; S. Baird, Mamm. N. A. 412.

D. phillipsii, Aud. & Bach. N. A. Quad. iii. 137, t. 130, 1853.

Macrocolus halticus, Wagner, Wieg. Arch. i. 172, 1846; Abhand. K. B. Akad. 1845, p. 319, t. 7 (skeleton).

Hab. Mexico, Real del Monte (*John Phillips*). B.M.

Var. Larger, darker, the colour more distinctly marked.

D. agilis, Gambel; Spencer Baird, Mamm. N. A. 414.

Hab. California (*Bridges*).

"Found in dense thickets, Maccartysville, Santa Clara county. It lives in the nests made by the *Neotoma*. Caught in traps during the night, baited with wheat" (*Bridges*). The tail of the variety is shorter, compared with the size of the body, than that of the stuffed specimen; but there is no knowing how much the skin of the body may have contracted before it was preserved.

Dr. Spencer Baird describes two other species of the genus, chiefly depending on the absolute length of the hind foot and the length of the tail as compared with the length of the body. He believes that there are at least two good species—one with a long tail and longer

hind feet, *D. phillipsii*, and one with a shorter tail and slenderer fore feet, *D. ordii*, with different geographical distribution (see M. N. Amer. pp. 409, 414, 415).

2. *DIPODOMYS ORDII*, Woodhouse, Leconte, Proc. Acad. N. S. Philad. vi. 1853, p. 224; Spencer Baird, Mamm. N. A. 410, t. 21. f. 1, t. 31. f. 1, 2 (skull).

? *D. montanus*, Spencer Baird.

3. *DIPODOMYS AGILIS*, Gambel, Proc. Acad. N. S. Philad. iv. 1848, p. 77; Spencer Baird, Mamm. N. A. 414.

4. *DIPODOMYS HERMANNII*, Leconte, Proc. A. N. S. Philad. vi. 1853, p. 224.

Hab. Sierra Nevada.

5. *DIPODOMYS WAGNERI*, Leconte, Proc. A. N. S. Philad. vi. 1853, p. 224.

Hab. South Carolina.

2. *Grinders rooted.* Heteromyina.

† *Upper cutting-teeth with a longitudinal groove.*

2. *PEROGNATHUS.*

Perognathus, Pr. Max. Nova Acta Acad. C. L. C. xix. 369, 1839; Spencer Baird, Mamm. N. A. 416.

Cutting-teeth with a longitudinal groove. Fur spinous or bristly; spines flat, with a central channel on the upper surface. Ears rather large, with a distant suborbicular lobe to the antitragus. Sole of the hind feet naked to the heel. Tail covered with dense hairs, sometimes tufted at the tip.

1. *PEROGNATHUS PENICILLATUS*, Woodhouse, Pr. Acad. N. S. Philad. vi. 200, 1852; S. Baird, Mamm. N. A. 418, t. 20. f. 5; Sitgraves, Expl. Colorado, 49, t. 3, 1853; Aud. & Bach. N. A. Quad. iii. 298, 1854.

Junior? *P. parvus*, Spencer Baird, M. N. A. 419, 425.

Tail crested above at the end; sides without a fulvous stripe; hair very coarse and stiff, without any under-fur.

Hab. San Francisco, California, Colorado River.

2. *PEROGNATHUS FASCIATUS*, Pr. Max. Nova Acta C. L. C. Akad. xix. 1, 369, t. 24, 1859; Aud. & Bachm. N. A. Quad. iii. 341, 1854; Spencer Baird, M. N. A. 420.

Tail simple; ears large; sides with a fulvous stripe. Above sandy-coloured; outside of fore legs and upper surface of the feet white; hair stiff and hard, like spun glass, without any under-fur.

Hab. Kansas.

3. *PEROGNATHUS HISPIDUS*, Spencer Baird, Mamm. N. A. 421, t. 51. f. 4, t. 69. f. 2, t. 83. f. 6.

Tail simple, sides with a fulvous stripe; ears small. Above cinnamon and black mixed; outside of fore and hind legs and upper surface of feet white; hairs very rigid, long, very thick, coarse, stiff, bristly; hair of tail long, concealing the whorls of scales.

Hab. Matamoras, Mexico.

4. *PEROGNATHUS BICOLOR*.

B.M.

Perognathus monticola, Gerrard, Cat. Bones B. M. (not Baird).

Black; upper lip, lower edge of the cheek-pouch, head, and under-side of body and inner sides of limbs white. Fur uniform bristly; bristles elongate, slender, with a slender point, and intermixed with very slender elongated hairs. Tail as long as the body, with rings, square scales, and short bristly hairs.

Hab. Honduras (Sallé). *Venezuela* (Sallé 47.2.1-7).

There is a Spiny Rat from Honduras with a longer tail and smooth front teeth, agreeing in colour with the above. *Venezuela* (47.2.1-8).

3. *ABROMYS*, Gray.

Upper cutting-teeth with a longitudinal groove; fur soft, abundant, uniform, long, and close. Tail tapering, cylindrical, covered with short hairs almost hiding the rings of scales.

Perognathus, sp., S. Baird, Mamm. N. A. 423.

ABROMYS LORDI.

B.M.

Fur soft, abundant, grey-washed, with blackish tips; chin and under-side of body whitish; tail tapering, grey, with a blackish-brown upper surface and tip; hair of the back dark lead-colour, with a short grey band and minute black tip.

Perognathus monticolor, Lord, in B.M.

? *Perognathus monticola*, S. Baird, Mamm. N. A. 422, t. 51. f. 3 (skull).

Hab. British Columbia (Lord).

The teeth destroyed. Length of body and head 3 inches, of tail 3 inches. It differs from *Dipodomys phillipsii* and other species of that genus in having no white spot over the eye at the base of the ear, or white band across the thigh.

4. *CRICETODIPUS*.

Upper cutting-teeth with a groove; ears small, without any lobe to the antitragus. Hairs —? Soles of the hind feet covered with short hairs on the posterior half; tail scantily hairy, not tufted at the tip.

Cricetodipus, Peale, Mamm. & Birds U. S. Expl. Exped. 1848, p. 33.

Perognathus cricetodipus, Spencer Baird, Mamm. N. A. 416, 418.

1. *CRICETODIPUS FLAVUS*, S. Baird.

Perognathus flavus, Spencer Baird, Proc. A. N. Philad. vii. 1855, p. 332; Mamm. N. A. 423, t. 21. f. 3 (head).

Hab. Nebraska, Ulah, Texas, Sonora.

2. *CRICETODIPUS PARVUS*, Peale, Mamm. & Birds U. S. Expl. Exped. 1838, p. 53.

Perognathus parvus, Leconte, Pr. Acad. N. S. Philad. vi. 1853, p. 235?

P. cricetodipus parvus, Aud. & Bachm. N. A. Quad. iii. 328, 1854; Spencer Baird, Mamm. N. A. 425?

Hab. —?

A doubtful species.

†† *Upper cutting-teeth broad and smooth in front.*

5. *HETEROMYS*, Gray.

Cutting-teeth smooth in front, the upper flat, square in front, lower compressed, narrow in front. Fur formed of flat, channelled, tapering spines. Pouches covered with hair. Tail slender, tapering, covered with rings of square smooth scales, with rings of short distant smooth hairs from the suture between the rings of the scales and about twice as long as the scales.

Heteromys, Gray, Spic. Zool. i. 10 (1831).

** *Fur consisting of uniform rather short broad spines tapering to a point, and with a broad central channel on the upper surface, with some scattered, slender, elongated hairs.*

1. *HETEROMYS ANOMALUS*.

B.M.

Fur pale chestnut-brown, white beneath.

Mus anomalus, Thompson, Linn. Trans. xi. 151, t. 10.

Heteromys anomalus, Gray, Spic. Zool. i. 10; Less. Mamm. B. M. 120, 1843.

Heteromys thompsoni, Lesson.

Dasynotus anomalus, Wagler.

Cricetus anomalus, Desm. Mamm. 513.

Hab. Trinidad (*John V. Thompson*).

Type, B.M.

Confounded with *Loncheres myosurus*, Licht.; *M. leptosoma*, Licht. See *Lonchura anomala*, Kuhl, Beitr. 70.

Mr. John Vaughan Thompson was a very careful and accurate observer, and far in advance of his time. He discovered the structure of Polyzoa, the transformation of Crustacea and of the Cirripedes, the larva state of *Comatula*, and the transformation of Mollusca. He sent a paper on the latter subject, with others, to the Royal Society; but they were not understood or estimated; and instead of being printed in the 'Transactions,' they were placed in the Ar-

chives. At length, in 1828, he commenced to publish at Cork a series of papers illustrated with his own etchings, under the title 'Zoological Researches and Illustrations of Natural History,' with plates, 8vo. They did not sell sufficient to repay the expense of printing, and the series came to a premature end on the publication of the fifth part in 1834. He also printed a "Memoir on the *Pentacrinus europæus*, a recent species discovered in the cove of Cork," 1st July 1823, Cork, in quarto, with two plates. This animal proved to be the first state of the *Comatula*. The memoir on *Pentacrinus* and the 'Zoological Researches' are now very rare.

The specimen of the present animal, which Mr. Thompson sent to the Linnean Society along with his paper, was left in the hands of the artist (Mr. James Sowerby) to whom it was sent to be figured and engraved, and not returned. Years after, when the skin was nearly destroyed, Mr. James De Carle Sowerby gave it to me, and I placed it in the British Museum, where the skull and imperfect skin now are. In this way many typical specimens are lost, as the specimen of *Rossia* and the Lepidoptera collected by Sir James Ross in the Arctic seas, which were for years in the hands of Mr. Curtis, and, I believe, are now lost to science.

2. HETEROMYS DESMARESTIANUS.

B.M.

Cutting-teeth small, upper flat, lower keeled, narrow in front, ears moderate, exposed. Chestnut-brown; tip of nape, lips, chin, and underside of the body, feet, and underside of tail white; spines of back white, with chestnut tips.

Heteromys desmarestiana, Gray, P. Z. S. xi. 1843, p. 79 (noticed).

Hab. Coban.

B.M.

This is very like *H. anomalus*, and may not be distinct from it.

3. HETEROMYS MELANOLEUCUS.

Fur black; upper lip, lower edge of cheek-pouch, chin, and underside of body white; legs and feet black. Ears large; tail much longer than the body and head; fur harsh; hair of back moderately broad, keeled, with bristle-like tips and a quantity of interspersed slender elongated hairs.

Perognathus monticolor, Gerrard, B.M., not S. Baird.

Hab. Honduras.

Very like *Perognathus bicolor*, the tail much longer, and the fur harsh, formed of well-marked channelled spines, and many slender elongated hairs.

4. HETEROMYS LONGICAUDATUS.

Fur grey, black and yellow mixed; lower surface of nose, upper lip, lower half of the cheek-pouches, chin, chest, and underside of the body, inner side of the limbs, and lowerside of the tail white; upper surface of fore and hind feet whitish; ears moderate, exposed; tail much longer than body and head, slender, nakedish, with a few short hairs at the tip. Fur smooth; hair of the back

formed of numerous slender channelled spines, ending in a long bristle, and intermixed with elongated slender hairs.

Hab. Mexico (*Sallé*).

The fur of this species is softer than that of *H. melanoleucus*, and not so soft as that of *H. irroratus*. The tail is much larger than either. There is no indication of any yellow streak on the side, between the colours of the back and under surface.

5. HETEROMYS IRRORATUS.

Fur rigid, grey, black, and yellow mixed; under surface of the nose, the upper lip, the lower part of the cheek-pouches, chin, and under surface of the body, the inner side of the limbs, and the under surface of the tail white; sides with a widish interrupted yellow line between the dark and white colour; upper surface of the feet whitish; tail almost as long as the body, and head closely covered with short hairs.

Perognathus fasciatus, *Sallé*.

Hab. Mexico, State of Oaxaca (*Sallé*).

This species agrees with the description of *H. fasciatus*, but the upper cutting-teeth are smooth. It is easily known from the preceding by the shortness and hairiness of the tail, and by the yellow streak on the side between the dark colour of the back and the white of the underside.

6. HETEROMYS ALBOLIMBATUS.

B.M.

Fur soft, smooth, grey, black, and very slightly yellow-varied; underpart of the nose, edge of the ears, lips, lower part of the cheek-pouches, underside of the body and inner side of the limbs, upper surface of the feet, and lowerside of the tail white. Fur soft, smooth; hairs lanceolate, soft, channelled above, ending in a bristle-like tip, with abundance of elongated very slender yellow hairs; tail as long as the body, slender, with rings of square scales and short black hairs, which are more abundant on the upper part near and at the tip, forming a kind of pencil.

Var. Tail white at the tip.

Hab. Mexico? ~~La Parada (Eiracion)~~. *La Parada - "Feirier 1861."*
(*Sallé*)

This species is known from the others by the greater softness of the fur, the greater slenderness of the hair, and the abundance of the elongated under-fur, and the distinct white edges to the ears.

6. SACCOMYS, F. Cuv. Mém. du Mus. x. 419, 1823.

Upper and lower cutting-teeth smooth in front; grinders rooted, $\frac{4.4}{4.4}$ each formed of two cross ridges, the first one of each jaw longer, with longer tubercles, the outer edge of the front tubercle of the second and third tooth broader, with a fold. Fur soft, abundant, without any spines, less dense beneath and on limbs. Ears large, naked, with well-marked lobules. Hind foot rather large, long; soles bald; toes 5.5; underside with cross bands. Tail slender,

elongated, with rings of square scales and short bristly hairs. The skull was broken up; the teeth are not said to be rooted, or not rooted.

SACCOMYS ANTHOPHILUS.

Head, shoulders, back, and rump pale fulvous; pouch and limbs paler; end of nose beneath reddish white.

Sacomys anthophilus, F. Cuvier, Mém. du Mus. x. 419. t. 26, 1823.

Hab. North America (*F. Cuvier*); probably some of the West-India Islands (*Spencer Baird*).

5. Notice of a Badger from China (*Meles chinensis*), sent by Mr. Swinhoe, H.M. Consul at Amoy, and Dr. Hartland from Hongkong. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Mr. Swinhoe has sent to the British Museum, from Amoy, the skin and skull of a Badger, which the British Museum had before received from Dr. Hartland, from Hongkong. It is a very distinct species from the Badger of Europe and Japan; but the skull is very similar to that of the Badger from Thibet which Mr. Hodgson named *Taxidea leucurus*—the *Meles leucurus* of my monograph of *Mustelidæ* in the ‘Proceedings’ of the Society for January 1865, p. 139.

But the fur of both the specimens is so different from that of the skin of the Thibet animal sent by Mr. Hodgson, that I believe it is an undescribed species, unless it is the Amur Badger, described as a variety of the European animal by Middendorff and Schrenck. It differs from the European Badger in the form of the skull, and almost justifies Mr. Hodgson referring it to a distinct genus. He first referred it to Mr. Waterhouse’s genus *Taxidea*, but afterwards gave the group the name of *Pseudomeles*.

The British Museum contains specimens of the skulls of the European, Japanese, Thibetan, and Chinese Badgers; the three species are most distinctly marked by their skulls.

Indeed the animals may be divided into two groups, according to the form of the skull, thus:—

I. Skull ovate, swollen behind; the forehead and upper part of the nose broad, flat above, and rounded on the sides; the face short, thick. The flesh-teeth of the lower jaw moderate, shorter than the tooth-line occupied by the three premolars. *Meles*.

1. MELES TAXUS, Linn.

Skull large; face very broad and rounded in front; the nasal aperture large, broad, as broad as high, postorbital aperture moderate, subcircular.

2. MELES ANAKUMA, Temm.

Skull small; face broad, tapering, narrow, and rounded in front; the nasal aperture oblong, moderate, higher than broad; the post-orbital opening very large, oblong.

The skull is well figured by Temm. & Schlegel, Fauna Japonica, t. 6. The name of this animal is erroneously printed *M. anakuma*, in P. Z. S. 1865, p. 140.

II. The skull oblong, elongate; the forehead and upper part of the nose narrow, subcylindrical above; face elongate, tapering, rounded in front; nose-hole moderate, rounded, as broad as long; the flesh-teeth of the lower jaw large, longer than the line occupied by the three premolars. *Pseudomeles*, Hodgson.

3. MELES LEUCURUS. Tampha or Tumpha.

Fur long, flaccid, dark iron-grey, black, grey, and white mixed; hair long, white, with a broad sublunate black band and a white tip; under-fur abundant, long, white; a streak on each side of the forehead blackish-grey-varied; chin, throat, legs, and underside of body black; tail, sides of head and body whitish.

Taxidea leucura, Hodgson, Journ. A. S. Beng. xvi. 763, t. 31, 1847.

Pseudomeles leucurus, Hodgson, MS. 1850.

Meles leucurus, Gray, P. Z. S. 1853, p. 191; 1865, p. 139.

Hab. Tibet, "Bhote Plains:" called Tampha (*Hodgson*).

As I observed in the 'Proceedings' 1865, p. 140, the skin is very like that of *Arctonyx collaris*, but differs in the chin and throat being black, and in the black streak on the face commencing on the side of the front of the nose, including the eyes.

4. MELES CHINENSIS*.

Fur short, harsh, yellow-brown, varied with black and grey; tips of the breast-hairs rigid, moderately short, yellow, with a narrow black subterminal ring and yellow tip; under-fur almost entirely absent.

Streak from end of nose on each side of the face, including the eye, the back of the ears, chin, throat, legs and feet, and underside of the body black; tail slender, harsh, yellow; some of the hair of the upper part with a black subterminal ring.

Arctonyx collaris, no. 206, c, Gerrard, Cat. of Bones B.M. p. 98.

? *Meles taxus amurensis*, Schrenck, Amurland, xvii. t. 1. f. 1-4.

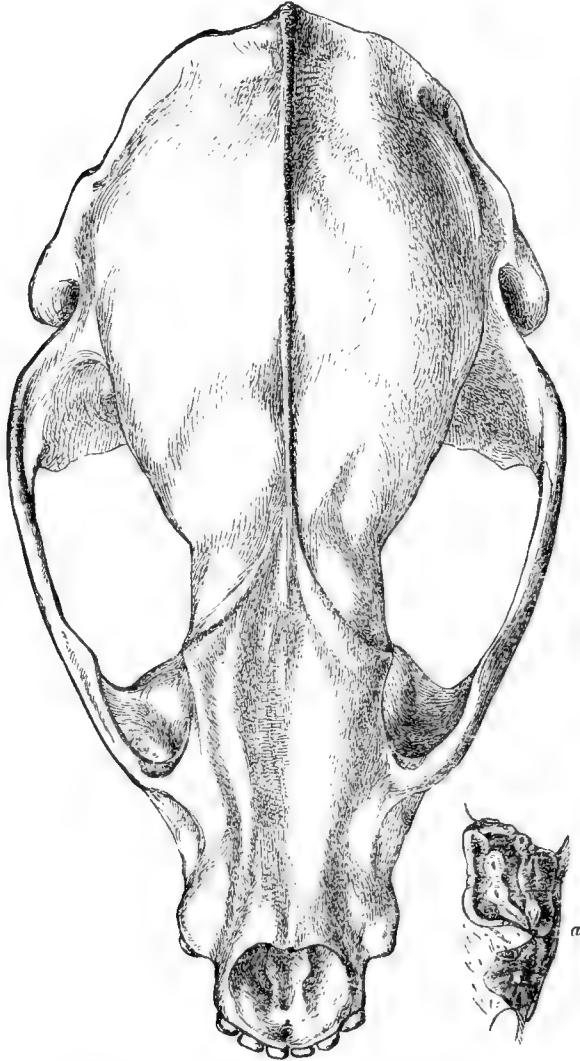
Hab. China, Hongkong (*Dr. Hartland*), Amoy (*H.M.C. Swinhoe*).

The general colouring is so like that of the European Badger that it is probably the *M. taxus*, var., of Middendorff (N. u. O. Sibir. Mamm. 3), and *Meles taxus*, var. *amurensis*, Schrenck, Amurlande, xviii. t. 1. f. 1-4; but the fur is much shorter, and the hair not so

* This may probably be *Meles leptorhynchus*, A. Milne-Edwards, from Northern China, indicated Ann. Sc. Nat. sér. 5, viii. Cahier 6.—J. E. G.

distinctly variegated as that of the European Badger, and very much harsher.

Fig. 1.



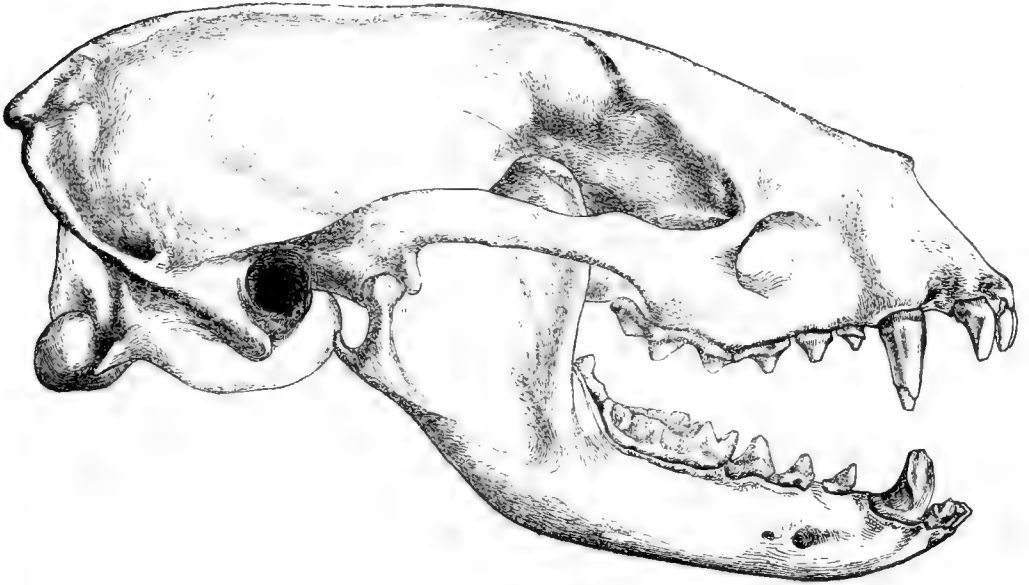
Meles chinensis. a. Hinder upper grinders.

The skull (figs. 1, 2) is so like that of *Meles leucurus* from Thibet, that I should have regarded them as the same, if there were not so much difference in the length and flaccidness and coloration of the fur, and the abundance of the under-fur. This may depend on the climate.

The shortness and peculiar colour of the fur are exactly alike in the specimens sent by Dr. Hartland from Hongkong and by Mr. Consul Swinhoe from Amoy.

I may observe that when Dr. Hartland's specimen was sent it was regarded as a young *Arctonyx collaris*.

Fig. 2.

Side view of skull of *Meles chinensis*.

I cannot see any appreciable difference between the skull of *Meles leucurus* from Thibet, given to the Museum by Mr. Hodgson, and the skull of the *M. chinensis*, sent with the skin from Amoy. Dr. Hartland's specimen is very young, but it agrees with the other two skulls in all particulars.

The following are the measurements of the skulls of the four species of *Meles* in the British Museum:—

| | <i>M. tarus.</i> | <i>M. anakuma.</i> | <i>M. leucurus.</i> | <i>M. chinensis.</i> |
|--|------------------|--------------------|---------------------|----------------------|
| | in. lin. | in. lin. | in. lin. | in. lin. |
| Length, entire | 4 9 | 4 8? | 4 9 | 4 4 |
| — from nose to front of orbit ... | 1 9 | 1 6 | 1 8 | 1 4½ |
| — of zygomatic arch | 2 5 | 2 0 | 2 2 | 2 1 |
| — of lower jaw | 3 4 | 2 9 | 3 0 | 2 10 |
| Width of nose in front of line of orbital apertures..... | 1 3 | 1 0 | 1 0 | 0 10 |
| — at back part of zygomatic arch | 3 0 | 2 7 | 2 8 | 2 5 |
| — of occipital end | 1 10 | 2 0 | 2 2 | 2 0 |
| — of forehead between orbits..... | 1 2 | 0 11 | 1 0 | 0 10 |

March 26, 1868.

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

A letter was read, addressed to the Secretary by H. E. Sir Rutherford Alcock, Corr. Mem., dated "British Legation, Pekin, Dec. 23rd, 1867," announcing that he was endeavouring to obtain from the Imperial Park at Pekin two pairs of the newly described Stag, *Elaphurus davidianus*, for the Society's menagerie.

The following extract was also read from a letter addressed to the Secretary by Monsieur le Père David, referring to the same animal :—

"Comme vous le savez sans doute, nous ignorons jusqu'aujourd'hui quelle est la patrie primitive de ce Cerf, qui se reproduit depuis beaucoup de siècles dans le parc déboisé de Pekin et dans deux ou trois autres endroits ; résistant également bien à l'hiver rigoureux ou à l'été si chaud et si long de Pekin. D'après des renseignements très-vagues je suis porté à présumer que l'*Elaphurus davidianus* existe à l'état sauvage et naturel au sud-ouest du Koukoo-noor, et peut-être aussi dans la partie orientale de la Mantchourie."

A second extract was likewise read from the latter letter, containing the following notices of the localities of various species of Chinese *Phasianidæ*, in reference to Mr. Sclater's paper on the *Phasianidæ* and their geographical distribution, published in the Society's 'Proceedings' for 1863 :—

"1. Le *Phasianus torquatus* est généralement répandu dans toutes les grandes montagnes de la province de Pekin, mais ne s'y voit jamais en captivité.

"2. Le faisan de Reeves (*P. reevesi*) se trouve, mais peu abondant dans deux ou trois localités de notre province, où abondent les *Biota*, dont il aime les fruits ; il paraît plus abondant dans les provinces du S.O. et du sud et au sud du Yantse Kiang.

"3. Le faisan doré (*Thaumalea picta*) est inconnu dans le nord, et c'est, sans aucune doute, par erreur qu'on dit qu'il se trouve dans la Daurie. Il est propre aux montagnes du centre-ouest de la Chine, et plus vers l'occident dans la même latitude.

"4. Le *Crossoptilon auritum* est un oiseau plus chinois que mantchou ; il devient partout plus en plus rare.

"5. C'est moi qui ai eu et signalé (en 1862) le premier une nouvelle espèce du *Pucrasia* que Mons. Gray a nommée *P. xanthospila*. Elle a été introduite en France par notre ministre M. Berthemy en 1864.

"6. Un *Ceriornis* vit au nord du fleuve jaune ; je ne l'ai pas encore vu, et ne sais pas si c'est le Tragopan de Temmiuck ou une nouvelle espèce.

"7. Je viens de signaler un nouveau Gallinacé aux Professeurs-Ad-

ministrateurs du Muséum de Paris, que je cherche en vain à me procurer depuis deux ans ; il est tout *d'un bleu uniforme*, plus obscur dans les parties inférieures, avec la queue noire et courte, et les pieds et le bec rouges. Un Lophophore peut-être?"

A letter was read from Percy Brandon, Esq., dated Bogota, Jan. 16th, 1868, stating that the Great Ant-eater (*Myrmecophaga jubata*) in the Society's Gardens, which had been presented by him on the 8th Nov. 1867, had been obtained when quite young from the Llanos of Casanaré on the eastern side of the Andes of New Granada.

Dr. Murie communicated the subjoined extract of a letter from the Rev. William Hincks of Toronto*:

"You will observe that I carefully guarded, in my first communication, against too great reliance on any of the characters which might possibly be affected by the degree of stretching or the precise position given in setting up. I still think these points worth careful comparison, but I referred to them in confirmation only of other characters ; but we must not let their uncertainty affect more important points. As to colour we must always allow for some variation ; and no doubt there are Trumpeter-Swans pure white like those that fell under your notice. Reliance cannot, therefore, be placed on this character, although it is well known here that the Trumpeter generally has the ferruginous hue on the head and neck, which *Cygnus americanus* never has, and which none of the specimens examined which seem to belong to *C. passmori* have, but which my last young specimen of *C. buccinator* has prominently, according to the rule to which I referred in my first paper, that such colouring is seen most in young birds. Absence of the characteristic colour is, then, some presumption against a Swan being *C. buccinator*, though after your specimens it is evident it is no proof, since the sterna you figure make it certain that your birds belong to *C. buccinator*.

"Now as to the sizes : of course very young birds are very small, and have to pass through all the grades to their full size ; but their growth is generally pretty rapid, and in very young birds there are various signs of immaturity, specially, for instance, the condition of the generative organs, which I had examined in every specimen. I stated in my paper that our first specimen of *C. passmori* (then the only one) seemed to be a mature bird. Now in comparing birds that have passed their first season, size is generally accounted a very important character ; and, as an instance in point, I referred in my last letter to the case of *Bernicla canadensis* and *B. hutchinsii*, where

* I have been favoured by a communication from the above-named gentleman, in which he expresses his unaltered conviction that *Cygnus passmori* is a distinct species from *C. buccinator*. As in a former paper of mine laid before this Society (P. Z. S. 1867, p. 8), I ventured to oppose the specific separation of *C. passmori* from *C. buccinator*, I think it but justice to Mr. Hincks to publish such portions of his letter to me as may vindicate his assertion.—J. M.

the markings are alike or very nearly so, but the former species is considerably larger; yet no practical observer doubts the species being distinct, their feeding and habits being somewhat different.

“If the relation of the trachea to the sternum is not a good character, all our species of *Cygnus* are in great confusion. Let it only appear that there is a real difference in the sternum and trachea between two sets of birds, and their specific difference is established. I was very particular in considering how far sex would affect the case; but as I had a pair, male and female, of *C. buccinator*, and the sterna were nearly alike, altogether so in all the important particulars, it is clear that sex does not account for any of the differences. Finally the shape of the pair of bronchial tubes, constant, I believe, in every species, is very apt to vary in different species, and is always worth noticing. Now as to the birds examined in this inquiry. The original specimen of *C. passmori* had its sternum like that figured by Yarrell for *C. buccinator*, whilst a large pair of *C. buccinator* compared with it had each a sternum such as is given in my paper (fig. 7), and of which the leading characters are much better expressed in your figures through being taken from younger birds. The expanse of the cordiform elevation is not so great in yours, nor the elevation of the knob in front; but no doubt can be entertained of your birds belonging to *C. buccinator*. All the doubts I admitted respecting *C. passmori* were founded on my examination of several Swans with essentially the sternum of *C. passmori*, but with slight variations as to the extent of the advance of the bended trachea within the carina, whilst I had no proof that the young of *C. buccinator* would display the cordiform swelling which I found in old specimens. Since then I have met with a known young *C. buccinator* which displayed the cordiform enlargement distinctly, though not fully developed in size and height; and your birds, which, though dwarfed and deficient in colour, certainly come between my young specimen and the old ones before examined by the intermediate development of the cordiform swelling, confirm the argument. In short, I am now in a position to affirm positively that the tracheal condition of *C. passmori* cannot, as I once thought possible though very doubtful, be a step in the development of *C. buccinator*. If, then, it does not mark a species, it is a mere variety; and in that case the forms of the sternum and bends of the trachea afford no true characters—a proposition which I cannot readily admit. It is now evident to me that the two young Swans referred to in my letter of April 10, 1864, were specimens of *C. passmori*, and, with my original specimen and Yarrell’s figure which belonged to that species, show the degrees of development of that species, whilst my young Swan noticed in the last paper I sent over, your two specimens, and my pair of old birds of *C. buccinator* fully illustrate the progress of that species. The cordiform swelling at the hind part of the sternum (as in *C. bewickii*), found with the knob at the vertical bone in front of the sternum, indicating both a horizontal and vertical bend of the trachea, mark *C. buccinator*. *C. passmori* has the knob marking the vertical bend, though much more feebly than in the other species, but has no hori-

zontal bend, though going backwards on the carina to a variable extent. Now as to the bronchial tubes: I am not certain that the observation I make on the specimens occurring to me is reconcilable with Yarrell's figure in the 'Linnean Transactions,' vol. xvii. 1, but I always find *C. passmori* with the two tubes separate, the swelling of the lower portion comparatively small, and the directions of the tubes nearly parallel, whilst in *C. buccinator* the swelling of the lower portion is much greater, causing the narrow tubular portions to recede widely; and I think the difference in the breadth and figure of the tracheal rings holds good as I described it.

"As to the matter of size, my very young *C. buccinator* was larger than any *C. passmori* I have seen; and though yours are smaller, though evidently older than the one I refer to, I think confinement and being captured very young may account for this difference. Without doubt the ordinary size and weight of those the sternum of which marks them as *passmori* is much less than that of the others. The other characters I gave may have value, but I wait for further observations. I take my stand on the sternum; and now with three specimens of each species before me exhibiting varying development, but the same essential distinction, and affording proof that it is not a distinction of sex, I feel bound to maintain my species, though I will give it up on a reasonable explanation of facts. You have not yet had all the facts before you, not being aware of my young male Trumpeter with the parts in an early stage of progress, yet showing a manifest difference from the seemingly mature *C. passmori*, and putting an end to the notion of the form in *C. passmori* being a stage of progress.

I am, &c.

"P.S. On looking again at your paper I fear I did not make my measuring sufficiently clear in one point, as you seem to have misapprehended me. I refer to your page numbered 12, the short paragraph near the middle of the page, respecting the sterno-tracheal elevations in your specimens as compared with mine. Now in my specimen of *C. passmori* and in both the other specimens which I now think belong to it, noticed in my appended letter, the inner surface of the sternum is *level*; there is no bony elevation, except that at the front of the sternum forming a knob. There is no horizontal loop of the trachea in any specimen which I should call *C. passmori*. My present doubts all arise from Yarrell's figure in the 'Linnean Transactions,' vol. xvii. The bronchial tubes there are certainly those of *C. buccinator*; and perhaps his figure is drawn from a very young specimen of *C. buccinator*, as they generally attain great size when young, and in that state the horizontal loop could be only just commencing. I shall be on the look-out for further information; but I believe we shall have no Swans this season."

Dr. J. Murie exhibited some specimens of fishes illustrative of the supposed arrest of development of the Salmon (*Salmo salar*) when retained in fresh water. These examples had been hatched in the Society's Fish-house from ova presented by Mr. F. Buckland, in

January 1863, and stated to be those of the Salmon of the Rhine.

Mr. F. Buckland exhibited and made remarks on other specimens of Salmonoids reared in fresh water.

Dr. Günther maintained that there was no sufficient evidence to prove that the ova from which these fishes had been hatched were really those of *Salmo salar*. Judging by the specimens themselves he believed them to be more probably young of some species of Lake-Trout or hybrids between two different species of *Salmo*.

The following papers were read :—

1. Notes on Baker's Antelope (*Hippotragus bakeri*). By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

(Plate XVI.)

In an article upon the Antelopes and Buffaloes of North-eastern Africa, published in the 30th volume of the 'Nova Acta Academiæ Leopoldino-Carolinæ'*, the well-known traveller and naturalist Th. v. Heuglin has given a description of a new Antelope of the genus *Hippotragus*, and named it after our illustrious countryman Sir Samuel Baker, by whom it was discovered and communicated to the author.

When visiting the Royal Menagerie at Turin last summer, I was shown a young male Antelope, recently received from Dr. Ori, the

* "Ueber die Antilopen und Büffel Nord-Ost-Afrikas. Von Th. v. Heuglin." Jena, 1863. Herr v. Heuglin gives the following description of this Antelope:—

Cornua in utroque sexu; his robustis, basi rotundatis et approximatis, arcuatis, recurvatis, vix ad apicem annulatis.

Pallide hepatico-fulvescens, fronte, macula oculari, striisque humeralibus 3-4 vix obliquis, nigris; juba collari et dorsali longa, nigerrima; rostri apice albido.

"The thickening of the horns above the base in this species is very peculiar. In two examples the tip of the horn lies outside the segment of the circle which the horn itself describes, and is slightly, although quite noticeably, directed outwards. A pair of horns from Setit, which I also ascribe to this species, are about one-third smaller, and the horns form a perfectly regular arc of almost 90°. In the adult animal the mane is very long, particularly upon the base of the hinder neck, and erect; also the front part of the neck appeared to me (as far as I could see at a distance of 80 paces) to be provided with a mane. The footprint of the beast is very large and broad.

"The animal lives in large herds, containing about thirty individuals, on the Qualabat, on the Djebel Qedani, on the Bahr Salám, on the Atbara, in Eastern Sennaar, and on this side of Fazogloa on the Djebel Qüd, Rorah, &c. It is only met with in open places, and is, moreover, so shy and swift that it can be caught only with the best horses.

"I have only once had the opportunity of seeing this beautiful Antelope, which is of the size of a Horse; on the other hand, I have to thank for most of the particulars here given the English traveller S. W. Baker, who brought the horns with him from the Atbara."



Plate 30

Illustration

HIPPOTRAGUS BAIRDII ♂ juv



King of Italy's agent at Chartoum, which was quite unknown to me, but which I at once recognized as belonging in all probability to the species described by v. Heuglin. In order to ascertain whether my supposition was correct, M. Comba, the Director of the Royal Menagerie, most kindly promised to have a figure made of the animal, so that it might be compared with v. Heuglin's description, which was inaccessible to us at Turin. The receipt of the excellent coloured photograph which I now exhibit (see Pl. XVI.) has enabled me to make this comparison; and I can now state, without fear of error, that the Antelope at Turin is unquestionably a young male *Hippotragus bakeri*. I am further confirmed in the correctness of my opinion by the testimony of Sir Samuel Baker, who has examined the photograph and kindly supplied me with the following notes upon the animal and its habits*.

"The Maarif, or *Hippotragus bakeri*, was first seen by me in 1861, at the western base of the lofty chain of mountains that walls in Abyssinia from the Egyptian territory. In this country it is by no means rare. I subsequently met with the same animal in the La-tooka country in 4° 20' N. lat., 32° 40' E. long.

"The Maarif is the largest of all the Abyssinian and Nubian Antelopes; it averages about 14 hands in height at the withers, which are extremely prominent. Its colour is mouse-grey, with black stripes across the shoulders and white markings on the nose and cheeks. The neck, both above and below, is protected by a stiff and coarse black mane, which stands erect like that of a hob-maned horse. Both males and females have horns; these are annulated and exceedingly powerful, they bend gracefully backwards.

"The Maarif is most difficult to approach, as it inhabits extensive plains, where the rifle has little chance at the extreme range which this Antelope invariably observes. In habits of watchfulness it is only equalled by the Giraffe. I have frequently remarked that the main body of the herd is protected while grazing by one or more of the party, who act as sentries and give alarm at the approach of danger. When arriving at the banks of a river, a herd of Maarifs never descend to the water until one or two have gone forward as an advanced guard. These narrowly scrutinize all sides, while the expectant herd waits their decision, and, although painfully thirsty during the hot season, they never drink until the leaders have assured them of safety.

"The margins of rivers are generally covered with thick bush, the resort of Lions and Leopards, which lie in ambush for the animals which visit the drinking-place; hence the extreme caution of the wary Antelope.

"The country in which the Maarif is most numerous is that between the Bahr Salaam and the mountain Nahoot Guddavi at the western base of the Abyssinian Alps. Throughout this district I have seen large herds of this Antelope; but the nature of the soil is so much against Horses that it would be impossible to overtake the

* See also Sir Samuel Baker's remarks on this animal in the 'Nile Tributaries of Abyssinia,' p. 475.

Maarif by riding. But the Hamran Arabs possess a fine breed of Greyhounds, by the aid of which there would be no difficulty in procuring specimens of it."

Sir Samuel Baker has also favoured me with the loan of a leaf from his original note-book containing a pencil-sketch of the adult male of this species. The elongated mane and the shoulder-stripes are clearly marked in this sketch.

Fig. 1.

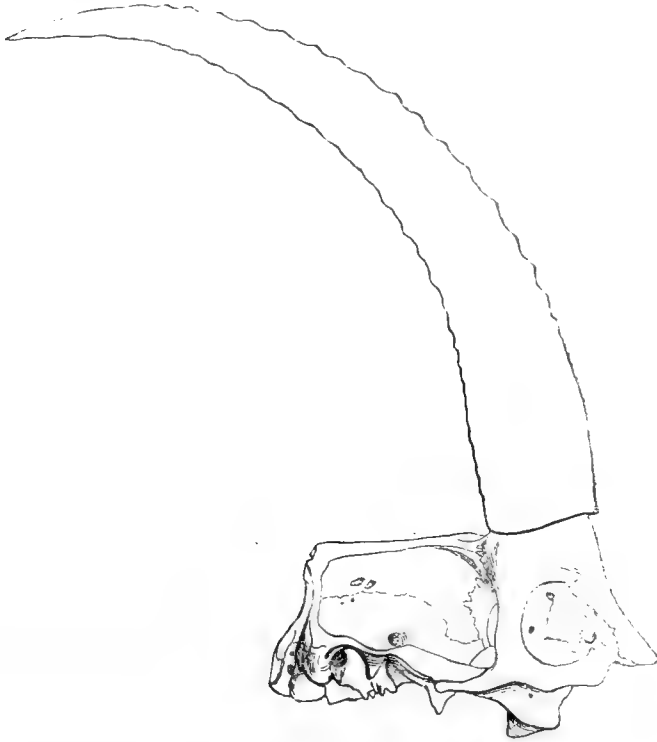


Horns of Baker's Antelope, from the typical specimen.

A fine pair of horns of Baker's Antelope, for the loan of which I am also indebted to Sir Samuel Baker, are the original specimens figured by Heuglin (*l. c.* figs. 6*a* and 6*b*). They measure 27 inches in length along the upper surface from the base to the tip, and are regularly annulated up to about six inches from the tips, the annulations being about 27 or 28 in number. Upon comparing them with horns of

Hippotragus equinus in the British Museum and the collection of the Royal College of Surgeons, I find the differences, as might have been expected, very small. But, judging from the single pair before us, the horns of the northern species appear to be much more massive, especially at the base, and not quite so long, and to have the tips *diverging* instead of slightly converging. This latter character may perhaps vary in individuals.

Fig. 2.



Outline of right horn of Baker's Antelope, from the typical specimen.

As regards the general external appearance of Baker's Antelope, it would seem to be readily distinguishable from the Equine Antelope by the pale fulvous colour, the pencilled ears, and the black stripes over the shoulders, which, although not distinguishable in the young specimen now at Turin, are, as is shown in Sir Samuel Baker's sketch, well marked in the adult.

There can, I think, therefore, be no doubt that Baker's Antelope constitutes a good species of the genus *Hippotragus*, of which there are three distinct species known, namely:—

I. *HIPPOTRAGUS EQUINUS*.

Antilope equina, Geoffr.

II. *equinus*, Sund.

Aigoceros equina, Smith, Ill. Zool. S. A. i. t. xxviii.

Hab. Northern confines of Cape Colony, now almost extinct (*Smith*)*.

2. HIPPOTRAGUS BAKERI. (Pl. XVI.)

Hab. Upper Nubia.

3. HIPPOTRAGUS NIGER.

Aigoceros niger, Harris, Trans. Zool. Soc. ii. p. 216, t. 39.

Hab. Transvaal republic (*Harris*); Zambesia (*Peters & Kirk*); Uniamuezi (*Speke*); Southern Kordofan (*Prüßsenayer*).

2. On four New Species of Birds.

By JOHN GOULD, Esq., F.R.S. &c.

BRACHYPTERYX (DRYMOCHARES) STELLATUS, sp. nov.

Forehead, ear-coverts, breast, chest, and abdomen grey, crossed by numerous narrow wavy lines of black; at the tip of each of the feathers of the abdomen, flanks, under (and some few of the upper) tail-coverts an irregular arrowhead-shaped mark of white; lores black; all the upper surface, wings, and tail chestnut-red; bill black; feet brown.

Total length $4\frac{1}{2}$ inches, bill $\frac{5}{8}$, wing $2\frac{3}{4}$, tail 2, tarsi $1\frac{1}{4}$.

Hab. Nepaul.

Remark.—I am indebted to Lieut. C. V. Eccles, of the Rifle Brigade, for one of the two specimens of this interesting species, brought by him, with other birds, from the rich country of Nepaul. Unfortunately he could not give me any precise information as to where his specimens were procured, further than that he believes they were shot on the dense scrubby side of the mountains, at an elevation of about 10,000 feet. In its structure and in its dense and silky plumage this bird is so closely allied to the smaller members of the genus *Brachypteryx* as scarcely to be removeable from them; and I should not have ventured to suggest a separate generic title, were there not so great difference in its colour and markings. The beautiful stellations of the breast render it specifically different from every other bird with which I am acquainted, while the black crescentic wavy lines of the chest and the chestnut colouring of the back distinguish it from all the species of the genus *Brachypteryx*, to which in the lengthened form of its thighs, tarsi, and toes, it bears a striking resemblance.

Ornithologists may please themselves as to the adoption or rejection of the new generic name proposed. Some may be inclined to

* I think it doubtful whether the West-African animal, of which the horns were obtained by Whitfield (Cf. Gray, P. Z. S. 1850, p. 133), is really of the same species. *A. leucophæa* of Pallas, however, is probably nothing more than *H. equinus*.

regard the bird as a member of the old genus, while others may consider its colour, markings, and *tout ensemble* sufficiently different to justify the divisional name of *Drymochares*. In size the bird is about twice that of the English Wren, *Troglodytes europæus*.

STURNUS PURPURASCENS, sp. nov.

Face, head, throat, and neck deep bronze, passing into green on the upper part of the back and breast; lower portion of the back and upper tail-coverts purplish blue; abdomen dusky brown, with a bronzy lustre; wing-coverts deep coppery or bronzy red; wings greyish brown, each feather bordered by a velvet-like line of black, showing very conspicuously on the tips of the secondaries; tail similar, but the velvet edging not so well defined; under tail-coverts black, tipped with white. A few of the feathers on the upper part of the back and on the upper tail-coverts with a spot of white at the tip; bill yellow; feet reddish-brown.

Total length $8\frac{1}{2}$ inches, bill $1\frac{1}{4}$, wing $5\frac{3}{4}$, tail 3, tarsi $1\frac{1}{8}$.

Hab. Erzeroum.

Remark.—I have had in my collection for many years three skins of a very beautiful Starling, all collected in Erzeroum, two of which are adult and one a yearling bird. Compared with *Sturnus vulgaris* on the one hand and *S. indicus* on the other, this bird will be found to differ in a remarkable manner from both. In size it is considerably larger than either, while in colouring it is sufficiently different to constitute it a new species. Beautiful as is our own Starling, the Erzeroum bird far exceeds it even in its finest nuptial and breeding dress, the entire back being of a lovely purple, while green is the prevailing tint of that part of *S. vulgaris*; the resplendent bluish-green of the wings of the European bird is replaced in the new species by shining coppery red, the lengthened plumes of the chest are bluish green instead of coppery, and the breast is coppery instead of the green or bluish green seen in *S. vulgaris*. The two birds, in fact, present a singular transposition of colouring; and the Erzeroum bird, for which I propose the name of *S. purpurascens*, is, as above stated, by far the finest of the two. The adults, as in *S. vulgaris*, are more or less speckled with white at the tips of the feathers of the back, according to age; and the young of the year presents all the characters of the adult, so far as regards the purple colouring of the back and the bronzy red of the wings, but, as is the case with a specimen of our own Starling of the same age, has the entire plumage very distinctly guttated with white, while the bill, as is usually the case, is of a dark hue.

AULACORHAMPHUS SEXNOTATUS, sp. nov.

Bill chestnut-red, with the centre of the culmen above almost black; sides of the base of both mandibles edged with white, much more broadly on the lower than on the upper; crown and all the upper surface green, tinged with sulphur, deepest on the shoulder; on the rump a spot of blood-red; bare eye-orbits dull brownish

red; above and rather behind the bare orbital space a mark of greyish blue, and on the cheeks, next the bill, is a patch of purer blue; throat and all the under surface lively grass-green, with a tinge of blue on the lower part of the breast, forming an obscure halfmoon-shaped mark; lower part of the abdomen and under tail-coverts of a yellower and more lively grass-green than the throat; two outer tail-feathers on each side green, the remaining six dull blue, tipped with deep chestnut-red, except the third from the centre, in which the chestnut only occurs on the inner web.

Total length $14\frac{1}{2}$ inches, bill $2\frac{7}{8}$, wing $5\frac{1}{4}$, tail $6\frac{1}{4}$, tarsi $1\frac{1}{2}$.

Hab. Unknown; supposed to be Peru.

This species is about the size of *A. hæmatopygius*, but it differs from that bird, and also from its larger near ally *A. castaneorhynchus*, in the third feather of the tail having the chestnut mark at the tip on the inner side only; from the former it also differs in the possession of a dull blue mark over the eye, a character found in *A. castaneorhynchus*, but from which species its diminutive size, as well as the greater number of the tail-feathers being tipped with chestnut, will at all times distinguish it.

PODICEPS MICROPTERUS, sp. nov.

Crown of the head and the ornamental diverging plumes chestnut-red at the base, their tips being black; back of the head and nape chestnut-red, passing into the brown of the back and upper surface generally, the feathers of which, particularly those of the rump, are interspersed with chestnut-red; throat, cheeks, and fore part of the neck white; under surface mottled silvery grey, brown, and chestnut; upper mandible apparently reddish brown; the lower one is bright yellow throughout its entire length; feet apparently olive.

Total length 12 inches, bill $2\frac{1}{2}$, wing 4, tarsi $1\frac{3}{4}$.

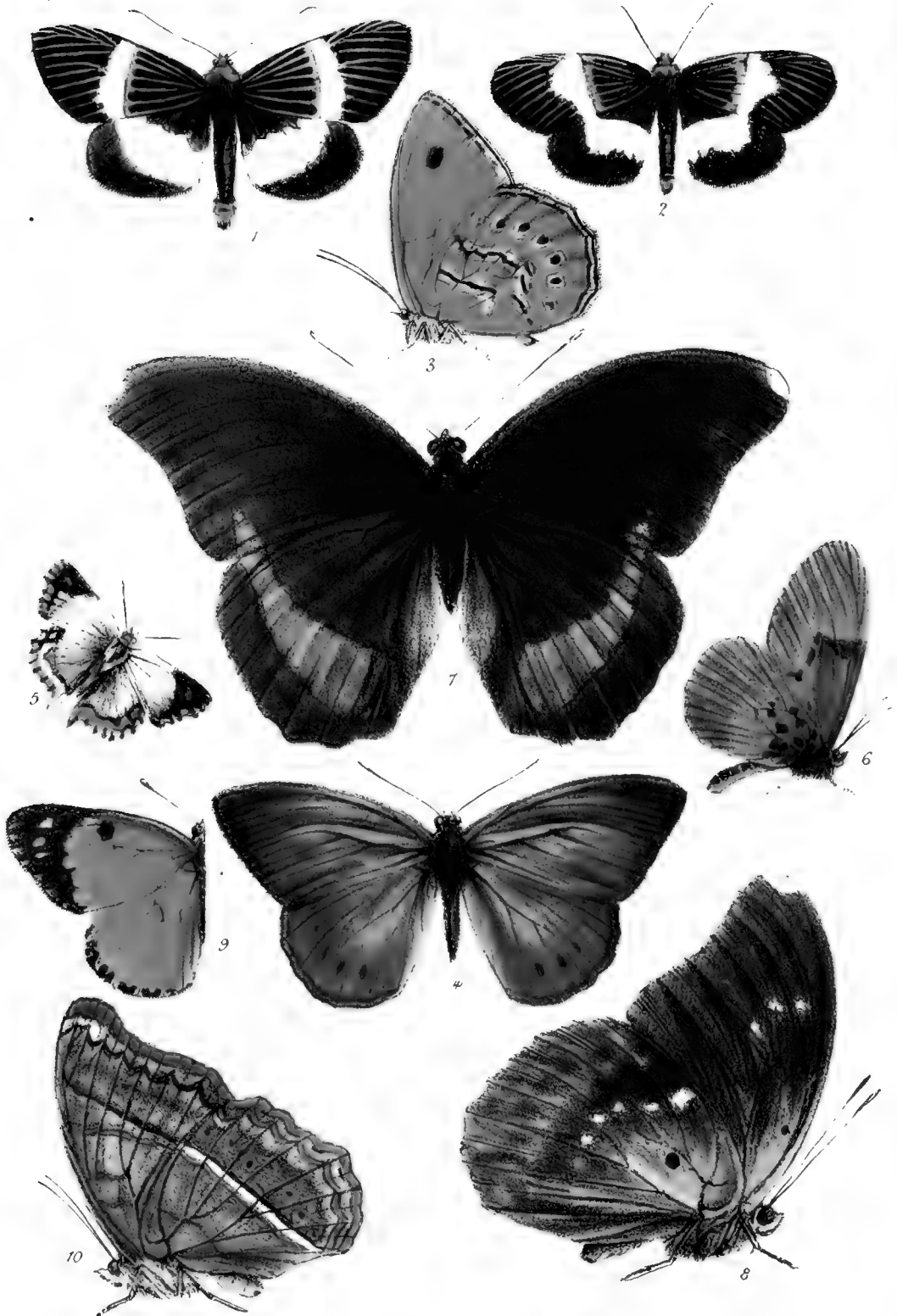
Hab. Lake of Titicaca in South America.

Remark.—This very singular bird, which is about the size of *Podiceps rubricollis*, has a very stout bill, and a crest which reminds one of some of the species of the genus *Eudytes*. Its apology for a wing renders it specifically distinct from every known member of its family; and it is questionable if it be not the smallest-winged bird, for the size of its body, yet discovered.

For this new and valuable acquisition to ornithological science I am indebted to David Forbes, Esq., a gentleman too well known as a traveller and as a scientific man to require any eulogium from me. I will merely, therefore, offer him my thanks for bringing me the present bird, which was killed by himself on the Lake of Titicaca, in Bolivia, as well as for several specimens of Humming-birds which also fell to his gun during his stay on the elevated lands of the southern hemisphere.

I cannot conclude this paper without remarking the prevalence of birds in the southern division of the world with diminutive wings, some being almost apterous, while others have these organs reduced to such a small size that they cannot be of the slightest service for





A G Butler del et lith Feby 1868

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NEW OR RARE LEPIDOPTERA .

flight; I allude to the Penguins and the Steamer-Ducks among the Waders, some of the Rails and Gallinules, the apterous group of New-Zealand birds, the living Rheas, Cassowaries, Ostriches, &c.

3. Descriptions of New or little-known Species of Lepidoptera. By ARTHUR G. BUTLER, F.L.S., F.Z.S.

(Plate XVII.)

Genus IDMAIS, Boisd. (1836).

IDMAIS TRIPUNCTA, sp. nov. (Pl. XVII. fig. 9.)

Affinis Idmaidii fulviæ (Wallace, Monog. Pierid.), alis autem anticis supra, area apicali, maculas tres solum includente, posticisque maculis marginalibus majoribus subquadratis: subtus fundo vivide flavescente, margine interno posticarum ciliisque anticarum lætissime fulvescentibus; maculis transerrantibus postmediis fulvis fuscoratis: stigmatе anticarum nigro majore.

Exp. alar. unc. 2.

Hab. India (Coll. Roberts).

This species is nearly allied to *I. fulviæ*, Wallace (Ent. Soc. Trans. 3rd ser. vol. iv. pt. 3. p. 392. n. 5, pl. 9. fig. 5), of which it is probably a local form. The exact locality of *I. tripuncta* has not been clearly ascertained.

Genus ACRÆA, Fabricius.

Section PLANEMA, Doubleday (1848).

PLANEMA MACARINA, sp. nov. (Pl. XVII. fig. 6.)

♂. *Affinis* P. macariæ (Fabricius), area autem discoidea anticarum fusca, et fascia transversali ferruginosa pone cellam alarum margini subparallela: punctis basalibus posticarum paucis, aliquando cœuntibus.

Exp. alar. unc. $2\frac{5}{16}$ — $2\frac{11}{16}$.

Hab. Gold Coast (Colls. Swanzy, Trimen, B.M.). B.M.

Allied to *P. macaria*, but smaller; the cell of the fore wings blackish brown, the transverse band slanting inwards instead of outwards, and the black spots on its inner edge also following in the same direction; the basal spots of the hind wings smaller, and on the under-side occasionally running together.

Genus CIRROCHROA, Doubleday (1848).

CIRROCHROA JOHANNES, sp. nov. (Pl. XVII. fig. 10.)

♂, ♀. *Affinis* C. bajadetæ (Moore), margine autem posticarum supra haud nigro, punctisque nonnullis pone cellæ anticarum finem

nigris, linea interrupta transversali ad angulum ani posticarum continuatis : fascia marginali nigra, anticarum quoque lineas duas undatas (internam vix visam) exhibente.

Alæ maris subtus roseo-aurantiuæ, stria media argentea posticarum regulari bene expressa, anticarum autem subtriangulari diffusa, fulvo utrinque limitata ; striolis quinque basalibus, fascia submarginali undata bene expressa et margine externo fulvis ; punctis tribus lunulatis subapicalibus argenteis diffusis : posticæ punctis sex nigerrimis postmediis, fulvo late cinctis : alæ femine subtus roseo-cinereis, area discali virescente ; fasciis omnibus brunneis ; aliter velut in mare.

Exp. alar. unc. $2\frac{3}{8}$ – $2\frac{5}{8}$.

Hab. Malacca (*Coll. Roberts*).

This beautiful species is allied to *C. bajadeta* and *C. ravana* of Moore, but is very distinct from both.

Genus CRENIS, Doubleday (1849).

CRENIS AMULIA, Cramer. (Pl. XVII. figs. 3 & 4.)

Papilio amulia, Cramer, Pap. Exot. ii. pl. 180. figs. C, D (1779).

Papilio amalia (sic), Fabricius, Ent. Syst. iii. pt. 2. p. 129, n. 398 (1793); Donovan, Nat. Rep. ii. pl. 40 (1824).

Hab. Sierra Leone and Old Calabar (*Coll. Druce*).

This beautiful species is little known, and is very rare. Mr. Hewitson has, I believe, three specimens in his collection; and Mr. Druce lately picked up in an Old-Calabar collection a shattered example, from which I have made my figure*. Cramer's figure is scarcely recognizable.

Genus EURYPHENE, Westwood (1850).

EURYPHENE SWANZYANA, sp. nov. (Pl. XVII. figs. 7, 8.)

♀. *Alæ supra fuscæ, apice anticarum niveo ; fascia discali cæruleo-violacea, anticis abbreviata interno-anali.*

Alæ subtus roseo-cinereæ, squamis viridibus, præcipue apud basin, adpersæ ; puncto anticis et macula posticis discoideis, nigris ; maculis tribus anticis et quinque posticis niveis discalibus : anticis quoque macula velut supra apicali : corpus supra nigro-fuscum, subtus lateribus viridibus, thorace medio ochreo ; palpis ochreis ; antennis nigris, ochreo clavatis.

Exp. alar. unc. $3\frac{6}{8}$.

Hab. Gold Coast (*Coll. Swanzy*).

This remarkable species seems almost to link the two genera *Romaleosoma* and *Euryphene*; it has the discoidal cells almost entirely open, and in form, size, and the coloration of the upperside appears to be nearly allied to *R. eupalus* of Fabricius; on the underside it more nearly approaches *R. losinga* of Hewitson. I believe, however,

* Mr. Druce has since obtained a second example in somewhat better condition.

that its truest position will be next to *Euryphene sæmis* of Hewitson. The specimen is kindly lent to me for description by Mr. Andrew Swanzy, of Lee, after whom I have named the species.

Genus ZERITIS, Westwood (1852).

ZERITIS THYSBE, Linn., aberration. (Pl. XVII. fig. 5.)

Alis supra fundo basali cæruleo nitidissimo et post alarum medium extenso, colorem discalem aurantiacum expungente; margine externo late nigro, cæruleo partim tincto, et a lunulis aurantiacis lilacino tinctis intus limitato: alis subtus velut in Thysbe (formæ communis).

Hab. Platteklip, Table Mountain (*Coll. Trimen*).

This singular and very beautiful variety of *Z. thysbe* is in the Collection of Mr. Roland Trimen, who in the Appendix to the second volume of his 'Rhopalocera Africæ Australis' makes the following observations respecting it:—"Herr Gross has shown me an extraordinary variety or 'sport' of the ♂ of that form (*thysbe*), which he captured near Platteklip, on the ascent of Table Mountain. In the last-named specimen *the blue suffusion is of unusual brilliancy and extent*, completely obliterating all the orange of *fore wing* as well as the spots, but leaving a very broad apical and narrow hind-marginal black border, edged outwardly by the usual small orange lunules; while in the *hind wing* the blue extends to beyond middle, but leaves a broad orange border of even width along hind margin: the markings of the under surface, however, remain as usual, but are strongly defined; the fore wings are acutely angulated, and the projections of hind wings unusually long.

"The beauty of Herr Gross's specimen is most striking, far exceeding that of the most perfect of ordinary examples."

Mr. Trimen afterwards obtained this specimen at a sale, and has kindly lent it to me to figure. He informs me that there is another, similar but somewhat larger, specimen of this aberration in the Burchell Collection (Hope Museum), taken, however, at Genadendal (Cape Colony) in the year 1815.

Genus MESSAGA, Walker (1854).

In his 'Lepidoptera Heterocera,' pt. 2. p. 358, Mr. Walker has characterized a genus under the above name, the type of which is the *Hesparia* of Cramer (Pap. Exot. vol. i. pl. 56. fig. C). Mr. Swanzy having lent me a second species, I referred to the specimens in the National Collection, and found three species representing *Hesparia*: the specimens, however, representing two of the above species want the abdomen, which appears to be a strong character for at once distinguishing them; so that it was natural that they should have been looked upon as merely varieties of one type.

I much doubt if we actually possess the Cramerian species; for even the most nearly allied form in the National Collection, though nearly agreeing with his figure in the banding of the wings, differs considerably in size and general coloration. The only perfect specimen representing the species (and the true type of Mr. Walker's genus) differs considerably from *Hesparia*, but more particularly in the golden colour of the anal tuft of its abdomen, that of *Hesparia* being scarlet; the third specimen, agreeing with Mr. Swanzy's insect, differs chiefly in the form and position of the central white band.

The two following may therefore be characterized as follows:—

MESSAGA MARITONA, sp. nov. (Pl. XVII. fig. 1.)

Messaga hesparia (part.), Walker [type].

♂. *Alæ nigræ, purpureo cyaneoque nitentes; fascia regulari transversali ad angulum ani posticarum extensa, nivea; venis supra cæruleis: corpus viridi-nigrum; capite, palpis, prothorace et pedibus anticis coccineo hirtis; cauda fulvo hirta.*

Hab. Sierra Leone.

B.M.

Presented to the Collection by the Rev. D. F. Morgan.

MESSAGA DELICIA, sp. nov. (Pl. XVII. fig. 2.)

Messaga hesparia, b. (part.), Walker.

♂. *Affinis M. hespariæ: alis nigris, cæruleo venosis albo irregulariter fasciatis; fascia anticarum in medio extus producta, posticarum undata, alarum margini subparallela nec ad angulum ani extensa: alis subtus haud cæruleo venosis, aliter similibus: corpus supra nigrum, capite, palpis, prothorace, pedibus anticis caudaque coccineo hirtis.*

Exp. alar. unc. $1\frac{11}{16}$.

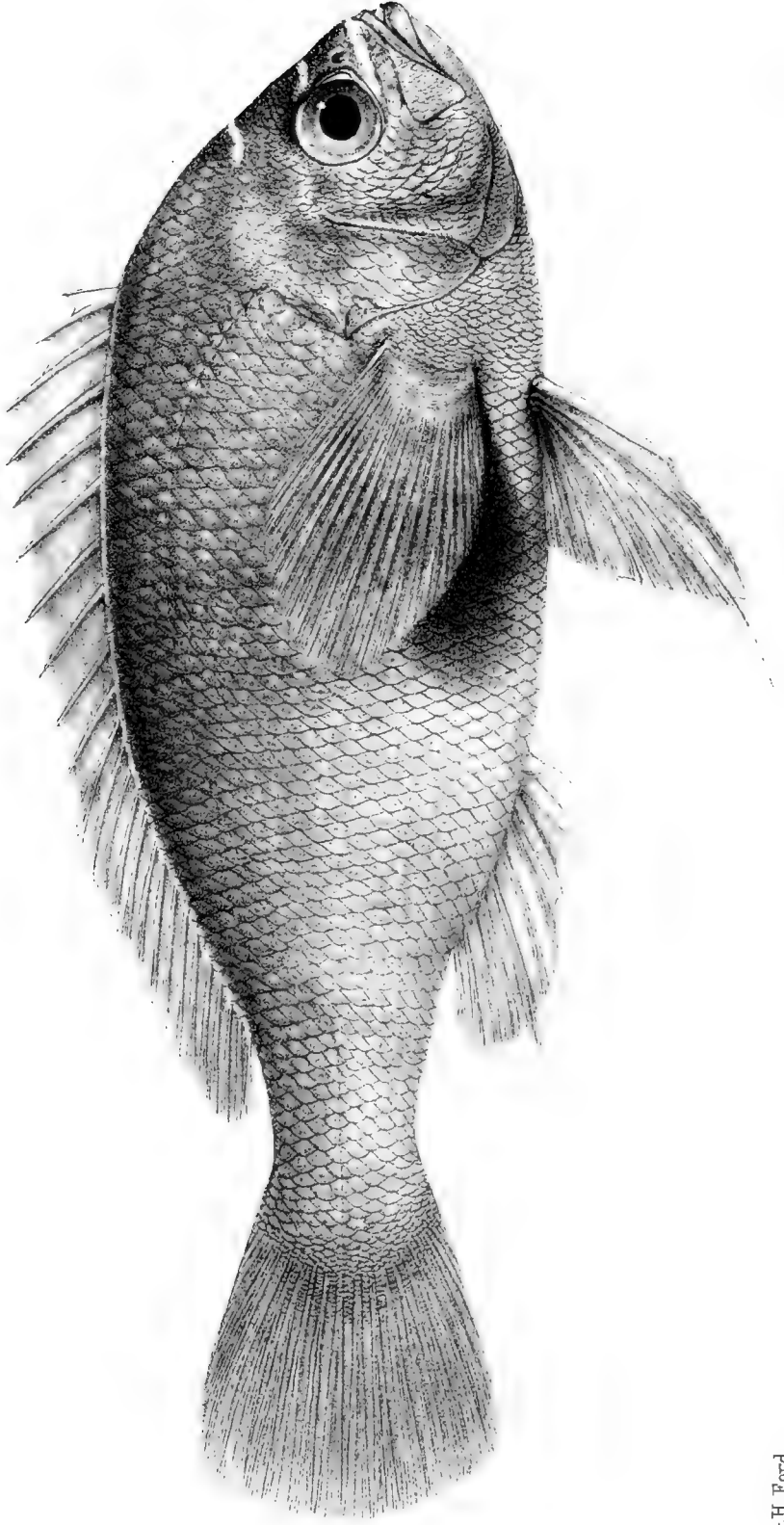
Hab. Gold Coast (*Colls. Swanzy and B. M.*).

Nearly allied to *M. hesparia*, with which it agrees in the colour of the anal tuft, but differs entirely in the form of the transverse white bands. This species seems to vary slightly in the outline of the fore wings; for the Museum specimen has them pointed at the apex as in *M. maritona*.

DESCRIPTION OF PLATE XVII.

- Fig. 1. *Messaga maritona*, p. 224.
 2. — *delicia*, p. 224.
 3, 4. *Crenis amulia*, p. 222.
 5. *Zeritis thysbe*, p. 223.
 6. *Planema macarina*, p. 221.
 7, 8. *Euryphene swanzyana*, p. 222.
 9. *Idmais tripuncta*, p. 221.
 10. *Cirrochroa johannes*, p. 221.



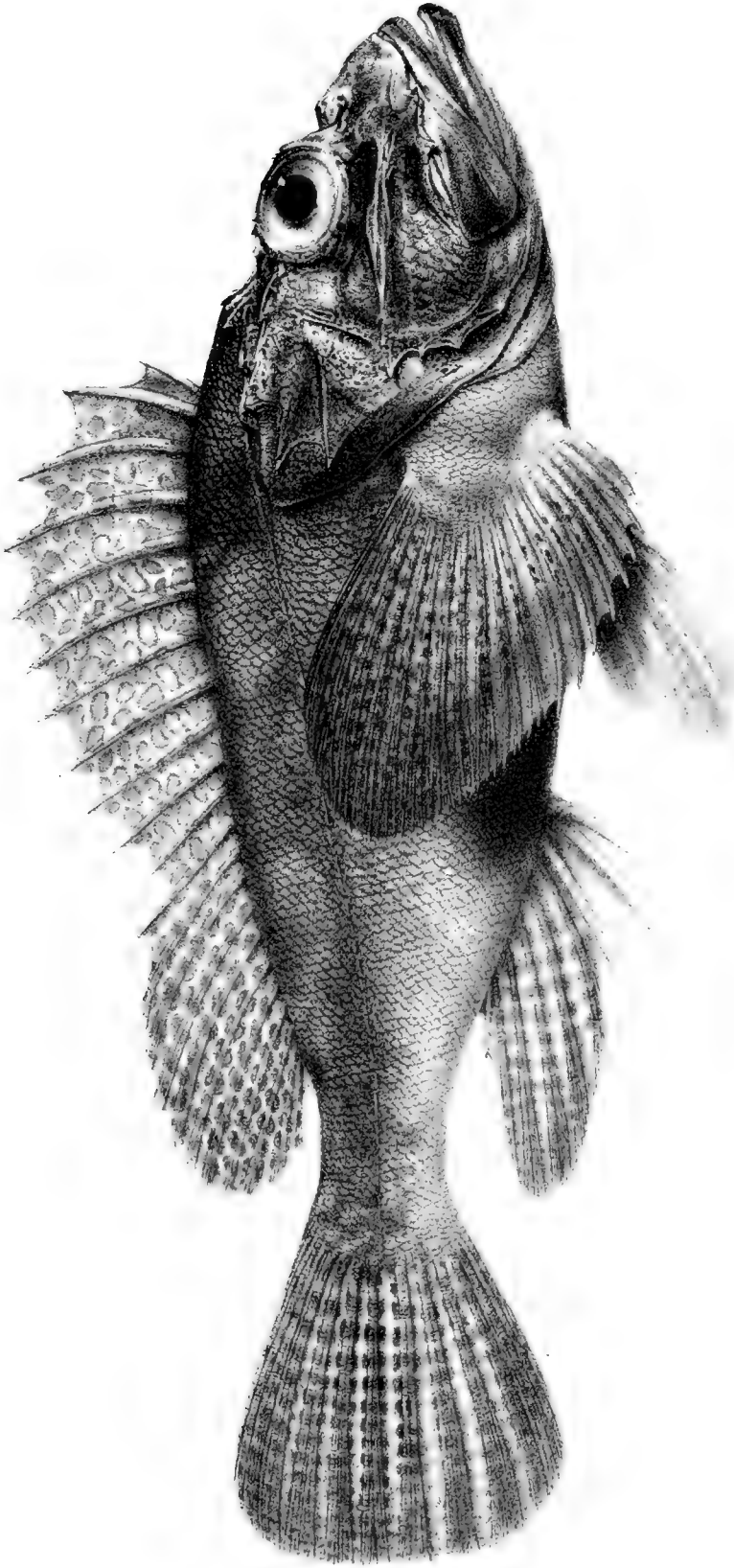


G.H. Ford.

ANTHIAS FRONTINCINCTUS.

W. West. imp.





SCORPÆNA MELLISSI.

4. Report on a Collection of Fishes made at St. Helena by J. C. Melliss, Esq. By DR. ALBERT GÜNTHER, F.R.S., F.Z.S., &c.

(Plates XVIII. & XIX.)

The British Museum has lately received a collection of very fine examples of marine Fishes made at St. Helena by J. C. Melliss, Esq. Various naturalists have brought to Europe collections from that island; but they were all made during a more or less hurried visit, and I believe that Mr. Melliss is the first resident on the island who has paid attention to this subject. The number of species contained in this first collection is not great; yet there are several which are apparently undescribed, and others new to this part of the Atlantic fauna. I have no doubt that Mr. Melliss will be richly rewarded by discoveries if he continues his researches, and that the fish-fauna of St. Helena will prove to be quite equal to that of Madeira in extent as well as in interest. In the following list I have marked the localities from which the species were previously known, thereby indicating the affinity of this fauna to those of other parts of the Atlantic:—

1. *Holocentrum longipinne*, C. & V. West Indies.
2. *Centropristis brasiliensis*, Barnev. West Indies.
3. *Holanthias fronticinctus*, sp. n. St. Helena.
4. *Serranus impetiginosus*, Müll. & Trosch. West Indies.
5. *Rhypticus saponaceus*, Bl. Schn. West Indies, Cape of Good Hope, Cape Verde Islands.
6. *Priacanthus boops*, Forst. St. Helena.
7. *Priacanthus*, sp. n.?
8. *Apogon axillaris*, Val. Island of Ascension.
9. *Pomatomus telescopium*, Risso. Mediterranean and neighbouring parts of the Atlantic.
10. *Sargus capensis*, Smith. Cape of Good Hope.
11. *Chaetodon sanctæ helenæ*, sp. n. St. Helena.
12. *Cirrhichthys fuscatus*, C. & V. Pondicherry.
13. *Sebastes nigropunctatus*, sp. n. St. Helena.
14. *Scorpæna mellissi*, sp. n. St. Helena.
15. *Scorpæna scrofinu*, C. & V. Brazil.
16. *Thyrsites prometheus*, C. & V. Madeira.
17. *Scomber colias*, Gm. North Atlantic.
18. *Echeneis naucrates*, L. Tropics.
19. *Caranx muroadsi*, Schleg. Japan.
20. *Caranx dentex*, Bl. Schn. From the Mediterranean to the coast of Brazil.
21. *Seriola lalandii*, C. & V. Atlantic, Japan, Australia.
22. *Lichia glauca*, L. Mediterranean, Atlantic.
23. *Xiphias gladius*, L. Mediterranean, Atlantic.
24. *Salarias atlanticus*, C. & V. Madeira, Atlantic, Panama.
25. *Aulostoma coloratum*, Müll. & Trosch. West Indies.

26. *Pomacentrus leucostictus*, Müll. & Trosch. West Indies.
27. *Glyphidodon saxatilis*, L. West Indies.
28. *Heliastcs insolatus*, C. & V.* West Indies, coast of Peru.
29. *Cossyphus pectoralis*, Gill (probably = *C. pulchellus*, Poey). Pacific coast of Central America, ? West Indies.
30. *Novacula sanctæ helenæ*, sp. n. St. Helena.
31. *Julis sanctæ helenæ*, C. & V. St. Helena.
32. *Scarus strigatus*, Gthr. St. Helena.
33. *Physiculus dalwigkii*, Kaup. Madeira.
34. *Rhomboidichthys*, sp. n. ?
35. *Belone loyii*, Gthr. Cape Verde Islands.

The determination of the Eels, Sharks, &c. is reserved for the new volume of my 'Catalogue of Fishes.'

ANTHIAS FRONTICINCTUS. (Plate XVIII.)

B. 7. D. $\frac{10}{15-16}$. A. 7. L. lat. 52.

Posterior margin of the caudal fin convex. The second ray of the pectoral and the third of the anal more or less produced into a filament. Teeth of the upper jaw separated by a toothless interspace; two pairs of canine teeth in the upper jaw, one pair in front and the other more inwards. Lower jaw with a pair of subhorizontal canine teeth in front, and with one or two pairs of erect teeth on the side. Band of vomerine teeth lancehead-shaped. Tongue with a large ovate patch of teeth. Three (in spirits) white bands across the snout, forehead, and occiput; a white line along the base of the dorsal fin, which has a white margin.

This species may be regarded as the type of a distinct generic division (*Holanthias*), distinguished from *Anthias* by its convex caudal fin.

Two specimens, 9 inches long (29).

Description.—The height of the body is one-third of the total length (without caudal). Muzzle short and obtuse. The length of the head is contained thrice and two-thirds in the total length (without caudal). Diameter of the eye equal to space between the eyes, greater than extent of snout, and contained thrice and three-fourths in the length of the head. Head covered with smaller scales than those of the trunk. Cleft of mouth very oblique; upper maxillary widening suddenly, and reaching to the vertical from centre of eye. Præorbital narrow, half as broad as maxillary. Crown rounded, convex. Præoperculum with fine serrature along hinder limb, with some coarser points at the angle and several coarse denticulations along the lower limb. Sub- and interoperculum entire. Operculum with three flat short spines, the upper of which is hidden by the scales, the middle one pointed and the longest, the lower one being very short, but apparent, and almost immediately beneath the middle one.

Dorsal fin commencing rather before the posterior margin of the operculum; spinous portion rather lower than the soft, but as long;

* = *Heliastes crusma*, C. & V.

spines slender, subequal in length from the third, which is the longest; the first spine is more than half the diameter of the eye, the second longer and somewhat more than half the length of the third. The membrane between the spines is but slightly notched, and emits a very small filament behind the tip of each spine. The anterior part of the spinous portion can be nearly concealed in a sheath. Soft portion rather higher, with upper margin nearly straight; rays subequal, the eleventh rather the longest and longer than any of the spines; the posterior rays somewhat diminishing in length.

Caudal rounded, covered for some distance between the rays by small deciduous scales.

Anal rather more elevated than dorsal, with the third ray longest and sometimes produced into a filament; second spine rather stronger but shorter than the third, which exceeds in length the last dorsal spine. Pectoral nearly reaching to commencement of anal, with twenty rays, the middle ones the longest, the others rounded off towards the outer margins of the fin.

Ventrals reaching to vent, with the second ray sometimes produced into a long filament, reaching slightly beyond the commencement of the anal, the spine exceeding the third of the anal by about one-fourth of its length.

Scales of moderate size, nearly twice as high as long; each has its base covered by one or more very small scales.

CHÆTODON SANCTÆ HELENÆ.

D. $\frac{13}{21-22}$. A. $\frac{3}{19}$. L. lat. 53.

The snout is slightly produced, a little longer than the eye, with the upper profile concave; præoperculum not serrated. The soft portions of the dorsal and anal fins low, regularly rounded. Body uniform olive-coloured; the ocular band is much narrower than the orbit, and much fainter below the eye, not extending downwards beyond the præoperculum. The outer half of the dorsal and anal fins is yellow, with a narrow black edge, the yellow colour crossing the caudal peduncle; caudal and ventral fins uniform light-coloured.

This description is taken from two examples (31), $5\frac{1}{2}$ inches long. Mr. Melliss has sent a third (63), which represents a curious uniformly coloured variety without ocular band.

SEBASTES NIGROPUNCTATUS.

D. $\frac{12}{10}$. A. $\frac{3}{5}$. P. 18. L. lat. 52.

The height of the body is contained thrice in the total length (without caudal), the length of the head twice and one-third. None of the dorsal spines prolonged; no orbital tentacle. Reddish-rose-coloured, with numerous brownish-black dots, between which white specks are scattered.

Two examples (30), the larger being 15 inches long.

Description.—Head scaly, except the snout, which is naked. The diameter of the eye is contained once and two-thirds in the

length of the snout, and is about one-fifth of that of the head. Mouth very wide, the maxillary extending somewhat beyond the vertical from the centre of the eye. The vomerine teeth form an angular band; the band of the palatines is narrow, of moderate length; however, it varies in width and length, even on the two sides of one and the same specimen. Tongue free in front; pharynx colourless. The interorbital space is concave, scaleless. Beside the nasal spines, there is one in front of, and two above, the orbit, three spines being on each side of the nape. All the spines, also those on the side of the head, are but slightly prominent.

The dorsal spines are of moderate strength, the fourth, fifth, and sixth being the longest and about one-third of the length of the head. The second anal spine is much stronger than those of the dorsal fin. Anal fin subtruncate, half as long as the head. Pectoral nearly as long as the head, without snout, extending to the anal spines; none of the rays are branched.

SCORPÆNA MELLISSII. (Plate XIX.)

D. $\frac{12}{10}$. A. $\frac{3}{5}$. P. 12+8. L. lat. ca 60.

The height of the body is contained thrice and one-third in the total length (without caudal), the length of the head twice and a half. Eye of moderate size, its diameter being contained once and two-thirds in the length of the snout, and *twice and one-half in that of the postorbital portion of the head*. Basal portion of the operculum scaly; head without tentacles, except at the nostrils; interorbital space concave, with indistinct longitudinal ridges; vertex with a quadrangular groove, which is broader than long. The maxillary extends nearly to the vertical from the hind margin of the orbit. Palatine teeth in a short band, which is shorter than the vomer is broad. Scales smooth, irregularly arranged, those of the lateral line being much the largest. Dorsal spines long, slender; the fourth, fifth, and sixth are the longest, two-fifths as long as the head; anal spines stronger but shorter than the spines just mentioned. Pectoral fin extending to below the fourth ray of the dorsal, ventral to the third anal spine.

Body nearly uniform brownish grey; head with numerous brown dots; each dorsal, caudal, and pectoral ray accompanied by a series of small subquadrangular brown spots. Axil of the pectoral colourless.

One specimen, 11 inches long.

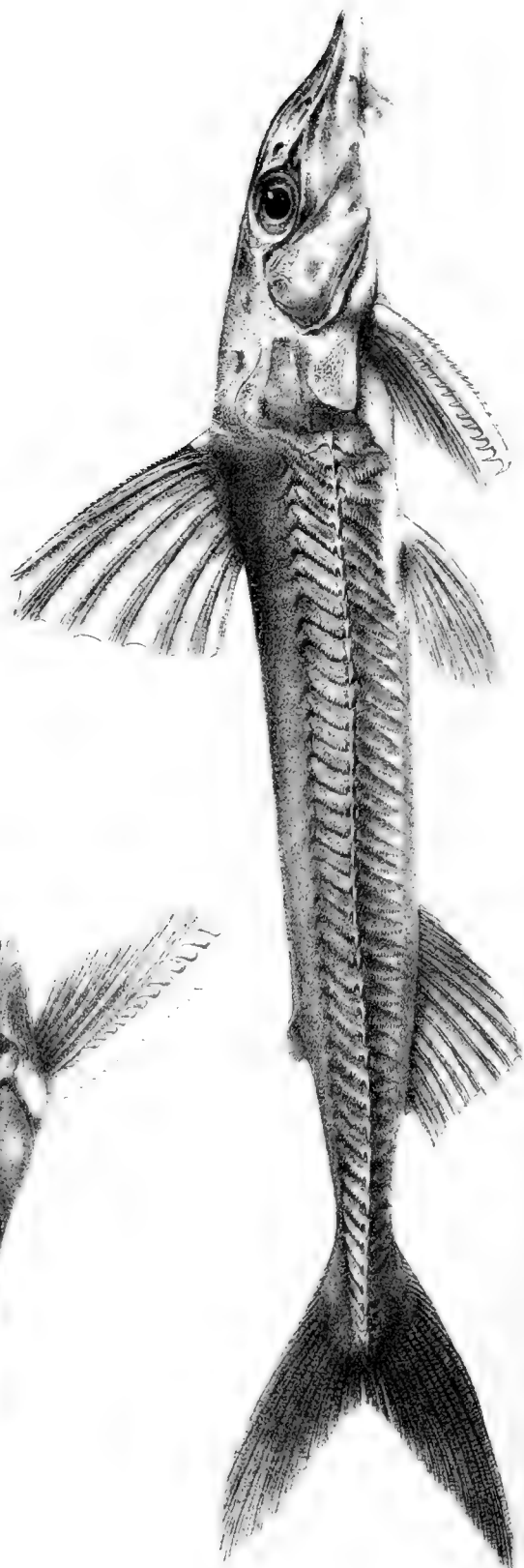
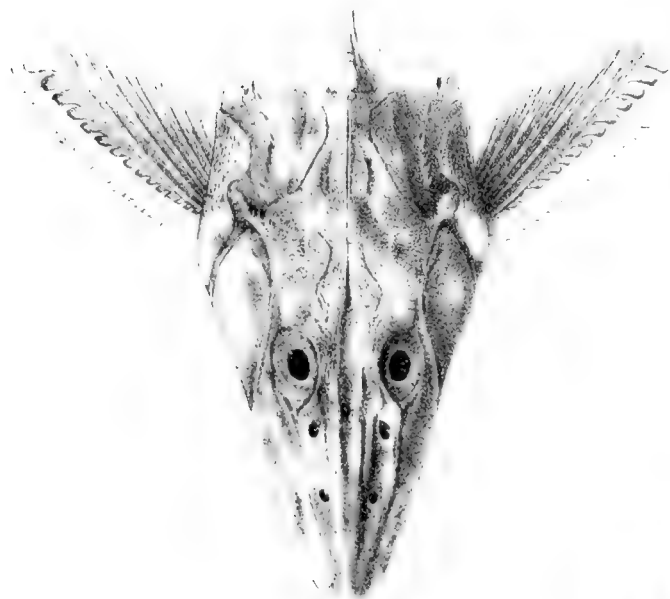
NOVACULA SANCTÆ HELENÆ.

D. $\frac{9}{12}$. A. $\frac{3}{12}$. L. lat. 28.

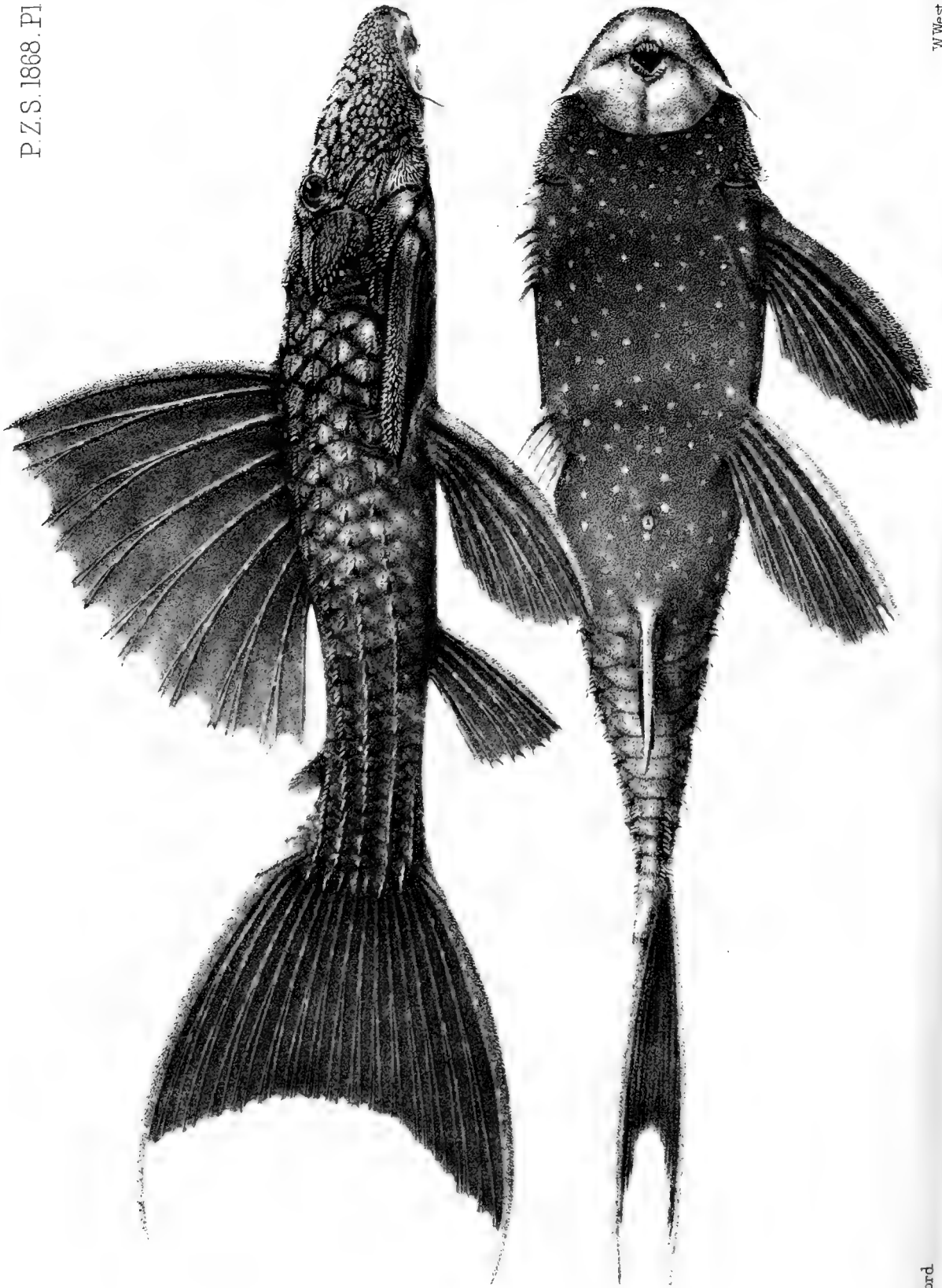
Closely allied to *N. cultrata*. The height of the body is one-third of the total length (without caudal), the length of the head two-sevenths. A few rudimentary scales below the orbit; only the first dorsal spine is flexible. Head and body apparently without spots or streaks.

Two examples (6), 11 inches long.

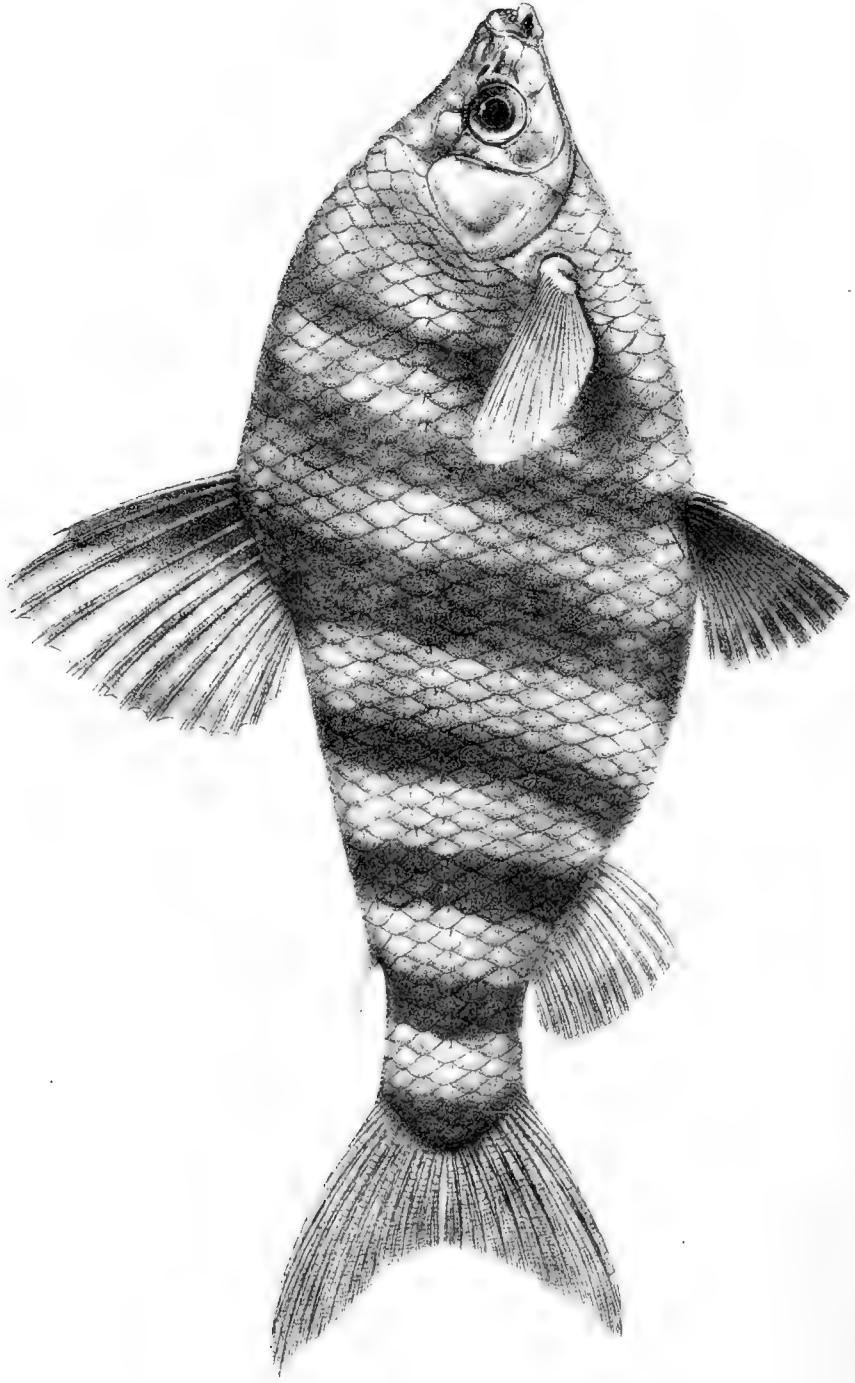












Leporinus hypselonotus

5. Descriptions of Freshwater Fishes from Surinam and Brazil. By DR. ALBERT GÜNTHER, F.R.S., F.Z.S., &c.

(Plates XX., XXI., XXII.)

The British Museum received in the course of last year several collections of freshwater fishes from Surinam and Brazil. Whilst engaged in the determination and arrangement of these examples, I have found several species which do not appear to have been described hitherto. All of them belong to the *Siluridæ* and *Characínidæ*. The collections whence these examples were obtained are the following:—

1. A collection made by Mr. Edward Bartlett on the Huallaga, a tributary of the Upper Amazons, and on a smaller tributary near the town of Xeberos. This collection contained a greater proportion of new species than one made by Mr. Bartlett on the main stream, which was noticed by me in Ann. & Mag. Nat. Hist. 1866, xviii. p. 30. Besides the species which will be mentioned subsequently, the following were collected by him at Xeberos:—*Ageniosus brevifilis* (C. & V.), *Plecostomus emarginatus* (C. & V.), *Prochilodus nigricans* (Agass.), *Curimatus latior* (Spix), *Leporinus megalepis* (Gthr.), *Chalcinus brachypoma* (C. & V.), *Tetragonopterus orbicularis* (C. & V.), *Myletes duriventris* (Cuv.), *Serrasalmo humeralis* (C. & V.), *Xiphorhamphus ferox* (Gthr.), *Sternopygus virescens* (Val.).

2. A small collection from the Upper Amazons, made by Mr. Hauxwell, a correspondent of Mr. Bates, at Pebas. All the specimens contained in this collection have been previously described.

3. Two collections made by Hr. Kappler on the Maroni River, a river forming the boundary between the Dutch and French Guianas.

4. The freshwater fishes forming part of the museum of the late Dr. Van Lidth de Jeude. Unfortunately the localities whence these examples were procured are not preserved; but it is probable that the greater part, if not all, are from the Dutch possessions in Guiana, many of them being identical with species known to inhabit the fresh waters of Surinam.

DORAS HELICOPHILUS.

D. 1/6. A. 12. P. 1/8. V. 8. L. lat. 32–34.

Lateral shields well developed, entirely uncovered by the skin; the depth of the third is one-half of the length of the head, those on the tail only half as deep as the tail; their whole surface is covered with minute spines. The maxillary barbels reach to the middle of the pectoral spine, the outer of the mandible being somewhat, and the inner much, shorter than those of the maxillary. Humeral process without spines, with a very slight ridge, extending to the hinder third of the pectoral spine. The posterior lobes of

the nuchal carapace are rounded, reaching to the base of the second soft ray of the dorsal fin. Dorsal spine serrated in front and behind, the anterior denticulations being directed upwards. Pectoral spine very long, much longer than the head, extending to the ventral. Caudal peduncle shielded above and below. Uniform blackish; dorsal fin white, its middle black; base of the anal fin and the two posterior rays white.

Three examples, 14 inches long, were sent by Hr. Kappler from Surinam. This fish swallows Ampullarias of a diameter of an inch, and, after having digested the animal, passes the shells, not broken or damaged in any way. The mouth is not larger than in the allied species.

OXYDORAS ACIPENSERINUS. (Plate XX.)

D. 1/6. A. 16. P. 1/10. V. 7. L. lat. 42.

This fish is distinguished from all its congeners by the peculiar shape of the head and snout, which is elongate-triangular, pointed, and much depressed in its anterior portion. We find such modifications of form in other allied genera, and they cannot form the base for establishing distinct generic divisions.

The length of the head is nearly one-fourth of the total (without caudal); crown entirely bony to the dorsal fin; body much elongate, its greatest depth being only one-half of the length of the head. Mouth toothless. Barbels united by a broad thin membrane; the maxillary barbel is the longest, extending nearly to the root of the pectoral fin, and provided with several larger and smaller similar appendages. The outer mandibular barbel is split nearly to the base, so that the mandible appears to be provided with six barbels. Eye of moderate size, its horizontal diameter being more than the width of the interorbital space. Lateral shields very high, covering at least two-thirds of the side of the body; their margin is striated and spinous, the median spine being very strong. Humeral process obtuse, scarcely longer than high. Dorsal spine slender, shorter than the head, slightly serrated along both edges. Adipose fin low and short. Pectoral spine flat and very strong, coarsely dentated along both edges. Pectoral fin forked. Coloration uniform.

One specimen, 8 inches long, has been sent by Mr. Bartlett from Xeberos.

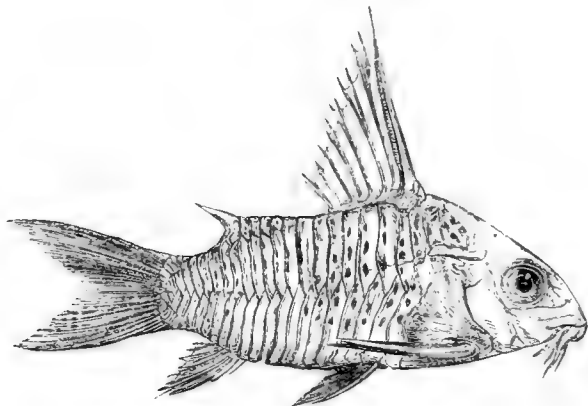
CALLICHTHYS ARMATUS. (Fig. 1, p. 231.)

This species belongs to the group with compressed head.

D. $\frac{1}{7}$ /1. A. 1/6. P. 1/8. V. 6.

Head rather higher than long; the height of the body is two-fifths of the total length (without caudal). Maxillary barbels extending to below the eye. Twenty-three series of shields in the upper series; there are four or five azygos shields before the adipose fin. Spines of the fins very strong and long; dorsal spine as high

Fig. 1.

*Callichthys armatus.*

as the body, finely serrated behind; pectoral spine rather stronger but shorter than that of the dorsal, longer than the head. Anal spine shorter and more feeble than that of the adipose fin. Olive-coloured (in spirits), the nine or ten anterior scutes with vertical series of small blackish spots.

Several examples, 2 and $2\frac{1}{2}$ inches long, were collected by Mr. Bartlett at Xeberos and on the Huallaga.

CHÆTOSTOMUS FORDII. (Plate XXI.)

D. $1/8$. A. $1/5$. P. $1/6$. V. $1/5$. L. lat. 25.

Head much depressed, elongate, its length being one-third of the total (without caudal); snout broad and elongate, the distance of the eye from the posterior end of the head being only two-fifths of the length of the snout. Eye small, one-eighth of the length of the head, and two-fifths of the width of the interorbital space, which is rather flat. Occiput terminating in a low obtuse ridge. The entire upper surface of the head is very rough, and covered with minute spines; the scutes with which the snout is covered are but loosely united, so that this part is rather soft. Interoperculum with about ten setiform spines, the longest being about as long as the eye. *Each jaw with six or seven stoutish teeth on each side; each of them has a lobe on its outer side, rather distant from the flat apex.* Lower lip not notched, with numerous papillæ. Throat, thorax, and belly naked. The first ray of the dorsal and anal, and the upper and lower of the caudal, slightly thickened and rough. Caudal lobes more or less produced. Pectoral spine strong, extending to the second third of the ventral fin, covered with short hooks. Ventral spine as long as that of the pectoral fin, extending beyond the anal. Each scute of the body with a series of three or four very prominent spines. Ten scutes between anal and caudal, and eight between the two dorsal fins. Brownish black; most of the scutes with a round bluish-white dot at the

base; lower parts with numerous similar but more distinct white dots.

This beautiful species, which I have named after Mr. Ford, is probably from Surinam. Four male specimens, the largest 9 inches long, were obtained from the collection of Dr. van Lidth de Jeude.

CHÆTOSTOMUS DEPRESSUS.

D. 1/7. A. 6. P. 1/6. L. lat. 23.

Head and trunk much depressed and flattened. The length of the head is rather more than one-third of the total (without caudal); the diameter of the eye is one-fifth of the length of the head, and *two-thirds of the width of the interorbital space*. The margin of the snout is covered with short bristles; interoperculum with a bundle of about eight similar bristles, the longest being only half as long as the eye. The lower margin of the opercle slightly serrated. The lower side of the head, thorax, and belly entirely naked. Dorsal fin rather higher than long, the first ray being shorter than the head; the length of its base is nearly equal to its distance from the caudal; there are six scutes between the two dorsal fins. Caudal fin obliquely truncated, the lower rays being much longer than the upper. Pectoral spine extending to the second third of the ventral, and rather rough; ventral fin extending to the end of the anal. Eleven scutes between the anal and caudal fins. Scutes with numerous striæ, each stria composed of numerous very small spines. Posthumeral ridge obtuse. Brown, each scute with several round very small whitish dots; dorsal and caudal rays with a series of similar dots, the interradial membrane being immaculate.

This species is also probably from Surinam; one male specimen, 6 inches long, has been obtained from the collection of Dr. van Lidth de Jeude.

This species is allied to *Plecostomus barbatus* and *P. guttatus*. We have received a very complete series of the former species from the same collection, and I find that the long bristles on the margin of the snout and the interoperculum form a sexual character and are peculiar to the male. In the female they are very short, and sometimes scarcely developed. Both these species might be referred, with greater propriety, to *Chætostomus*.

CHÆTOSTOMUS MEGACEPHALUS.

D. 1/7. A. 5. P. 1/6. L. lat. 23.

Head but slightly depressed, rather longer than broad, *its length being more than one-third of the total (without caudal)*; a very obtuse ridge runs from the upper angle of the orbit to below the nostril; occiput flat; interorbital space with a pair of shallow grooves. The horizontal diameter of the orbit is more than one-half of the width of the interorbital space, and about one-fifth of the length of the head. Margin of the snout granulated, without

bristles; interoperculum with a bundle of about twenty setiform spines, the longest of which are about one-fourth of the length of the head, and extend backwards to the root of the pectoral fin. Thorax and belly entirely naked. Dorsal fin rather higher than long, the length of its anterior rays being three-fourths of that of the head; the length of its base equals its distance from the root of the caudal. There are six scutes between the two dorsal fins. Caudal fin forked, the lower lobe being the more developed. The pectoral spine extends to the second third of the ventral; the ventral fin to the middle of the anal. Twelve scutes between the anal and caudal fins. Scutes of the body without keels, but with vertical series of spines, the anterior scutes with one series only, the middle with two, and the posterior with three or more. Posthumeral ridge indistinct. Blackish brown; head and body with numerous indistinct round yellowish spots, each about as large as the pupil; each dorsal ray with a series of round whitish spots, the black ground-colour forming a network on the fin.

One male specimen, 6 inches long, has been obtained from the collection of Dr. van Lidth de Jeude. It is probably from Surinam.

CHÆTOSTOMUS DENTEX.

D. 1/7. A. 4. P. 1/6. L. lat. 23.

Head depressed, rather longer than broad, its length being somewhat more than one-third of the total (without caudal). A very distinct short ridge runs from the upper angle of the orbit to below the nostril. Interorbital space and occiput flat, the orbital margin being slightly elevated. Eye rather small, its horizontal diameter being one-half of the width of the interorbital space. Margin of the snout rough, like the surface of the head, but without bristles. *Interoperculum with a bundle of about ten straight setiform spines, the longest of which is as long as the eye. Thorax and belly nearly entirely naked, there being only a few granulations behind the throat. Teeth comparatively large, with the apex dilated, scarcely lobed*; there are about six on each side in the upper jaw, and three in the lower. Dorsal fin higher than long, but its anterior ray is shorter than the head; the length of its base is less than its distance from the caudal; there are seven scutes between the two dorsal fins. Caudal fin forked, the lower lobe being much longer than the upper. The pectoral spine extends to the second fourth of the ventral; the ventral fin beyond the anal. Eleven scutes between the anal and caudal. Scutes not keeled, but covered with strong spines. Uniform greyish brown.

One example, $3\frac{1}{2}$ inches long, was found by Mr. Bartlett at Xeberos.

ACANTHICUS HYSTRIX, Spix.

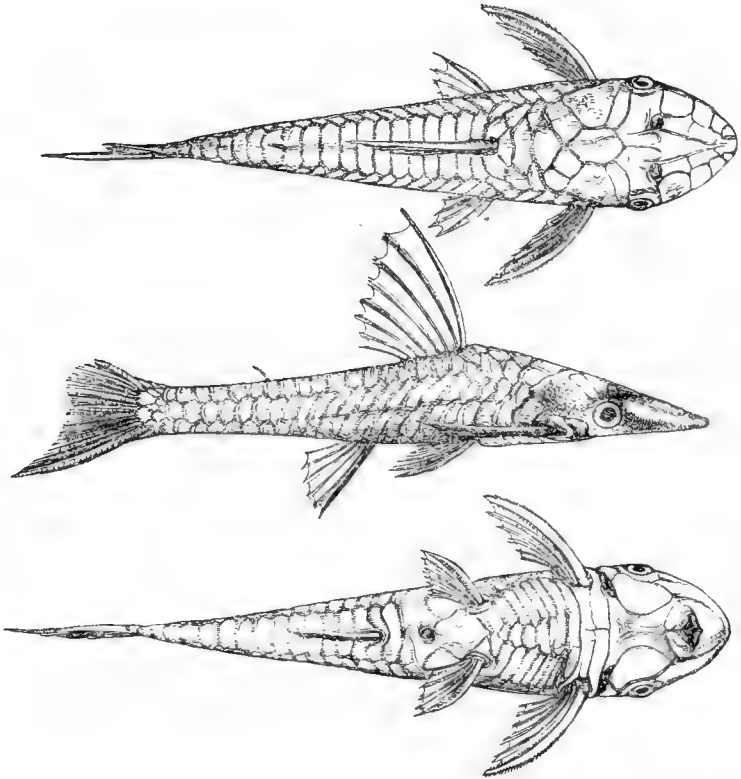
The figure given by Spix is not good; but the species may be readily recognized from it. Mr. Bartlett obtained a splendid ex-

ample, 22 inches long, at Xeberos. It has no adipose fin; therefore Kner's assertion, that the absence of this fin in the typical example is merely accidental, is not confirmed.

HYPOPTOPOMA (g. n. HYPOSTOMATINUM.).

This genus differs from *Plecostomus* in the peculiar formation of the head, which is depressed, spatulate, the eyes being on the lateral edge of the head. The moveable gill-covers are reduced to two bones, viz. the operculum, small and placed as in *Plecostomus*, and a second, larger bone (interoperculum?), separated from the eye by the narrow suborbital ring, and placed at the lower side of the head.

Fig. 2.



Hypoptopoma thoracatum.

HYPOPTOPOMA THORACATUM. (Fig. 2.)

D. $\frac{1}{6}$ /1. A. 6. P. 1/6. V. 1/5. L. lat. 24.

The form of the head approaches that of *Loricaria*, being much depressed; the snout broad, with the outline elliptical. The interorbital space is slightly convex, but little narrower than the greatest width of the head, which is three-fourths of its length. The

length of the head (to the occiput) is contained thrice and one-fourth in the total (without caudal). The margin of the snout is rough, like the upper surface of the snout. Structure of the mouth and teeth as in *Plecostomus*. Teeth small, about ten on each side in the upper jaw, and thirteen in the lower; lips narrow. The lower side of the head is naked, except where it is covered by the large subsemicircular interoperculum. Scutes without keels, covered with fine spines, which are arranged in longitudinal striæ. Thorax covered by two pairs, abdomen by three series of broad scutes. Dorsal fin much higher than long, the length of its base being one-half of its distance from the adipose spine; caudal fin obliquely truncated, the lower ray being much longer than the upper. Pectoral spine serrated along both edges, extending beyond the middle of the ventral; ventral fin scarcely extending to the anal. Coloration uniform olive, caudal fin darker.

A single example, 3 inches long, was obtained by Mr. Bartlett at Xeberos.

LORICARIA ROSTRATA, Spix.

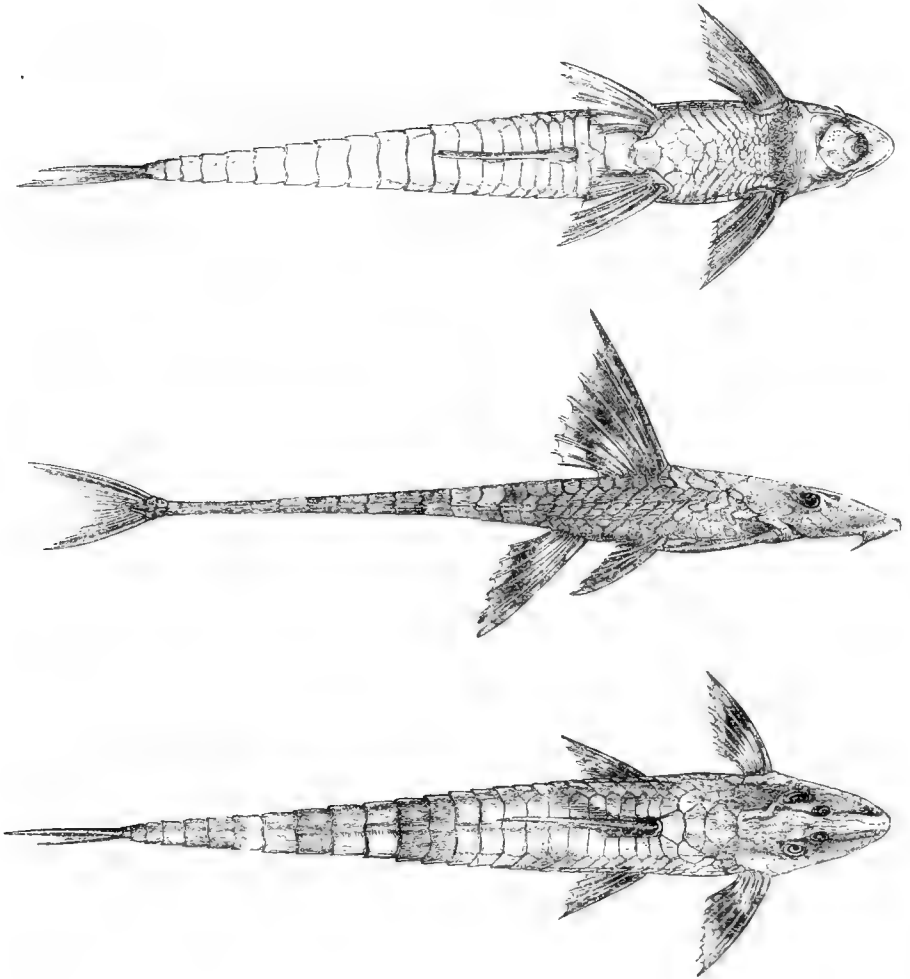
The figure given in Spix's *Pisc. Bras.* is bad. The figure of Valenciennes under the name of *Loricaria acuta* (pl. 452) has probably been made from an example of this species; it certainly does not agree with his description of *L. acuta*. This species shows the same sexual character as *Plecostomus barbatus*, the male having a bearded snout. Kner, not being aware of this, described the female as *L. rostrata*, and the male as *L. barbata*. Mr. Bartlett found this fish at Xeberos.

LORICARIA LANCEOLATA. (Fig. 3, p. 236.)

Head and body much depressed, but narrow, the greatest width of the head being three-fifths of its length. Lower lip broad, slightly notched behind; lateral barbels fine and small; fringes of the lip indistinct. Teeth very fine, few in number, about five on each side in the upper jaw, and about seven in the lower. Orbit with a rather shallow notch behind, its horizontal diameter (the notch included) being two-thirds of the width of the interorbital space, which is flat. Head and body rough; a pair of obtuse ridges on the occiput and nape. The lateral ridges of the body are confluent on the fifteenth scute. L. lat. 28. There is a series of seven scutes between the roots of the pectoral and ventral fins. Thorax and abdomen covered with irregular scutes. The length of the head (measured to the occiput) is a little more than one-fifth of the total (without caudal). None of the fin-rays are much produced; the pectoral extends somewhat beyond the origin of the ventral. Origin of the dorsal fin opposite to the root of the ventral. Brown; back with about five obscure dark cross bands; fins with broad, irregular confluent black cross bands.

One specimen, $3\frac{3}{4}$ inches long, was found by Mr. Bartlett at Xeberos.

Fig. 3.

*Loricaria lanceolata*, p. 235.**LORICARIA PLATYSTOMA.** (Fig. 4, p. 237, and fig. 5, p. 238.)

Snout of moderate length, slightly pointed; mouth broad, upper lip well developed, lower semicircular, of moderate width, papillose, not fringed, and with a minute barbel near the angle of the mouth. Teeth very fine, about forty on each side of each jaw, the series occupying nearly the whole width of the mouth. Orbit nearly circular, without notch, its horizontal diameter being two-thirds of the width of the interorbital space, which is slightly concave. Scutes remarkably smooth, even the lateral ridges of the body and tail being obtuse; they are confluent on the twenty-first scute. L. lat. 29. There is a series of seven or eight scutes between the roots of the pectoral and ventral fins. Thorax and abdomen covered with small irregular scutes. The length of the head (measured to the occiput) is contained five times and one-third in the total (without

Fig. 4.

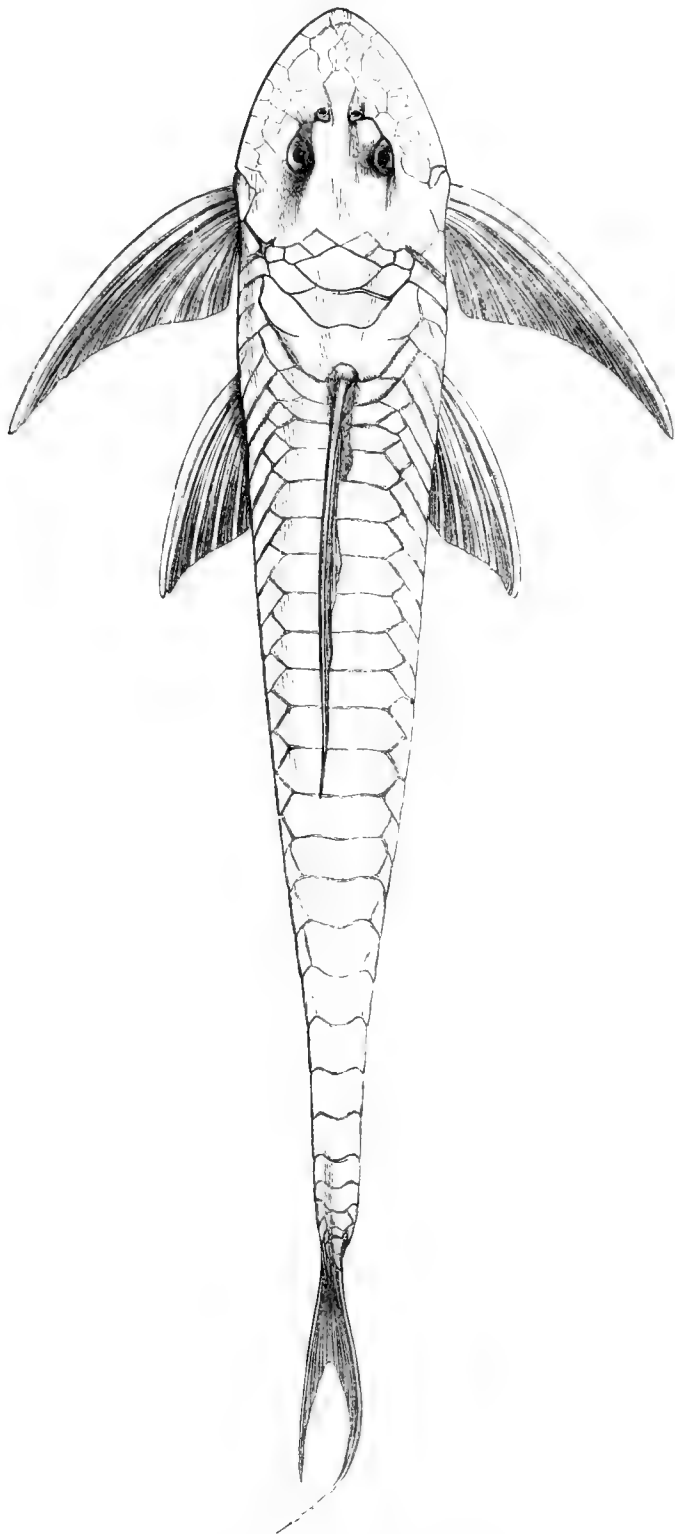
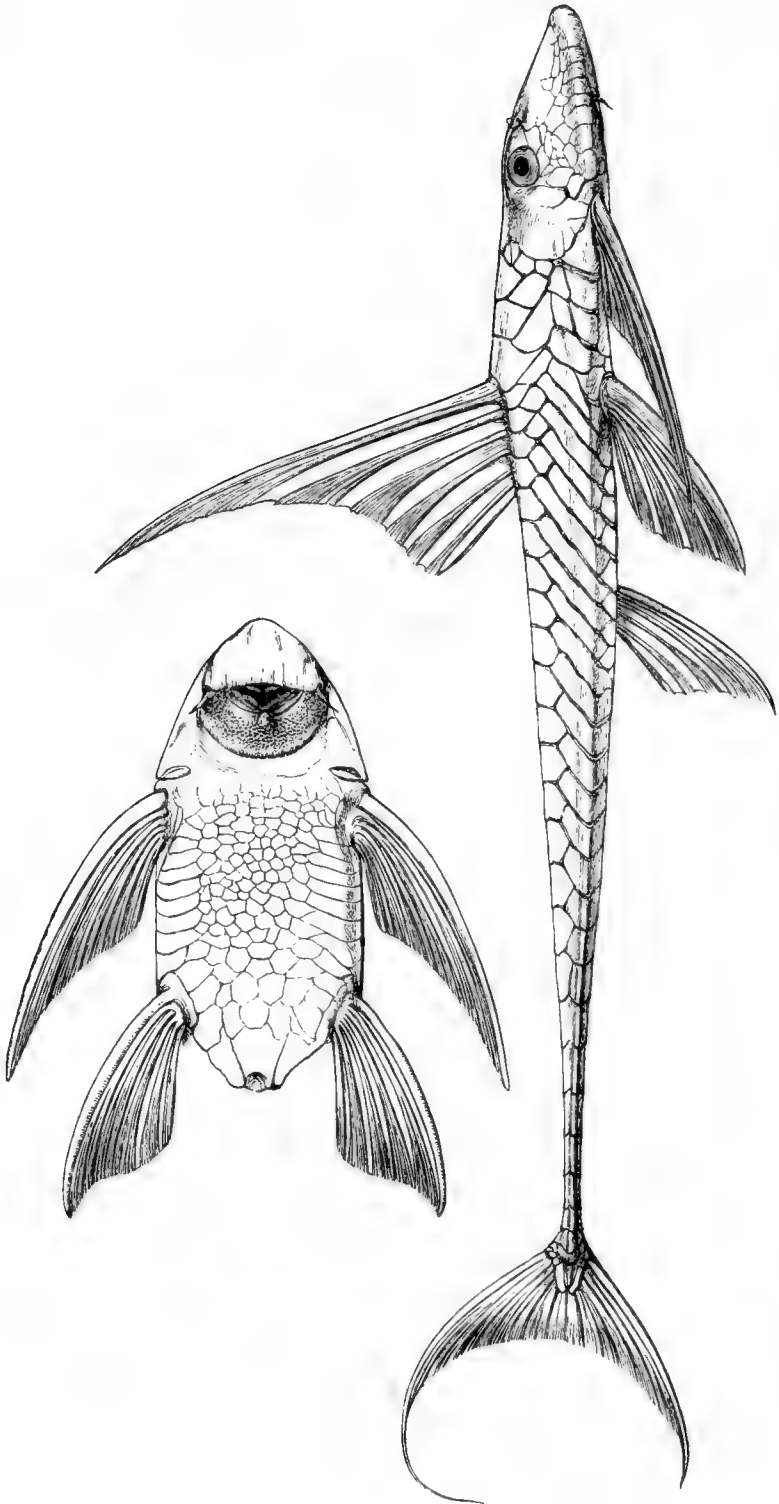
*Loricaria platystoma*, p. 236.

Fig. 5.

*Loricaria platystoma*, p. 236.

caudal). The outer ray of each fin (except anal) somewhat produced, that of the pectoral reaching to the middle of the ventral, that of the dorsal and upper caudal lobe being somewhat longer. Origin of the dorsal nearly opposite to that of the ventral. Uniform brownish (in spirits).

Two examples, 8 inches long, were obtained from the collection of Dr. van Lidth de Jeude. They are probably from Surinam.

LORICARIA LAMINA. (Fig. 6, p. 240, and fig. 7, p. 241.)

Head and body excessively depressed; snout of moderate length, very broad, the head being nearly as broad as long. Labial folds thin, fringed; a slender barbel at the angle of the mouth, extending to or beyond the gill-opening. Teeth minute, few in number; there are about five on each side in the upper jaw, and seven in the lower. Orbit small, with a shallow notch behind; its horizontal diameter (the notch included) is three-fourths of the width of the interorbital space, which is nearly flat. Edge of the snout trenchant. Two very low median ridges placed close together run from the parietal region to the prædorsal scute. Lateral ridges of the body very conspicuous, confluent on the sixteenth scute. L. lat. 32. There is a series of nine scutes between the roots of the pectoral and ventral fins. Thorax and abdomen covered with small irregular scutes. The length of the head (measured to the occiput) is contained four times and one-third in the total (without caudal). Pectoral extending to the dorsal, the origin of which is opposite to the root of the ventral. Upper caudal ray slightly produced. Olive-coloured (in spirits), with some indistinct small round whitish spots on the back of the trunk; head with brown vermiculated lines.

Three examples, from 7 to 8 inches long, were collected by Mr. Bartlett at Xeberos.

MACRODON TRAHIRA, Bl. Schn.

Is found also in the Huallaga (Bartlett). I may remark that specimens lately received from Trinidad are perfectly identical with those from Brazil.

ERYTHRINUS UNITÆNIATUS, Spix.

Examples from Trinidad (? *E. cinereus*, Gill) are not specifically distinct from examples from the continent.

CURIMATUS LEUCISCUS.

D. 11. A. 9. V. 10. L. lat. 64. L. transv. $\frac{11}{10}$.

The height of the body is contained thrice and two-thirds in the total length (without caudal), the length of the head four times. Upper profile of the head and nape straight. Snout a little longer than the eye, which is three-fifths of the width of the interorbital space. Snout somewhat projecting beyond the mouth; the second suborbital bone is more than twice as long as deep. Eye with a

Fig. 6.

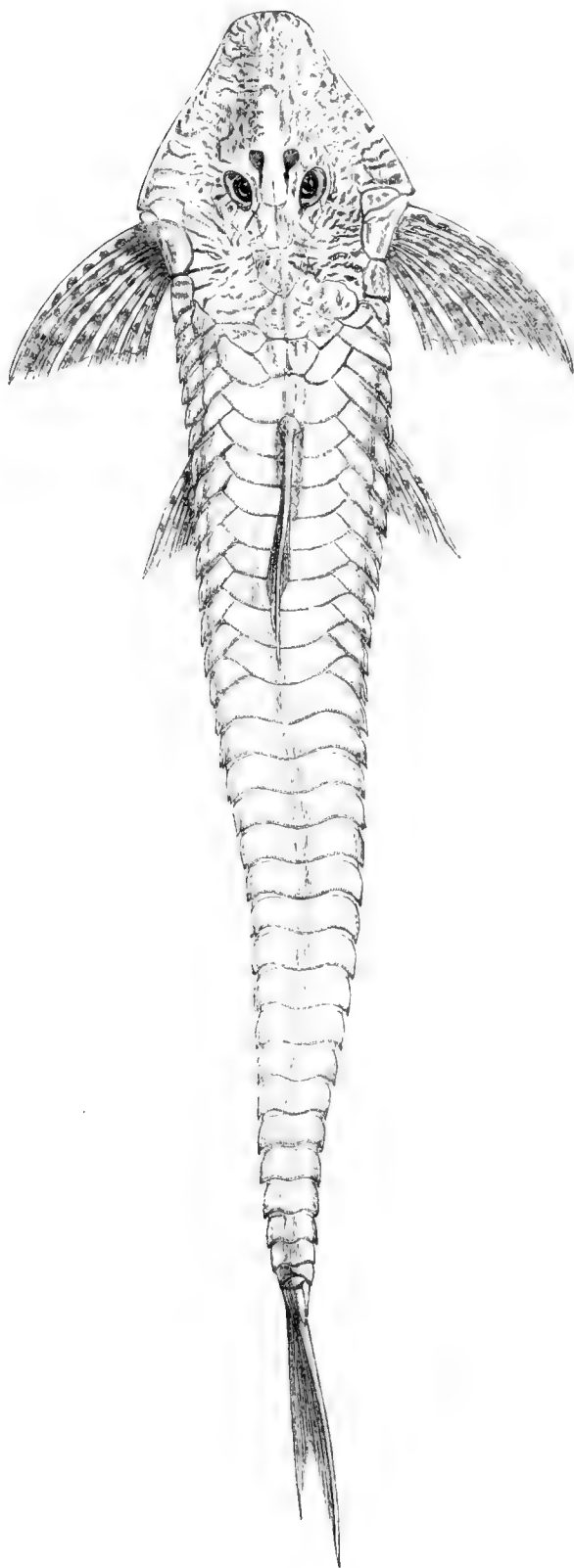
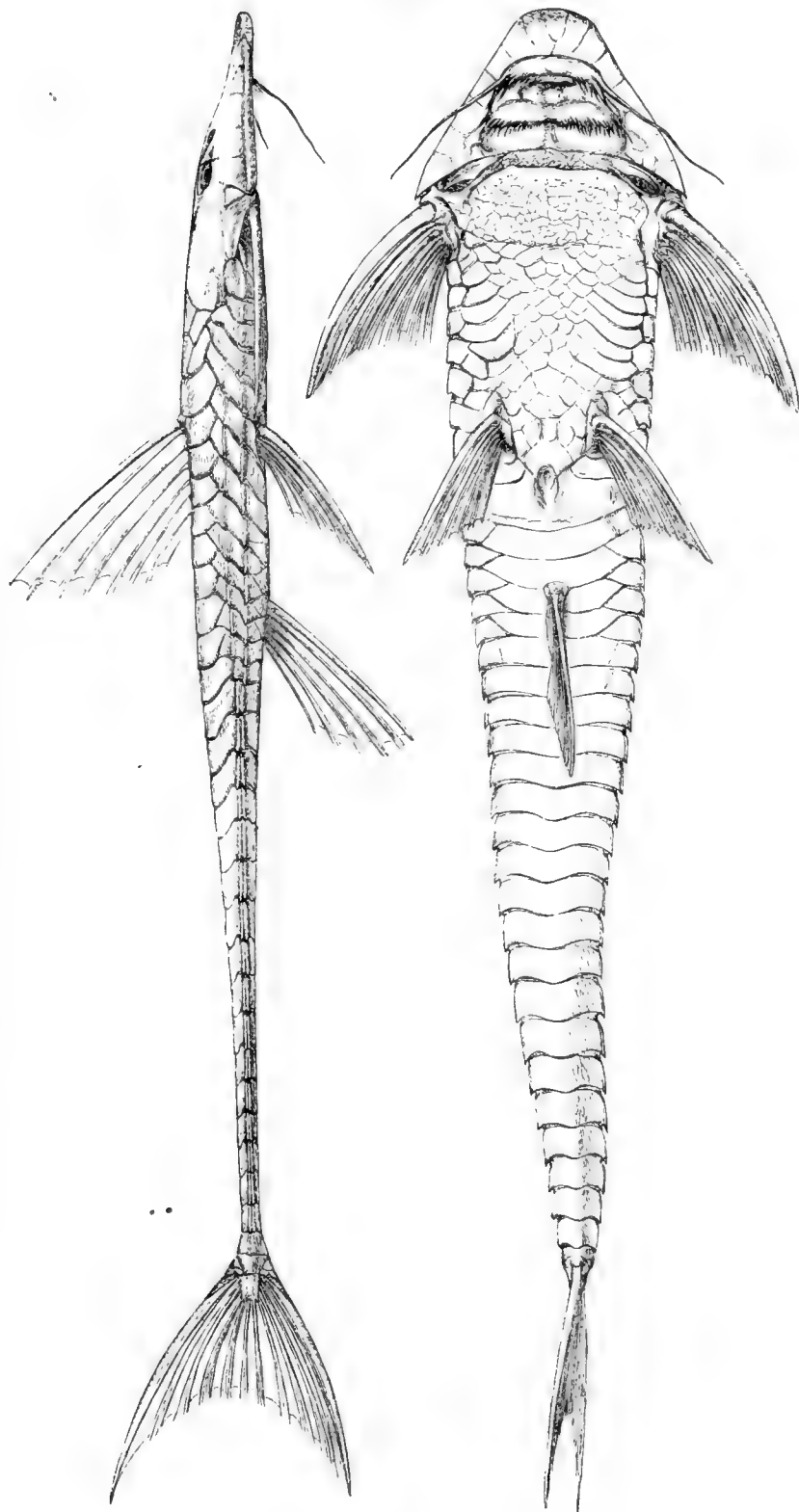
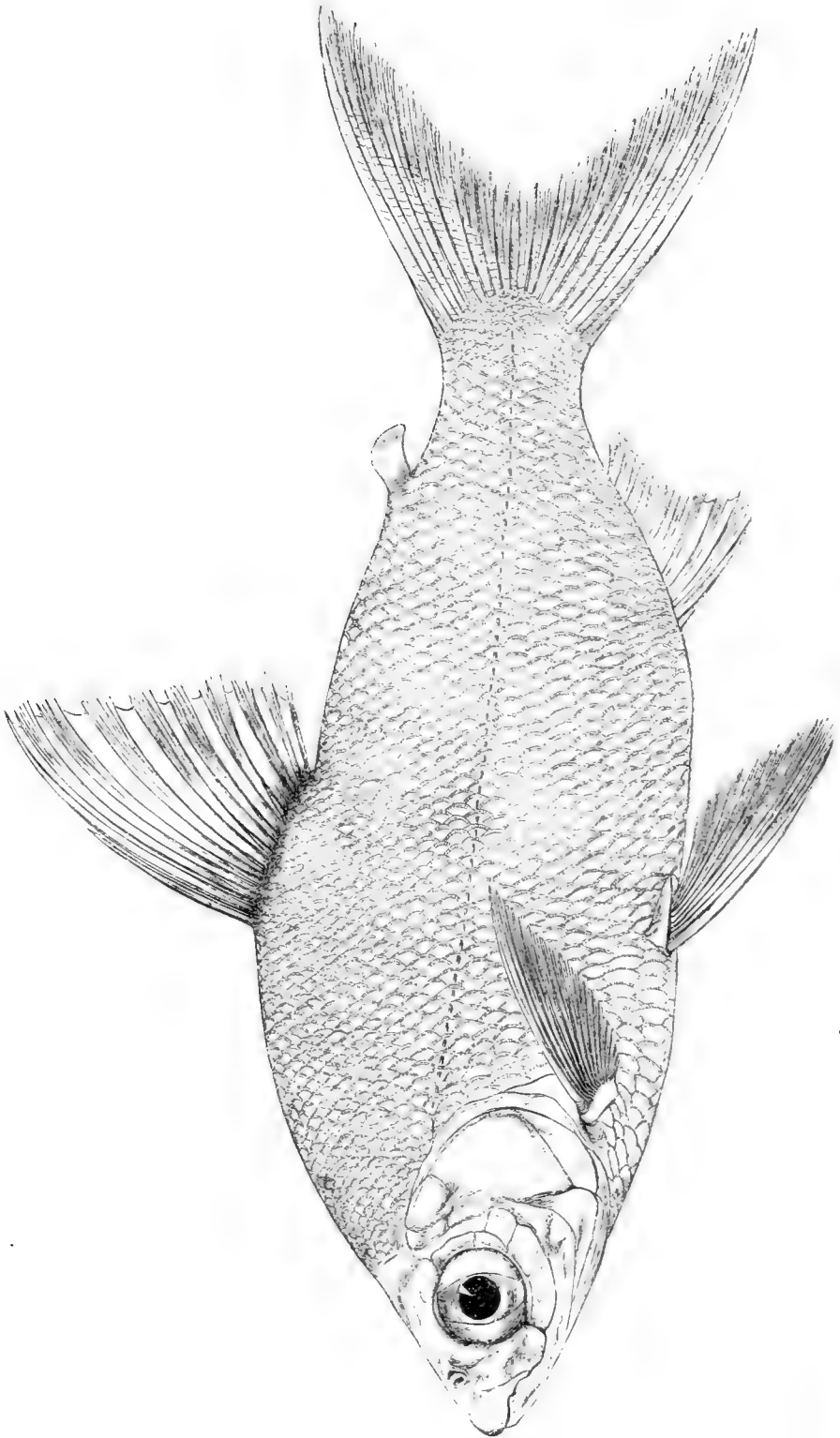


Fig. 7.



Loricaria lamina, p. 239.

Fig. 8.



Curimatus asper, p. 243.

narrow adipose membrane in front and behind. Origin of the dorsal fin equidistant between the end of the snout and the adipose fin, considerably in advance of the ventrals. Pectoral terminating at a considerable distance from the ventral, ventral terminating close to the vent. Abdomen rounded before and behind the ventrals. Scales with their entire margin conspicuously serrated. Coloration uniform.

Two examples were collected by Mr. Bartlett in the Huallaga, the longest being $5\frac{1}{2}$ inches long.

CURIMATUS ASPER. (Fig. 8, p. 242.)

This species differs from *C. cyprinoides*, *C. essequibensis*, and *C. schomburgkii* in having the scales strongly serrated, from *C. rutiloides* in the form of the snout, and from *C. ciliatus* in the form of the body.

D. 11. A. 12-13. V. 9-10. L. lat. 51. L. transv. $\frac{13-14}{9}$.

The height of the body is contained twice and two-thirds or thrice in the total length (without caudal), the length of the head thrice and one-half. Upper profile slightly concave above the occiput. Snout as long as the diameter of the eye, which is a little more than one-half of the width of the interorbital space. Snout somewhat projecting beyond the mouth. The second sub-orbital bone is twice and one-half as long as deep. Eye with an anterior and posterior adipose membrane. Origin of the dorsal fin nearer to the end of the snout than to the root of the caudal, in advance of the ventrals. Pectoral fin extending beyond the base of the ventrals, ventral fins to, or nearly to, the vent. Abdomen flat before the ventrals, compressed behind them. Scales with their entire margin conspicuously serrated. Coloration uniform.

Four examples were collected by Mr. Bartlett on the Huallaga and at Xeberos. The largest is 7 inches long.

CURIMATUS DOBULA.

Allied to *C. troschelii*.

D. 12. A. 10. L. lat. 43. L. transv. $6/7$.

The height of the body is contained thrice and four-fifths in the total length (without caudal), the length of the head four times. Upper profile slightly convex on the nape. Abdomen rounded in front and behind the ventrals. Snout rather shorter than the eye, the diameter of which is contained thrice and one-third in the length of the head, and less than the width of the interorbital space. Orbit with an adipose eyelid in front and behind. Caudal fin deeply forked, at least as long as the head. The origin of the dorsal fin is nearly midway between the end of the snout and the adipose fin, corresponding to the tenth scale of the lateral line. The pectoral fin terminates at some distance from the ventral; the ventral fin does not reach to the vent. Scales with a few obtuse denticulations. Body silvery; dorsal fin with an indistinct oblique blackish band ascending forwards.

Three examples, $4\frac{1}{2}$ inches long, were collected by Mr. Bartlett on the Huallaga.

HEMIODUS KAPPLERI.

Allied to *H. notatus*, but with the body much more elongate.

D. 11. A. 11. V. 11. L. lat. 64. L. transv. $13/8$.

The scales below the lateral line are much larger than the others; there are six longitudinal series between the lateral line and ventral fin. The height of the body equals the length of the head, which is two-ninths of the total (without caudal). The depth of the head equals its length, without snout. The distance between the gill-opening and the vertical from the origin of the dorsal is but little less than the length of the head. Origin of the dorsal nearly midway between the end of the snout and the adipose fin, considerably in advance of the root of the ventral. Caudal peduncle longer than deep. Silvery; a round black spot above the lateral line, behind the dorsal fin, corresponding to the thirty-fourth scale of the lateral line. Each caudal lobe with a black longitudinal band.

Two specimens were sent by Hr. Kappler from Surinam. The larger is 9 inches long.

LEPORINUS MEGALEPIS, Gthr.

Xeberos. Young examples have the upper incisors distinctly notched.

LEPORINUS FREDERICI, Bl.

An example found by Mr. Bartlett at Xeberos, and 6 inches long, might be taken for a distinct species of *Anostomus*, as it has the teeth still distinctly notched. The three spots are confluent into an uninterrupted band—a peculiarity which I have also observed in examples from the Essequibo, though in a less marked degree.

LEPORINUS HYPSELONOTUS. (Plate XXII.)

D. 10. A. 13. V. 9. L. lat. 37–38. L. transv. $6/7$.

The height of the body is contained twice and one-half or twice and two-thirds in the total length (without caudal), the length of the head four times and one-half or four times and two-thirds. Back much elevated, with its profile very convex to the dorsal fin. Eye nearer to the end of the snout than to that of the opercle; its diameter is one-fourth of the length of the head, less than that of the snout, and one-half of the width of the interorbital space, which is very convex. Opercle two-thirds as long as deep. Incisors strong and broad, the form of their edges varying with the age of the tooth. Lips not fringed. Origin of the dorsal fin equidistant between the end of the snout and the adipose fin. Abdomen compressed behind the ventrals. Body with seven more or less broad oblique blackish cross bands; the two anterior in front of the dorsal; the third from the anterior dorsal rays to behind the ventral

fins; the fourth corresponding to the vent, the fifth to the middle of the anal, the sixth from the adipose fin, and the seventh round the last caudal scales. Anterior part of the base of the dorsal and the ventrals deep black; the other fins yellowish.

Several examples, the largest 6 inches long, were obtained by Mr. Bartlett at Xeberos. All of them have one side of the gill-cavity infested with a parasitic crustacean.

TETRAGONOPTERUS OVALIS.

D. 11. A. 26. L. lat. 31. L. transv. $5\frac{1}{2}/6$.

The height of the body is one-half of the total length (without caudal); the length of the head is contained thrice and two-thirds in it. Upper profile rather more convex than lower, slightly concave on the nape. The diameter of the eye is more than the width of the interorbital space, less than the length of the snout, and one-third of that of the head. The maxillary extends somewhat beyond the vertical from the front margin of the orbit. Origin of the dorsal fin immediately behind the root of the ventral. Pectorals extending beyond the ventrals, ventrals to the vent. There are four longitudinal series of scales between the lateral line and ventral fin. Humeral spot indistinct; caudal spot diffuse, extending over the base of the fin. Remainder of the body uniformly coloured.

A single example, 4 inches long, was obtained by Mr. Bartlett at Xeberos.

APHYOCHARAX, g. n.

This genus belongs to the *Tetragonopterina*, and is, technically, distinguished from *Chirodon* by the presence of maxillary teeth.

Dorsal fin placed in the middle of the length of the body, behind the ventrals; anal rather long. Body oblong, covered with scales of moderate size. Lateral line visible on a part of the scales only. Abdomen rounded before the ventrals. Cleft of the mouth narrow; maxillary short; intermaxillary, maxillary, and mandibles with a single series of pointed teeth, those in the intermaxillary having a minute lobe on one or both sides; all the others appear to be simply pointed.

APHYOCHARAX PUSILLUS.

D. 9. A. 18. V. 8. L. lat. 36. L. transv. 12.

The height of the body equals the length of the head, and is two-ninths of the total (without caudal). The diameter of the eye is two-sevenths of the length of the head, more than that of the snout, and less than the width of the interorbital space; maxillary extending somewhat beyond the vertical from the anterior margin of the orbit. Intermaxillary with about seven, mandible with nine teeth on each side; maxillary teeth very small, occupying about one-third of the length of the bone. Jaws even in front, the mandible projecting when the mouth is open. Origin of the dorsal fin midway between the end of the snout and the root of the caudal, behind the

root of the ventrals. Caudal fin slightly forked. Scales slightly striated at the base, the lateral line being visible on the eight anterior scales. Uniform olive-coloured; the middle caudal rays black.

Three examples, $2\frac{1}{2}$ inches long, were collected by Mr. Bartlett on the Huallaga and at Xeberos.

ANACYRTUS AFFINIS.

D. 11. A. 55. L. lat. 80.

Upper and lower jaws on each side with a pair of short conical tooth-like processes directed forwards and outwards. Intermaxillary teeth in two irregular series, those of the mandible being in a single series, two pairs of them larger than the rest, canine-like. Maxillary with four or five distant short conical teeth. Back much elevated, the profile on the nape being deeply concave. The height of the body is contained twice and two-thirds in the total length (without caudal), the length of the head four times. Lower jaw considerably shorter than the upper; maxillary not extending to the vertical from the front margin of the eye. Suborbital touching the lower præopercular limb, slightly and irregularly striated. The diameter of the eye is equal to the width of the interorbital space, or to the length of the snout, and two-sevenths of that of the head; it is placed immediately below the upper profile. The humeral process in front of the pectoral terminates in an obtuse point behind, without projection in front. Origin of the dorsal fin opposite to that of the anal, rather nearer to the end of the snout than to the root of the caudal. Pectoral extending beyond the vent, ventral beyond the origin of the anal. Caudal forked. Humeral and caudal spots more or less indistinct; a narrow silvery band along and above the lateral line.

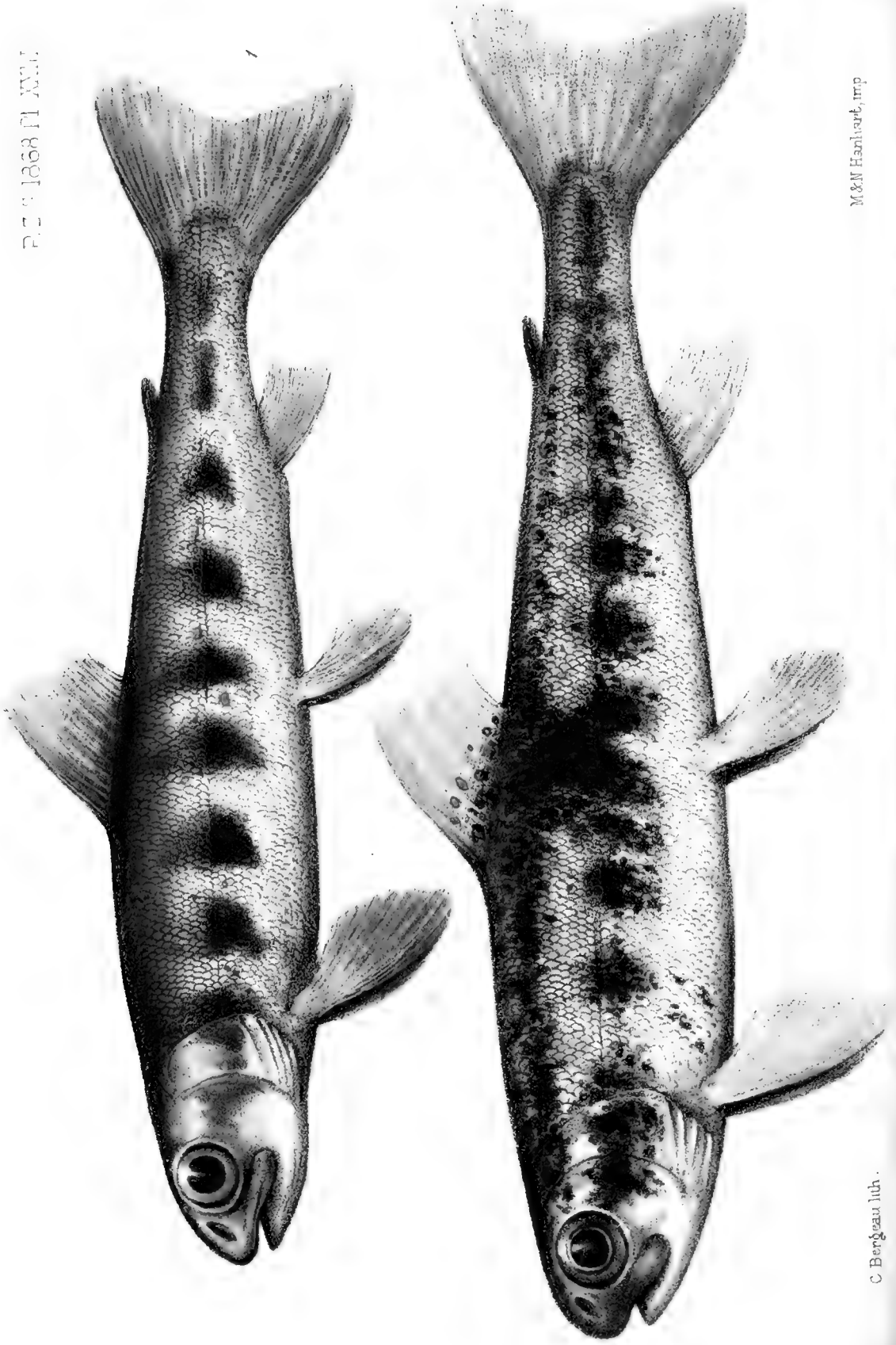
Two examples, 4 inches long, were collected by Mr. Bartlett on the Huallaga.

ANACYRTUS (CYNOPOTAMUS) AMAZONUM.

D. 11. A. 40. V. 8-9. L. lat. 110.

The height of the body is contained twice and two-thirds in the total length (without caudal), the length of the head thrice and three-fourths. Upper profile deeply concave on the nape, the back being much elevated. Abdomen not compressed, but with a median ridge from behind the ventrals. The intermaxillary teeth are of three sizes, viz. :—1, a pair of large canine teeth in front of the jaw, standing close together, and a second similar tooth close to the end of each bone; 2, a series of small teeth between the canines mentioned; 3, two smaller canines in a separate series inwards of the small teeth. The maxillary is armed with a series of very small teeth in its entire length. The teeth in the mandible are similar to those of the intermaxillary, but rather stronger, and *form a single series*; they stand in the following order:—(first) two small teeth, (secondly) a canine corresponding to the upper front canine,





M & W Hartnort, imp.

C. Bergéau lith.

(thirdly) a small canine, (fourthly) a very large canine fitting into a groove of the upper jaw, (fifthly) at some distance from the preceding a smaller canine corresponding to the upper posterior canine, and followed (sixthly) by a series of closely set small teeth*. The upper jaw overlaps the lower slightly, the maxillary extending far behind the eye, which is rather small, placed in the middle of the depth of the head, nearer to the snout than to the gill-opening. Suborbital slightly and irregularly striated. Origin of the dorsal fin nearer to the end of the snout than to the root of the caudal, its last ray being opposite to the origin of the anal fin. Pectoral extending beyond the root of the ventral, ventral scarcely reaching the vent. Operculum very narrow; a naked space between the suborbital and lower limb of the opercle. Coloration uniform; a black spot on the end of the lateral line.

Two examples, 10 inches long, were collected by Mr. Bartlett at Xeberos.

TETRAGONOPTERUS MELANURUS, Bl.

Specimens from Surinam have the caudal fin whitish, with a broad black median band.

MYLETES DURIVENTRIS, Cuv.

D. 15-16. A. 33-34. Abdominal spines 39-48. Xeberos.

CYNODON PECTORALIS, Gthr.

D. 45-48. Xeberos.

XIPHORHAMPHUS FALCIROSTRIS, Cuv.

A. 22-27. Young, with a blackish longitudinal band. Xeberos, Pebas.

6. On the Supposed Arrest of Development of the Salmon when retained in Fresh water. By JAMES MURIE, M.D., F.L.S., F.G.S., Prosector to the Society.

(Plate XXIII.)

Introductory Remarks.—Lately there was brought to me a small fish of which the life-history is somewhat peculiar. So interesting, indeed, does it seem to me that I have not hesitated in bringing the facts of the case before the notice of this Society. I do so the more readily because it appears to me that, if it could be shown with certainty that the said fish is an undoubted *Salmo salar*, Linn., a physiological law of wide import would necessarily follow.

* I have given this detailed description of the dentition because the other species referred to *Cynopotamus* have another series of small teeth within the outer. This is another proof that *Cynopotamus* is not a distinct genus.

A number of writers affirm, and instances shall by and by be quoted where facts are adduced in proof, that Salmon-fry can be retained in fresh water alone in a healthy condition for a number of years consecutively. In these cases, so to speak, the growth has been arrested, and the fish have remained in the parr or smolt condition.

Some have even gone so far as to believe that such fishes, were they permitted to migrate to large freshwater lakes, where abundance of nourishing food could be obtained, would return to their native streams as large and full-developed Salmon.

Other scientific naturalists, on the contrary, entirely ignore the facts of such alleged cases, or at least doubt the accuracy of the observations.

The specific identification of a single specimen in the flesh, and upon which a main argument in the present paper would be satisfactorily established, is not, as some might suppose, an easy matter. When such a competent authority as Dr. Albert Günther, in his Preface to the Catalogue of the Fishes in the British Museum (vol. vi. 1866), states of the *Salmonidæ* that "sometimes forms are met with so peculiarly and so constantly characterized, that no ichthyologist who has seen them will deny them specific rank; but in numerous other cases one is tempted to ask whether we have not to deal with a family which, being one of the most recent creation*, is composed of forms not yet specifically differentiated," there is surely some ground for giving a decisive judgment with caution.

Such divergence of individual opinion and the consequent difficulty of defining specifically the varied forms of the family increase the value of faithfully recorded instances bearing upon the mooted questions.

The case presently to be related is one, it may be, involving contradiction.

History.—I am indebted to the Keeper of our Fish-house, Tennent, for the subjoined information (taken from his Note-book) regarding the receipt and subsequent hatching of Fish-ova. Our Superintendent, Mr. Bartlett, has substantiated his statement.

1. "Ova of Rhine Salmon, presented to the Gardens by Frank Buckland, Esq., on the 8th of January, 1863. These ova began to be hatched on the 20th of the month following (February)."

2. "Ova of Great-Lake Trout, received February 18th, 1863; began to hatch on the 1st of March."

3. "Another batch of Great-Lake Trout came on the 28th of February, and began to hatch on the 12th of March, 1863."

4. "Mr. Gurney presented some ova of the Common Trout upon February 20th, and these began to hatch on the 6th of April, 1863."

5. "In the same year there also was received (21st of February) some ova of Galway Salmon, which commenced hatching on the 1st of March."

6. "Furthermore, upon the 28th of February, 1863, some ova

* "No fossil true *Salmo* is known at present; the nearest fossil approaching to it is a *Mallotus*" (footnote, *ibid.*).

of Charr and of Salmon-trout arrived. The Salmon-trout began to be hatched on the 11th of March following, and the Charr commenced hatching on the 14th of March."

I am particular in noting these details, so that all possibility of error or mistake may be fully made known.

On Mr. Bartlett's and Tennent's authority I may state that each of these batches of ova, on their arrival and during the subsequent processes of hatching and of rearing, were scrupulously kept separate from each other. The different dates of arrival and of evolution from the egg further prevented confusion.

Concerning the Rhine Salmon and the Great-Lake Trout, Mr. Frank Buckland himself received these from the Fish-rearing Establishment at Huningue, near Basle. If it cannot be authenticated, it is presumed the ova were such as represented. The precise Swiss lake which the Trout were inhabitants of I have not learned.

In 1864, ova of Salmon, Great-Lake Trout, Common Trout, and hybrids between Salmon and Trout were duly added to the Society's collection. Some of these, chiefly the hybrids, never reached maturity, but were added. What did come forth were sufficiently different in size.

During the four succeeding seasons ova have been hatched in the Gardens, but in limited quantities.

Great care, however, has always been taken that the ova both of the different species, seasons, &c. should be kept separate. In fact, as the whole has been considered in the light of scientific experiments, and with the watchful eye of Mr. Bartlett over them, besides numerous observers well versed in ichthyology constantly visiting the fish-house and overlooking the experiments, there is little room left for doubt as regards the data occurring during the earlier periods of their development in our establishment.

Some of the aforesaid ova of the Rhine Salmon, successfully hatched in the Gardens in February 1863, have lived in *fresh water alone* up to the present date. Regarding these (two in number) I shall say more presently.

From a dozen to twenty in number, according to Mr. Tennent, lived between two and three years in the above condition (*viz.* in a small tank with a running stream of fresh water), and in apparent health.

After they were a year old, at the usual period of migration of true Salmon, these, then well-marked Parr, showed no uneasy disposition or tendency to escape from their tank.

In the second year some of them had slightly altered in colour, the Parr markings becoming somewhat indistinct; and a tendency to a silvery-scaled appearance ensued. But this change did not occur to all. About a third of the total number, my informant assures me, did not appear to have changed in the slightest.

About the beginning of May of that year (1865), at the season of Salmon-migration, those which had assumed a silvery dress grew restless, and endeavoured to escape by leaping over the tank they were confined in; indeed a few did spring entirely out, and died in

consequence. A net was then put over the tank to prevent a further loss of life.

The same phenomena as regards alteration in colour, and restless disposition at the annual migratory period, occurred the year following (1866).

It was further observed that those which had assumed the silvery dress in the beginning of the year again lost it in the autumn, and became distinctly Parr-marked.

During the latter part of 1866 a good many specimens died—some of those that had assumed the smolt dress, and also others that had not changed.

In 1867 the few that remained exhibited change of dress, restlessness, and leaping-propensity in the spring, as they had done in previous years.

As to their growth, this can only be spoken of approximately; for no exact measurements were taken of those that died previously to the specimen which I exhibit to the Meeting.

During the first and second years the young fish seemed to grow, and did attain a size corresponding to the young of Salmon—that is, from 3 to 6 inches long. It may be observed, however, that at the last period spoken of they particularly varied in size; in other words, some seemed to grow more rapidly or be longer than others, from the same batch of ova.

During the third and fourth years they appeared all to have grown somewhat larger; but the accession of growth was very limited compared with what had taken place the two previous years. They still varied in size, attaining, it might be, 5, 6, and 7 inches respectively.

Only two, as previously mentioned, have lived to their fifth year; these I shall presently describe, but premise this much of them—that, according to Tennent and Mr. Bartlett, they have grown little, if at all, during this last year. The words of these gentlemen are, “they have not perceptibly grown during that period.”

My inquiries as to feeding have been thus answered:—When quite young they received the yolk of egg boiled hard and broken up into small fragments; as they grew older, but in their first year, *Daphne aculeata* and suchlike water-insects, with the common blood-worm were consumed by them in quantities; raw flesh chopped up was also occasionally given them.

In the succeeding years, worms, chopped meat, fish-spawn, and the fry of minute fish have been added. They have always had abundance of fresh food, which at times has been given to them as often as from twelve to twenty times daily.

Description.—Having thus dwelt at considerable length on the history of our Salmon-culture in the Society's Gardens, I shall proceed to describe in detail two of the said young Rhine Salmon.

That which I may for convenience' sake call No. 1 (Plate XXIII. fig. 1) I now exhibit, preserved in spirits; the other, No. 2 (Plate XXIII. fig. 2), is at present alive and well in the tank in the Society's Fish-house. Both these were among the brood reared in

February 1863. No. 1 is a male (by examination); of No. 2 the sex cannot be stated.

The coloured figures best display the tints and markings; but for the sake of precision I shall describe each separately. No. 1, it may be observed, has been drawn from the dead specimen, and hence it appears paler than during life; this, however, rather increases its Salmon-like characters. No. 2 has been drawn from life (25th March, 1868). It is very possible it may shortly alter considerably; if it does so, I propose to have it figured in its change of garb*.

No. 1 (Plate XXIII. fig. 1) may be thus described:—The dorsum, from the head to the tail, is of an olive-brown, deepest in the neighbourhood of the dorsal fin. On the sides this shades into a yellow, which becomes still lighter below the median line, and almost white and silvery towards the abdomen. This is particularly the case between the pectoral and ventral fins. The upper part of the head and the snout are of a sombre hue, approaching to that of the back. Scattered along both above and below the median line are a series of bright red spots; these are absent behind the adipose fin. There are ten transverse bars of a purplish grey, deepest in colour below the median line. The two hinder bars are more or less united; and the same may be said of the anterior one, also indistinctly double and occupying the operculum and suboperculum. The iris is of a golden-yellow colour, the pupil large and black. At the root the dorsal fin is darkest; but the reverse is the case with the pectoral fins. The ventral fins are the lightest-coloured, the anal and caudal intermediate in shade. All these fins are of a neutral yellowish brown. The adipose fin is dark brown.

No. 2 has nearly similar general under-tints to No. 1, but is chiefly distinguished from it by darker markings and spots throughout the body. There are thirteen more or less distinct transverse bars, the opercular one being large and well marked. Between the root of the dorsal fin and the lateral median line a large, broad, and dark-coloured patch exists; this intermingles to a certain extent with the fifth, sixth, and seventh transverse bars. Both along the deep-brown dorsum and below the median lateral line, upon and between the transverse bars, very many small dark spots are freely dispersed. The lesser-sized red spots in this specimen are irregularly placed both upon and above the lateral line. The dorsal fin has a number of deep-coloured interradiial spots, chiefly confined to its root.

The form of the body in both specimens (the dead and the living one) is that of a Salmonoid, but not the clean plump outline of a full-grown Salmon.

* On June 30th this fish (No. 2) was carefully compared with the drawing made on March 25th; and the coloration then sensibly appeared to have become lighter and yellower. The alteration in shade, however (as Tennent, the keeper, justly pointed out), depended more on the strong sunlight than on any permanent change; for in the mornings and evenings, or when skulking in the shadow of the rockwork, the tone of colour was darker. No silvery-scaled appearance has been assumed this year.

In No. 1, which I shall further describe in detail, the greatest depth of the body is perpendicular to the front of the dorsal fin; it is somewhat less than a fourth of the length of the body (not including the head and tail). The snout is rather blunt and of about equal diameter with the eye. This last occupies one-fourth of the distance between the tip of the snout and the posterior edge of the operculum. A vertical line dropped from the middle of the eye would meet the hinder margin of the maxillary bone; the eye is 0.4 inch in diameter. The angular bend of the hinder margin of the operculum and suboperculum is gently rounded; the præoperculum is still less angular in fact. The interorbital space is slightly convex transversely and antero-posteriorly; it is as broad as the diameter of the eye. The occiput is rather prominent, and between it and the interorbital region laterally there is a slight depression.

There is complete dentition. The vomerine teeth incline to the right and left sides, and are also slightly alternate in position, although apparently only one series. The palatine teeth are more linear in their arrangement, and do not on either side extend so far back as the vomerine.

The dorsal fin has fourteen rays, the anterior two being shorter than the third. The posterior margin of the dorsal fin is nearer the adipose fin than its anterior edge is to the occiput. The adipose fin is dark-coloured, and not red as in the Trout. It is 0.8 of an inch apart from the first caudal ray. The caudal fin is posteriorly incised; the lower fork appears a little larger than the upper. Tail-rays thirty-six in number, the upper and lower or anterior ones being very short. The anal fin possesses twelve rays; its length is greater than its basal attachment; the third, fourth, and fifth rays are the longest. During life the lower corner of this fin is more rounded than our illustration depicts. Each ventral fin is about the same length as the anal (to its furthest point); but the ventral is considerably shorter than the pectoral. Its attached root is rather in advance of a vertical line from the posterior end of the base of the dorsal fin; its rays number nine. The pectorals are attached to the thoracic walls immediately beneath the opercular angle; they have thirteen rays apiece.

With respect to the number of scales, taken in linear series longitudinally and transversely to the axis of the body, to which some ichthyologists attach considerable value as a specific test among the Salmonoids, I regret that circumstances prevented me from counting them with such rigid accuracy as could have been desired. Eager to get as correct a sketch of the natural colours as possible, I left over their numeration until the artist had finished, and found that in consequence the body had got somewhat rubbed. It is merely an approximation to the truth, then, when I state there are 120 or 122 scales along, but above, the median lateral line. An oblique series from the lateral line up to the dorsal fin numbered nineteen.

No measurements of No. 2 have yet been taken; the subjoined are those of the male, No. 1. The better to compare this fish with well-authenticated specimens of young Salmon and of hybrids of

nearly equal size, I have placed alongside the dimensions of two specimens in the British-Museum collection.

Unfortunately for perfect exactness of corresponding measurements, mine have been taken in tenths of an inch, while Dr. Günther's are sixteenths, eighths, and quarters of an inch. Notwithstanding this difference in fractions, the eye is able to follow the lines of resemblance, or otherwise.

| | No. 1. | Specimens in British Museum. | |
|--|--------|---------------------------------|-----------------|
| | | a. | b. |
| Total length | 6·5 | $6\frac{7}{8}$ | $7\frac{1}{2}$ |
| Length of the head | 1·4 | $1\frac{7}{16}$ | $1\frac{9}{16}$ |
| Distance between end of snout and eye..... | 0·3 | $\frac{3}{8}$ | $\frac{3}{8}$ |
| Diameter of the eye | 0·3 | .. | $\frac{1}{3}$ |
| Length of maxillary bone | 0·6 | $\frac{9}{16}$ | $\frac{5}{8}$ |
| Length of base of dorsal..... | 0·9 | .. | .. |
| Greatest height of dorsal | 1·2 | .. | .. |
| Length of pectoral | 1·2 | .. | .. |
| Distance between root of pectoral and root of ventral..... | 1·6 | .. | .. |
| Length of ventral fin | 3·1 | .. | .. |
| Distance between root of ventral and origin of anal fin | 1·2 | .. | .. |
| Length of anal fin | 0·8 | .. | .. |

As regards the internal anatomy of the specimen No. 1, of which the bodily measurements are given above, the following points were noted:—The cæcal tubes were from 48 to 50 in number; I state both of these numbers because, although counted several times, there was difficulty, 49 being counted once, 48 a second time, and 50 a third. They were small and not well developed; greatest length of a single one 0·3 inch. The intestine beyond the cæci measured barely 3 inches long. Testes moderately developed, $2\frac{1}{2}$ inches long, milt flowed freely on being handled. Air-bladder large, long, single, and tapering behind. The vertebræ are 59 in number.

After having described our specimen, it still remains to say whether it is a Salmon or not. If not a true *Salmo salar*, then one would expect it be some other well-known form of the genus *Salmo*.

Now upon this point there is some diversity of opinion. Mr. Buckland and Mr. Bartlett aver it is, and that the whole of the brood which I have referred to as having been hatched in February 1863 are true Salmon. This view I have been myself inclined to adopt; but the opinion of Dr. Günther, than whom I know not a more scientific ichthyologist, has in some respects made me waver respecting a decision. On the other hand, it has strengthened my belief that the arrest of the growth of Salmon when retained in fresh water is a physiological fact, perfectly compatible with what we already know connected with the life-development of the Salmon.

Those who have regarded our specimens as Salmon have done so, first, because of their history; secondly, from their external markings and other outward anatomical resemblances to Salmon;

thirdly, believing in the published statements and experiments of several trustworthy authorities; fourthly, because the fact of an arrest of growth under certain conditions is one consistent with the history of the development of the species.

On the other hand, Dr. Günther expressly affirms:—First, that they are not true Salmon. Secondly, that he cannot venture to give an opinion of what species they may be. Thirdly, he suggests they are hybrids, but is ignorant of the parentage.

Now, as the whole matter is one involving laws of the highest consequence, I have endeavoured to follow out the objections as well as circumstances favourable to the assumed facts.

I trust I have now drawn attention to a question which, negatived by some, upheld by others, still requires careful observations—observations and study different from what heretofore have been given to it, inasmuch as the deductions consequent on the fact of an arrest seem to me to be of high value in elucidating, or, as Dr. Günther says, “finding a way through this vast labyrinth of variation of character in the *Salmonidæ*”^{*}.

The longer I consider the question the wider the generalization of law seems to grow. Imagine some sudden convulsion, and a river is converted into an inland lake. Would the Salmon revert to the Trout?

We can, indeed, conceive such remarkable changes. Is, after all, species dependent on the variation and changes of old mother earth? or is “natural selection” that which circumscribes the limits specifically?

These and many such problems seem wrapped up, or are in some way connected with, such strange physiological anomalies as are found in this Salmon question. To my mind they have a significance in zoological science far beyond that of mere demonstration of points indicating specific difference.

April 23, 1868.

W. H. Flower, Esq., F.R.S., in the Chair.

Dr. J. Murie read the first part of a memoir on the anatomy of the Sea-Bear (*Otaria*), founded on the animal recently living in the Society's Menagerie.

This paper will be published in the Society's ‘Transactions.’

Mr. St. George Mivart read the following notes on *Salamandrina perspicillata*, communicated to him by Prof. Lessona of Turin:—

“La *Salamandrina perspicillata* est commune aux environs de

^{*} *Loc. cit.* Preface.

Gênes. Elle abonde sur les montagnes qui environnent la ville comme un amphithéâtre. De ces montagnes coulent des petits cours d'eau sur la ville et à la mer. Les cours d'eau sont parfois des torrents pendant les orages, plus souvent ils sont à peu près secs ; mais il y a toujours dans le parcours de leur lit quelque concavité qui conserve de l'eau limpide, avec végétation, larves d'insectes, insectes aquatiques. Les montagnes ne sont pas boisées.

“ Les Salamandrines se tiennent cachées non loin des ruisseaux, sous les pierres, dans la fange humide. Elles sortent les jours pluvieux, le printemps et l'automne.

“ On ne les voit pas l'été, même pendant les pluies d'orage, qui d'ailleurs sont très-rares à Gênes dans cette saison. L'hiver elles sortent quelquefois pendant les journées belles et tièdes, qui ne manquent pas même au mois de Janvier.

“ On pourrait donc dire que la Salamandrine a une sorte de sommeil léthargique l'été, et pas l'hiver. Mais à ce propos on peut ajouter que le sommeil léthargique d'hiver des Salamandres n'est peut-être en général ni très-profond ni très-constant. Les tritons nagent dans les étangs aux environs de Turin, et les femelles ont le ventre rempli d'œufs, au commencement de Mai, même quand l'hiver à été très-rigide. Une *Salamandra maculosa* a été vue à Lanzo, localité froide dans les Alpes en Piémont, courir sur les montagnes le 8 Janvier, tandis que la neige tombait en abondance.

“ Le *Salamandrina perspicillata* donne la chasse aux fourmis, aux petites araignées, dont elle fait sa nourriture.

“ Dès les premiers jours du printemps, au commencement du mois de Mars, elle va à l'eau pour déposer ses œufs ; on trouve alors plusieurs femelles dans les ruisseaux, aux endroits où les concavités du lit maintiennent les eaux. Les premières arrivées choisissent les endroits meilleurs ; c'est à dire les parois des roches qui tombent en l'eau du côté opposé à celui par lequel les eaux s'écoulent de la concavité ; là les œufs attachés à la roche ne peuvent être entraînés par les eaux, même pendant les averses. Une fois les bonnes places prises, les Salamandrines retardataires attachent leurs œufs où elles peuvent, aux pierres, aux branches et aux feuilles sèches submergées. Très-souvent ces œufs sont emportés, en grand nombre, à la mer par les averses. Quelquefois, mais beaucoup plus rarement, il arrive que les eaux se dessèchent tout-à-fait, et les œufs sont encore perdus.

“ Les femelles seules des Salamandrines vont à l'eau ; jamais on n'y rencontre un mâle. La fécondation se fait donc hors de l'eau, et intérieurement. Les œufs pondus sont entourés de matière semblable à celle des œufs de grenouille, et présentent, sans beaucoup de différence, les mêmes modifications, sillonnement, développement, &c. Le développement de l'œuf dure de vingt à vingt-deux jours. Le têtard commence à faire quelque mouvement dès le dixième ou douzième jour, et fait des mouvements fréquents les derniers jours. A peine sorti de son enveloppe glaireuse, il tombe au fond de l'eau, épuisé, couché sur le lit du fleuve. Il reste de cette manière, sans guère se mouvoir, à peu près deux jours. Si on le touche il nage

rapidement, mais il s'arrête et retombe aussitôt. Au troisième jour il commence à se placer sur le ventre, s'attachant au moyen de ses deux appendices ventousiformes (crochets de Rusconi). Les extrémités antérieures paraissent les premières. Quand celles-ci commencent à montrer le pli du bras et la bifurcation des doigts, le petit animal s'en sert pour s'appuyer, comme certains poissons font avec les nageoires pectorales; il rampe même avec ces petits pieds antérieurs, au fond de l'eau. Si on le touche, il s'enfuit en nageant rapidement.

“Les têtards des Salamandrines sont bien plus sédentaires que ceux des grenouilles. Ils restent très-longtemps au fond de l'eau sur une pierre; ils s'élancent pour saisir une proie, quelque larve d'insecte. Ils sont franchement carnivores. La couleur de la peau de ces têtards est brune à la tête et aux flancs, jaunâtre sur le ventre, tachetée de brun.

“Au mois de Juin on trouve déjà de toutes petites Salamandrines de têtards de l'année qui ont accompli leur métamorphose. Probablement la Salamandrine n'arrive à toutes ses dimensions que l'année suivante. La Salamandrine marche assez lentement, et nage avec de grands mouvements latéraux serpentiformes. Souvent elle est entraînée par les eaux au temps de la crue. Après la ponte la Salamandrine a une mue de peau. La peau de la Salamandrine suinte, comme dans la *Salamandra maculosa*, une matière liquide; cette matière se secrète dans les mêmes conditions que la *Salamandra maculosa*, mais elle est moins abondante, et n'a pas la couleur du lait; elle paraît sur le corps de l'animal, quand on l'attrape, comme une rosée. Probablement ce liquide a des propriétés analogues à celui de la *Salamandra maculosa*. La vie de la Salamandrine est très-tenace: des individus ouverts par le ventre, les viscères arrachés, ont été vus courir sur la table.

“La Salamandrine morte ne tombe pas en putréfaction; constamment elle se dessèche comme une momie.”

The following papers were read:—

1. Notice of an interesting American Monkey living in the Society's Gardens. By Dr. J. E. GRAY, F.R.S., V.P.Z.S.

(Plate XXIV.)

The Society has just acquired a very interesting small American Monkey belonging to the genus *Mico* (P. Z. S. 1865, p. 734). It is very distinct from *Mico melanurus*, which is dark brown with a black tail, and from *Mico argentatus*, which has been considered an albino variety of the former species, and is nearly entirely white with a black tail. I have not seen either of these species alive.

The specimen now living in the Gardens is evidently not an albino, for the irides of the eyes are dark brown, and the animal shows no



M & N Hanhart imp

MICO SERICEUS



symptom of albinism, being lively, and using its eyes in the brightest daylight. It may be called

MICO SERICEUS. (Pl. XXIV.)

Fur pure white, soft and silky; legs, feet, and tail pale yellowish; ears large, roundish, flesh-coloured through the distant rigid expanding hairs, which form a double fringe on the circumference.

Three specimens of this species were obtained; but two are said to have died on the passage, and to have been thrown away: they were all alike in colour and size.

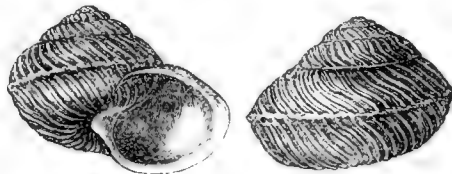
2. Description of a New Species of *Helix* from South Australia. By GEORGE FRENCH ANGAS, C.M.Z.S., F.L.S., F.R.G.S. &c.

HELIX (RHAGADA) SILVERI, n. sp.

H. perforata, globoso-conica, tenuis, plicis validis obliquis flexuosis corrugata, cretacea; spira conoidea, apice obtuso, sutura distincta; anfr. 6, convexiusculis, ultimo antice descendente, periphæria leviter carinato, basi convexo; apertura obliqua, subovali, marginibus conniventibus, callo tenui junctis, dextro tenui, acuto, expansiusculo, columellari superne expanso, reflexo, perforationem semitegente.

Diam. maj. 11, min. 9, alt. 8 lin.

Hab. The Eastern Plains, South Australia.



Helix silveri.

I have named this remarkable and interesting species in honour of Mr. S. W. Silver, to whose kindness I am indebted for specimens of the shell.

3. Notes on some of the Species of Land Mollusca inhabiting Mauritius and the Seychelles. By GEOFFREY NEVILL.

NANINA (MACROCHLAMYS) VIRGINIA, Morel.

The upper surface of the foot and the tentacles in this species are black, and the sole of the foot is of an iron-grey colour.

Mauritius. Found on shrubs and on the ground.

NANINA (MACROCHLAMYS) NITELLA, Morel.

The animal is of a saffron-yellow colour, with the tentacles black, the black being continued a short distance beyond their bases; the sole of the foot is light yellow.

Mauritius, on the Pouce Mountain. Found on the ground.

NANINA (ROTULA) CERNICA, H. Ad.

The animal in this case has the tentacles black, the colour being continued a little beyond their bases; the foot is whitish, with a band of minute white spots along the sides and on the caudal part.

Mauritius, Vacoa. Found on the ground.

STYLODON (EREPTA) CALDWELLI, Bens.

The tentacles are black, and the upper surface of the foot the same, with a narrow white streak down the middle, and one on each side starting from the lower tentacles; down the caudal part the streak is comparatively broad.

Mauritius, on the Pouce Mountain. Found always on the ground.

BULIMINUS (PACHNODUS) VELUTINUS, Pfr.

The entire animal is black, with the exception of a row of very peculiar orange-coloured nodules down the middle of the caudal part, which is very pointed. It is very strong and quick in its movements, and unusually tenacious of life. There is a variety with both animal and shell of a cream-colour (very rare), the same nodules being discernible.

Seychelles (Mahé, Praslin, and Silhouette). Found under the dead leaves of the cocoa-nut, and sometimes on shrubs.

BULIMINUS (PACHNODUS) FULVICANS, Pfr.

In this species the tentacles are of a dull purplish colour; the foot is yellow, stained, especially anteriorly, with a varying brownish purple; the caudal part, which is unusually long and pointed, has a row of minute brownish spots, not nodules, down the centre.

Seychelles (Mahé, Praslin, and Silhouette). Found at the base of the tuft of leaves of the cocoa-nut tree.

BULIMINUS (PACHNODUS) NIGER, Duf.

The entire animal is black, excepting the sole of the foot, which is of an ashy-grey colour.

Seychelles (Mahé and Silhouette). Found on a species of Palm, at a very great height only.

GIBBUS LYONETIANUS, Mke.

The sole of the foot in this species is yellow; the anterior part of the upper surface varies from reddish claret to purple, and the posterior is yellow, dotted with minute purplish spots; the tentacles are dull purple.

Mauritius.

This species, there is every reason to believe, will become extinct in a few years.

GIBBUS (GIBBULINA) BACILLUS, Pfr.

This species has the foot yellow, with a black band along the sides, which is broader on the posterior part; the tentacles are crimson.

Mauritius. Arboreal.

GIBBUS (GIBBULINA) TERES, Pfr.

The animal is nearly pure white, delicately spotted on the foot with minute pale scarlet dots; the tentacles are at first scarlet, then dull purple.

Mauritius.

GIBBUS (GIBBULINA) HOLOSTOMA, Morel.

The foot is vivid orange, with broad black bands on each side; the tentacles are orange tipped with black.

Mauritius.

GIBBUS (GIBBULINA) PRODUCTUS, H. Ad.

The foot in this species is yellowish flesh-colour, the sides being mottled with brown; the tentacles are at first dark brown, and then bright scarlet.

Mauritius.

GIBBUS (GIBBULINA) MODIOLUS, Fér.

The animal is brownish red, having the sides dark brown; the tentacles are red; and the sole of the foot is pale greenish flesh-colour.

Mauritius.

Var. FUSCUS.

The upper surface of the foot is brick-red, bordered with a dull light-brown band, narrow on the anterior, and broad on the posterior part; the sole of the foot is of a dull greenish colour; the tentacles are brown. Arboreal.

GIBBUS (GIBBULINA) STRIATI-COSTA, Morel.

The foot in this species is black, mottled with orange, and with an orange fillet round the base and down the middle of the upper surface of the posterior part; the sole of the foot is pale orange flesh-colour.

Mauritius. Found living on the ground.

This species is consistent in its colouring, and is very striking in appearance.

GIBBUS (GIBBULINA) CALLIFER, Morel.

The sole of the foot of the animal is greenish flesh-colour, the

sides black, with a pale orange streak down the middle, the posterior part being a uniform black; the tentacles are black.

Mauritius.

GIBBUS (GIBBULINA) VERSIPOLIS, Fér.

The animal in this case has the sole of the foot brownish green, the sides light orange mottled with light reddish brown, the posterior part a uniform liver-brown; the tentacles are dull red.

Mauritius.

GIBBUS (GIBBULINA) MAURITIANUS, Morel.

The sole of the foot is yellowish green, the upper surface of the foot neutral brown, shading off to a dark green and becoming yellow posteriorly; the tentacles are dull purplish brown.

Mauritius.

GIBBUS (GIBBULINA) DUSSUMIERI, Reeve.

The tentacles in this species are black; the foot iron slate-colour, with a light-grey streak down the centre both anteriorly and posteriorly.

Seychelles (Mahé, Praslin, Silhouette, and Félicité).

The colouring of the animal much resembles that of *Gibbulina callifera*, although the shell differs widely, being more like that of *Gibbus mauritanus*.

GIBBUS (GIBBULINA) PALANGA, Fér.

The tentacles in this species are dull purple; the upper surface of the foot orange closely mottled with dark olive-green, and the sole of the foot orange.

Mauritius.

GIBBUS (GONIDOMUS) SULCATUS, Müll.

The sole of the foot is yellow; the upper part has the anterior portion scarlet, and the posterior yellowish green; the tentacles are scarlet.

Mauritius.

ENNEA (GULELLA) CLAVULATA, Lam.

The tentacles are orange tipped with black; the foot is yellow both anteriorly and posteriorly, and streaked down the middle with an orange fillet; the sole of the foot is yellow.

Mauritius.

STREPTAXIS SOULEYETIANA, Petit.

In this animal the tentacles are black; the foot is ash-coloured, anteriorly stained with rufous wine-colour (varying in shade), the caudal part sometimes greenish, at others yellow; the sole of the foot the same.

Seychelles (Mahé, Praslin, Silhouette, and Félicité). Found in company with *Gibbulina dussumieri*.

It has been a matter of much surprise to me to find such distinct and consistent differences between the species that I have had the opportunity of observing alive, even where they are closely allied to one another as regards their shells; and I have found these differences of great assistance in determining them.

May 14, 1868.

George Busk, Esq., F.R.S., V.P., in the Chair.

Mr. P. L. Sclater called attention to some of the recent additions to the Society's Menagerie, amongst which were particularly noticed the following:—

1. A young Caiman from Paraguay, presented by George Wilks, Esq., C.M.Z.S., February 4th. This specimen had been determined by Dr. Gray as belonging to his species *Jacare longiscutatu**, and was of interest as indicating the true *patria* of this rare species.

2. A Smooth-headed Capuchin Monkey (*Cebus monachus*, F. Cuv.), remarkable for its large head covered with short recumbent hairs, very different from those of the *Cebi* ordinarily seen in the Society's Menagerie, where this species was believed to have never been exhibited before. The present individual had been deposited by Mrs. Pascoe Dupré Grenfell, on the 26th of February, and appeared likely to do well in the Menagerie.

3. A Thick-tailed Opossum (*Didelphys crassicaudata*, Desm.), from the Argentine Republic, presented by George Wilks, Esq., C.M.Z.S., March 5th, being a fine example of this rare species.

4. A Burrowing Owl (*Pholeoptynx cunicularia*, Mol.) from the same locality, and presented by the same donor. No sooner had this bird been placed in its cage than, true to its habits, it had excavated a hole in the soil at the bottom, into which it always retreated when threatened.

5. A Wrinkled Hornbill (*Buceros corrugatus*, Temm.) from Borneo, obtained by purchase on the 27th March. This bird differed from Temminck's figure (Pl. Col. 531) in having the ends of the tail-feathers white instead of rufous—and increased the species of Hornbills now living in the Society's Gardens to *seven* in number (Cf. P. Z. S. 1867, p. 890).

6. A male example of the Bornean Fire-backed Pheasant (*Euplocamus nobilis*, Sclater, P. Z. S. 1863, p. 119, t. xix.) obtained at the same time, and believed to be from the same locality.

7. A Spur-winged Goose (*Plectropterus gambensis*) from the Shiré River, Eastern Africa, presented by Lieut. R. M. Sperling, R.N., and of much interest as proving that this species, and not

* Trans. Zool. Soc. vol. vi. p. 164, t. xxxiv.

the allied *P. rueppelli* (Sclater, P. Z. S. 1859, p. 131), occurred in Zambesia.

8. A White-billed Parrot (*Tanygnathus albirostris*, Wallace, P. Z. S. 1862, p. 336) from Celebes.

9. A male Lyre-bird (*Menura superba*) deposited April 21st, making up a pair of this extraordinary bird now living in the Society's Gardens.

10. A specimen of the rare *Hapale argentata* (Linn.)*, purchased of a Liverpool dealer, and stated to have been received from the Amazons.

In his Catalogue of the Primates of the Paris Museum (p. 60) M. Isidore Geoffroy St.-Hilaire had treated this species as an albino variety of *Hapale melanura*. This appeared to be quite erroneous, as would be evident from the inspection of the living animal. Moreover the habitats of the two species were quite different, *Hapale melanura* being from Bolivia, and *H. argentata* from the Lower Amazons, whence it was originally brought by La Condamine.

From Mr. Bates's 'Naturalist on the Amazons' it appeared that the exact habitat of this species was the lower part of the Tocantins river in the vicinity of Cameta†. Mr. Bates had stated that it is one of the rarest of the American Monkeys, and that he did not succeed in obtaining specimens of it.

Mr. E. Blyth exhibited a skin and the head and horns of a Wild Goat obtained in Crete by Lieut.-Col. Drummond-Hay, which he considered was referable to the *Capra ægagrus* of Pallas. Mr. Blyth added some remarks on the Mouflons (*Ovis*) of the islands of Sardinia, Corsica, and Cyprus.

The following papers were read:—

1. Description of a new Species of *Sclerostoma* from the Stomach of the African Elephant (*Loxodonta africana*).
By W. BAIRD, M.D., F.R.S., &c.

In the 'Proceedings' of this Society for 1859, I described a species of *Sclerostoma* from the large intestines of a young Indian Elephant which had recently died in London, after having been only a short time in England; this species I named, from a general resemblance to the form of a Sipunculus, *Sclerostoma sipunculiforme*. Recently there died in London a young female African Elephant, *Loxodonta africana*; in the stomach of this animal Dr. Murie, who dissected it, found a number of specimens of another species of *Sclerostoma*, which he has kindly deposited in the British Museum.

* Le Mico, Buff. Hist. Nat. xv. p. 124, t. xviii. *Simia argentata*, Linn. Mantiss. t. ii. p. 521; Gm. S. N. i. p. 41; Schreber, Säugeth. i. p. 13; Wagner, Säugeth. v. p. 245. *Mico sericeus*, Gray, P. Z. S. 1868, p. 257. Pl. XXIV.

† L. c. vol. i. p. 162.

The specimens were rather numerous, but, with only one exception, were all females. When first deposited in the Museum, about two months after the death of the Elephant, the female worms were of a dark brownish-red colour, whilst the male was pure white. The colour has faded considerably by being kept in spirit; but the contrast between the two sexes was for a long time distinctly visible.

This species, which I propose naming *Sclerostoma clathratum*, is very different in appearance from *S. sipunculiforme*, is much longer and more slender; the head is much smaller both in male and female, and the caudal bursa of the male differs in structure from

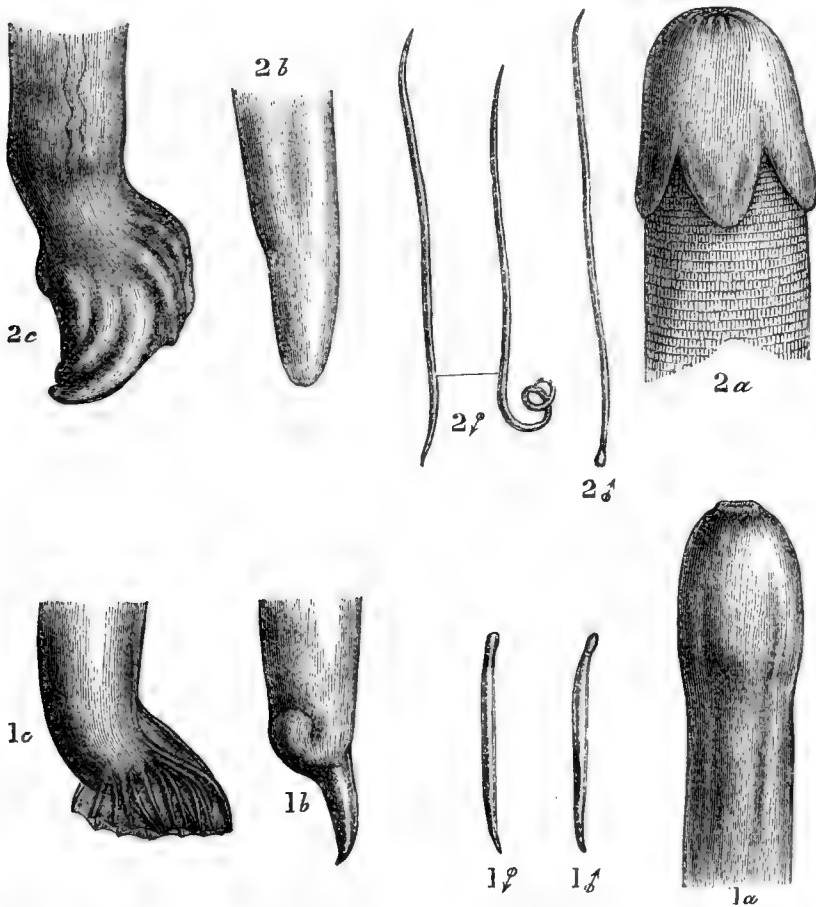


Fig. 1. *Sclerostoma sipunculiforme*, from the Indian Elephant, male and female, nat. size.

- 1 a. Head of female, magnified.
- 1 b. Tail of female, magnified.
- 1 c. Tail of male, magnified.

Fig. 2. *Sclerostoma clathratum*, from the African Elephant, male and female, nat. size.

- 2 a. Head of female, magnified.
- 2 b. Tail of female, magnified.
- 2 c. Tail of male magnified.

that of *S. sipunculiforme*. I exhibit figures of both of these species, which will show the great differences between them.

SCLEROSTOMA CLATHRATUM.

Caput corpore discretum, cylindricum, parvum; oris limbo interno dentato, limbo externo auriculato; auriculis quinque; corpus utrinque attenuatum, lineare.

Femina.—*Corpus minute clathratum, striis exilibus transversis et longitudinalibus; cauda obtusa, sæpe convoluta, apertura genitali supra apicem.*

Mas.—*Corpus longitudinaliter minute striatum, striis numerosis; bursa caudalis lobata.*

Long. fem. lin. 26, lat. lin. 1.

Long. maris lin. 24, lat. lin. $1\frac{1}{2}$.

Hab. In ventriculo *Loxodontæ africanæ*.

The head is distinctly separated from the rest of the body, and is cylindrical and small; the mouth is dentated inwardly, and on the outer edge is marked with five distinct auricles, which descend upon the upper portion of the body, but do not form a distinct part of it. The body is attenuated at both extremities and is linear in shape; in the female it is, as it were, minutely clathrate, being striated transversely with fine lines, and having the spaces between the lines minutely longitudinally striated or sulcated, giving, under a tolerably high power, the appearance of being latticed or clathrate. The tail is obtuse, not so sharp-pointed as *Sclerost. sipunculiforme*, and has the genital organs situate a short distance from the extremity; it is frequently, but not in all cases, convolute. The body of the male is longitudinally striated, and the bursa at the extremity of the tail is lobed.

The African Elephant, from which these worms were taken, was a young female which died in London in October 1867. I am not aware of any entozoa having been previously described as inhabiting the body of this species of Elephant.

2. Notes on the Pelicans living in the Society's Gardens.

By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

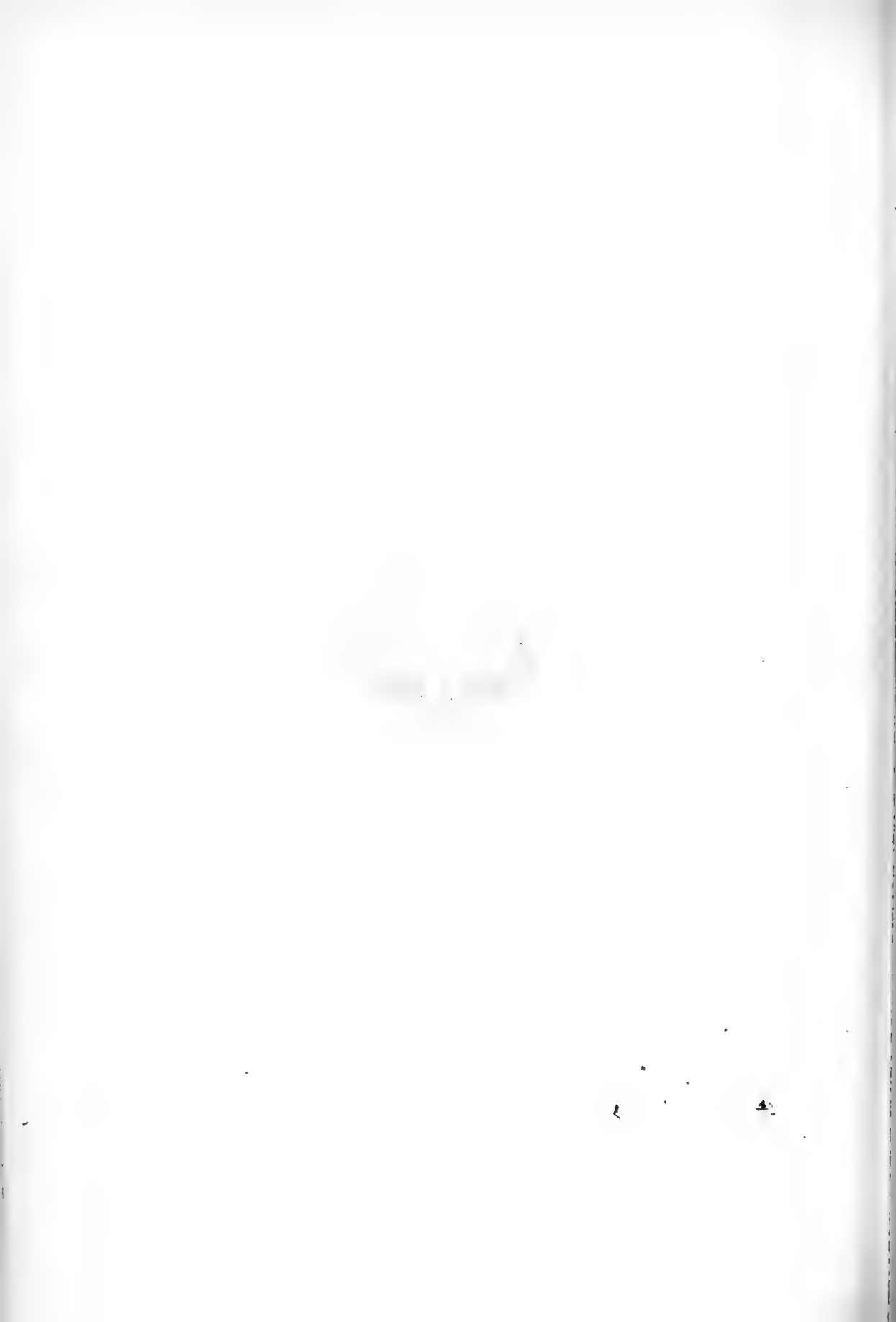
(Plates XXV. & XXVI.)

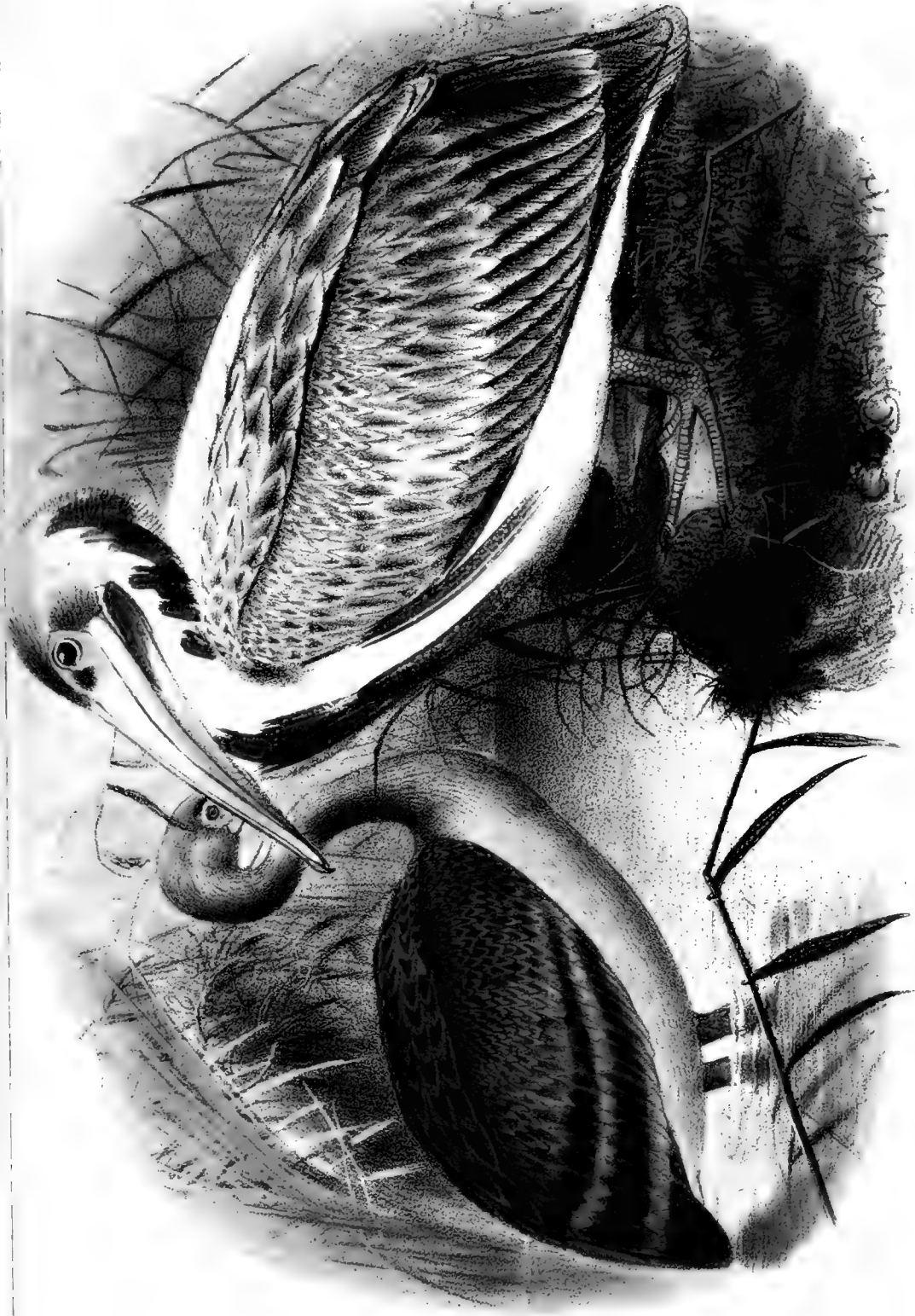
The Society's series of Pelicans has been much augmented of late years. During the present spring examples of no less than six distinct species have been exhibited, concerning which I beg leave to offer a few remarks to the Meeting.

1. PELECANUS ONOCROTALUS, Linn.

Of this well-known species two fine examples, acquired in 1851 and 1852, are in the Society's collection. Early every spring they







J Smit lith

PELECANUS RUFESCENS.

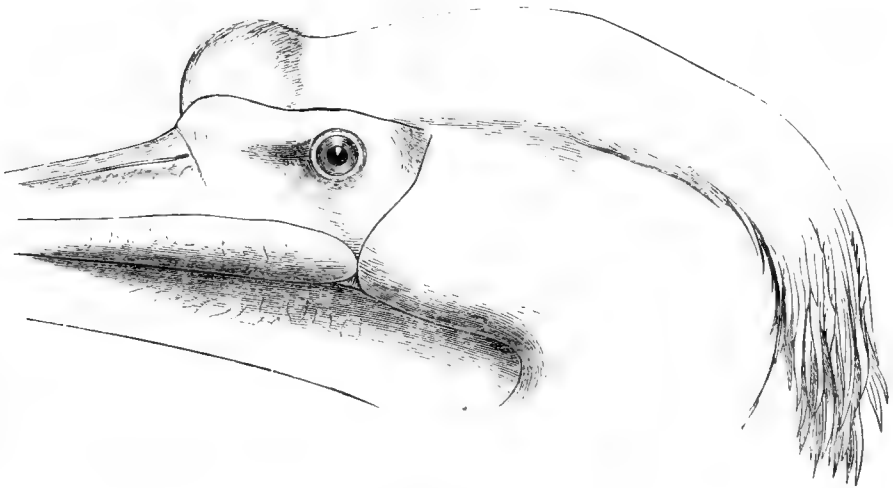
McClellan Hart. imp

put on their nuptial dress. A beautiful rosy tint overspreads the whole of the plumage, a fine large lemon-coloured patch appears upon the breast, the colour of the gular pouch becomes bright yellow, the crest attains a greater development, and the point of the bill attains a brighter crimson.

These phenomena, however, do not last very long, disappearing gradually about six weeks or two months after they have been attained. At the present date they are already passing away.

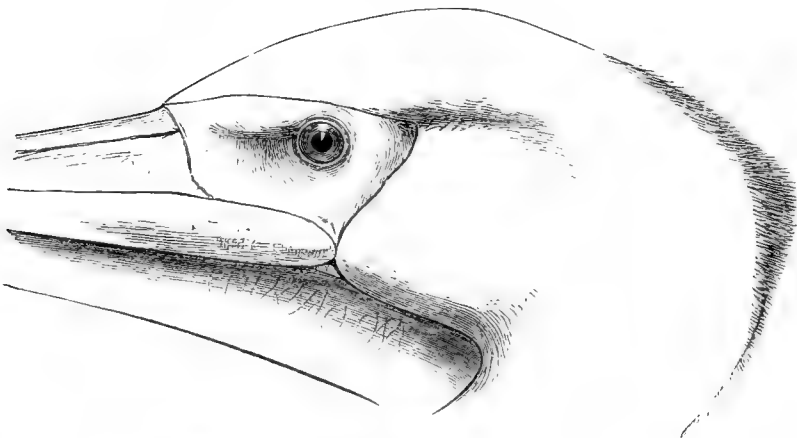
On the 3rd of February last we received from our Corresponding Member, Mr. E. T. Rogers, Acting Consul-General for Syria, a bird which I am inclined to consider the young of this species. Mr. Blyth, however, believes that this is an example of the "Large

Fig. 1.



Head of *Pelicanus onocrotalus* (adult).

Fig. 2.



Head of *Pelicanus onocrotalus* (jr. ex Syria).

Indian Crestless Pelican (the true *P. javanicus* of Horsfield), which never has a pendent crest or a tumid forehead, has narrow black margins to both the outer and inner webs of the wing-coverts and tertiaries, the bill livid blue and the throat-patch of a much deeper yellow than in *P. onocrotalus*." If Mr. Blyth's views are correct (which will be proved when the bird becomes fully adult), the range of the latter species will be extended to Syria, whence our specimen was received.

The drawings now exhibited (figs. 1 and 2) give comparative views of the head of the adult *Pelecanus onocrotalus* and the Syrian bird, showing the flattened forehead and crestless nape of the latter.

2. PELECANUS MITRATUS, Licht.

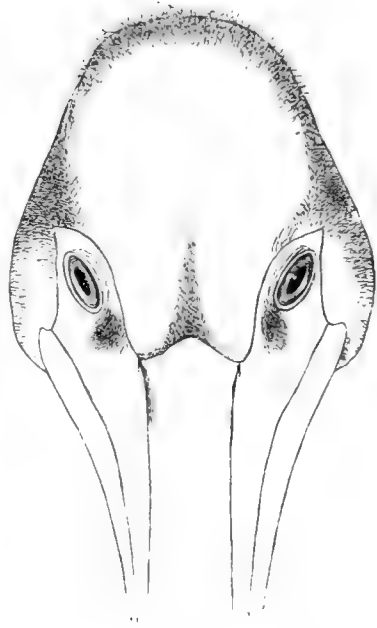
Last summer (August 6th) we received from our excellent correspondent, the Babu Rajendra Mullick of Calcutta, two white Pelicans, which (such is the confusion among the Indian species of the group) I had at first some difficulty in determining. Upon referring, however, to Lichtenstein's valuable paper on the group (Abh. Akad. Berlin, 1838, p. 433), there can be no doubt that they

Fig. 3.



Pelecanus mitratus.

Fig. 4.



Pelecanus rufescens.

are referable to his *P. mitratus* (*l. c.* p. 436), which is also admitted by Jerdon into the category of Indian birds, although stated to be rare in India. I have also little doubt that this species is the

true *P. minor* of Rüppell (Mus. Senck. ii. p. 185, et Syst. Ueb. p. 132, t. 49). It belongs to the same group as *P. onocrotalus*, having the frontal feathers produced into an acute angle between the eyes, as shown by Lichtenstein, *l. s. c. t. iii. fig. 2 a* and in fig. 4; but no one who has seen the two species alive together would deny their specific distinctness. *P. mitratus* is at once distinguishable by its smaller size, by the purer white of the whole plumage, and the long pendent crest.

Bonaparte (Consp. ii. p. 162) has united *P. mitratus* to *P. rufescens*. This is a great error*, as these birds belong to two distinct sections of the genus. In *P. mitratus* (see fig. 3, p. 266) the frontal plumes are produced between the eyes and terminate in an acute angle. In *P. rufescens* (fig. 4, p. 266), as will be seen from the sketches taken from our living specimens, these feathers terminate in a curved line which is concave towards the middle of the culmen.

On the 16th of April last we received on deposit from a London dealer a third specimen of this species, but a younger bird. It has no crest, and the smaller wing-coverts along the carpus are slightly variegated with black.

3. PELECANUS CRISPUS.

Of this bird we have a single fine specimen, purchased in September 1853, and believed to have been received from Upper Egypt.

The chief changes to be noted of this species in the breeding-season are the greater development of the crest, the brilliant orange-colour of the pouch, and a patch of lemon-colour on the breast.

Pelecanus crispus is usually considered to be the rarest species of European Pelican; but in Epirus and Western Greece it is certainly much more abundant than *P. onocrotalus*. See Lord Lilford, 'Ibis,' 1860, p. 355, and Mr. W. H. Simpson, *ibid.* p. 395.

4. PELECANUS RUFESCENS, Gm. (Plate XXVI.)

On the 18th of May 1866 we purchased of a dealer the first living specimen of this Pelican I ever saw, and, so far as I know, the first that had ever reached this country alive. It was said to have been brought from Western Africa. This bird is not yet in adult plumage; but I have thought it worth while to have a coloured figure made of it (Plate XXVI. fig. 1), as so little is known of the changes of plumage of these birds, and the only tolerable figure published (Rüpp. Atlas, t. 21) represents the adult state. It will be observed that there are as yet no signs of the rufescent tinge on the lower back depicted in Rüppell's figure. The lower back in this specimen is pure white, as is the whole of the body below; while the head above, scapulars, wings, and tail are of a mottled grey.

More recently (on the 5th inst.) we have acquired two young Pelicans from Western Africa, which are, I have little doubt, of the same species. One of these is represented in the background of the drawing (Plate XXVI. fig. 2).

* Cf. Jerdon, B. India, iii. p. 856.

The plumage is brown above, below much paler; wings and tail brownish grey.

5. PELECANUS CONSPICILLATUS.

The Australian Pelican was a desideratum in the Society's series until 1864, when one was obtained by purchase, which is still living in the Gardens. Two other specimens were presented shortly afterwards by the Acclimatization Society of Victoria, but have been lost. In this species there appears to be but little change in the breeding-season, except that the plumage becomes generally brighter and purer.

6. PELECANUS FUSCUS. (Plate XXV.)

Of this species the Society received two specimens (both males, as subsequently ascertained by dissection) from their late Corresponding Member, Capt. Abbott, in 1854. These birds lived many years in the Gardens—one having died in the spring of 1867, and the other only a few weeks since. Every year, in the month of February, they put on the fine nuptial plumage shown in the sketch now exhibited (Pl. XXV., front figure). The back of the neck becomes of a deep rich coffee-brown, with a pure-white longitudinal stripe between it and the gular sac; the gular sac itself becomes darker, and the whole plumage brighter. Some time in August this plumage is put off, and the bird appears in the more sombre colour shown in the second sketch (Pl. XXV., hinder figures).

These changes of plumage not having been well understood, I have thought it important that a record should be made of them. It appears to have been supposed by Audubon* and other writers on American ornithology that the white-necked plumage is peculiar to the female. Our observations show that this is not the case, both our males having adopted it upon the termination of the breeding-season. Whether the females ever adopt the black and white neck and corresponding changes of plumage I cannot say, as we have not as yet possessed specimens of that sex.

I will now add a few remarks upon the species of Pelican that have not yet been exhibited in the Society's living series. These are, as far as I am acquainted with the group, four, namely two American (*P. trachyrhynchus* and *P. molinæ*) and two Asiatic (*P. javanicus* and *P. philippensis*).

P. javanicus, Horsfield†, has the frontal feathers produced into an acute angle, as in *P. onocrotalus*—but never attains the pendulous crest of that species and of *P. mitratus*, having merely a short recurved crest on the nape. Several skins of this species are in the collection formed by Capt. Beavan in British Burmah.

P. philippensis is, as admitted by all authors, a close ally of *P. rufescens*; but I agree with Prince Bonaparte (C. R. xliii. p. 574,

* Birds of America, vii. p. 200.

† The bird described by Jerdon (B. Ind. iii. p. 857) as *P. javanicus* appears to be *P. mitratus*; while his *P. onocrotalus* (l. c. p. 854) is probably the true *javanicus* (Cf. Blyth, J. A. S. B. xviii. p. 821).

et Consp. ii. p. 162) in considering it distinct *rostri maculis impressis seriatim dispositis*. Several skins of it are in Capt. Beavan's collection, and appear undoubtedly different from our living *P. rufescens*.

*P. trachyrhynchus** appears to be often without the conspicuous knob on the upper mandible. Probably this striking feature is only developed in the adult male. This species is distributed in appropriate localities all over the United States, both east and west; it is also found in Mexico, and on the Pacific coast of Guatemala (cf. *Sci. et Salv. Ibis*, 1859, p. 233, et *Salvin, ibid.* 1865, p. 197). I trust that it will not be long before we acquire living examples of this species from some of our excellent correspondents in the New World.

P. molinæ (well-described in Bonaparte's 'Conspectus,' ii. p. 164, under the name *Onocrotalus thagus*) is one of the numerous excellent species that is not in the Leyden Museum, and is consequently discarded by its Director as a mere synonym of *P. fuscus*. But after examining the specimens of this bird in the British Museum, I cannot but allow, with Mr. George Gray and Prince Bonaparte, that it is an excellent species, allied to *P. fuscus*, but at once distinguishable by its larger size and darker plumage. At the same time I agree with Prof. Schlegel (*Mus. des P.-B. Pelecani*, p. 28) that *Pelecanus thagus* of Molina is a very doubtful synonym, and prefer, therefore, to adopt Mr. Gray's appellation *molinæ* for this species.

The species of *Pelecanus*, therefore, which seem to me to be well founded are ten in number, and may be divided as follows:—

- | | |
|---|---|
| a. <i>Saccus gularis minor, gulam solam amplectens.</i> | |
| a'. <i>Lora nuda.</i> | |
| a''. | Frontis plumæ projectæ, in angulum acutum antice terminantes... { |
| | 1. <i>P. onocrotalus.</i> |
| | 2. <i>P. mitratus.</i> |
| | 3. <i>P. javanicus.</i> |
| b''. | Frontis plumæ truncatæ, linea fere recta antice terminantes. { |
| | 4. <i>P. crispus.</i> |
| a'''. | Mandibula tota nuda..... { |
| | 5. <i>P. rufescens.</i> |
| | 6. <i>P. philippensis.</i> |
| b'''. | Mandibula ad basin plumosa ... { |
| | 7. <i>P. trachyrhynchus.</i> |
| b'. | <i>Lora plumosa</i> { |
| | 8. <i>P. conspicillatus.</i> |
| b. | <i>Saccus gularis major, ad collum medium descendens</i> { |
| | 9. <i>P. fuscus.</i> |
| | 10. <i>P. molinæ.</i> |

* I think it better to pass over Gmelin's name *erythrorhynchus* for this species, although prior to Latham's. The bill is not red; and Gmelin called it *erythrorhynchus* because he mistook the word "rough," applied to its bill by Latham, for *rouge*! (See Latham, *G. H.* x. p. 408.)

3. On Two New or little-known Kingfishers belonging to the Genera *Ceyx* and *Cittura*. By R. B. SHARPE.

(Plate XXVII.)

I have for the last three years devoted my leisure time to the study of the Kingfishers, with the view of publishing a monograph of this beautiful family, and I have great pleasure in announcing that the first part of my work will shortly be before the public. Mr. A. R. Wallace has most kindly lent me the whole of his collection of these birds; and it is among them that I have discovered the beautiful new species of *Ceyx* described below. The researches of Mr. Wallace have brought to light many new Kingfishers, some of which are still unrepresented in European collections. As, however, not one of them bears his name, I have very great pleasure in calling my new bird

CEYX WALLACII, sp. nov.

C. lepida, Wall. P. Z. S. 1862, p. 338.

C. affinis *C. lepida*, sed dorso toto latissime cyaneo, scapularibus nigris, et macula utrinque ad latera colli intense rufa.

Above black; head and nape spotted with cobalt, more on the latter, each feather having a central stripe of brighter blue; cheeks and wing-coverts streaked with bright cobalt; back very rich shining cobalt, the upper tail-coverts slightly tinged with ultramarine; scapularies black; wing- and tail-feathers blackish; throat whitish; a spot on each side of the base of the bill and the whole of the under surface bright orange; the characteristic spot on the sides of the neck deep rufous; a line at the base of the loreal spot, also the space between this spot and the eye, and a large patch of feathers on the side of the upper part of the breast, deep black; bill and feet coral-red; iris dark.

Length of wing $2\frac{3}{8}$ inches; bill, from front, $1\frac{1}{2}$.

Hab. in insulis dictis "Sula" maris Celebensis (*Wallace*).

This species is undoubtedly the most beautiful of the group to which it belongs. Mr. Wallace himself was fully impressed with its distinctness from *C. lepida*; and it was only by accident that it was inserted in his paper on the "Birds of the Sula Islands" (*l. c.*) as the last-named bird. Its nearest ally is certainly *C. lepida*; but it is at once to be distinguished by the cobalt instead of ultramarine (or rather violet) tinge of the blue on the head, cheeks, and back, as well as by the totally black scapularies, which in *C. lepida* are washed with bright violet. The patch of feathers on each side of the neck is dark rufous, instead of white tinged with orange, as in *C. lepida*; and there are other minor differences.

I am acquainted with the following species of the genus *Ceyx*, specimens of all of which are now lying before me.

1. *Ceyx tridactyla* (Linn.). Ex India et penins. Malayana.



2. *C. rufidorsa*, Strickland. Ex Java, Sumatra, et penins. Malay.
3. *C. melanura*, Kaup. Ex ins. Philipp.
4. *C. uropygialis*, Gray. Ex Batchian, Gilolo.
5. *C. cajeli*, Wallace. Ex Bouru.
6. *C. wallacii*, Sharpe. Ex ins. Sula.
7. *C. lepida*, Temminck. Ex Ceram et Amboina.
8. *C. solitaria*, Temminck. Ex ins. Aru et Nov. Guinea.

The next bird to which I have to draw attention is undoubtedly one of the most remarkable Kingfishers yet known. I am fortunate in having secured for my collection one out of only five specimens of it that have yet reached Europe. They were all received from the Island of Sanghier by Mr. Frank, of Amsterdam, who informs me that Prof. Schlegel proposes to name the species *sanghirensis*. I cannot find, however, that it has yet been described by the learned professor; but as the work in which it has been published may not have reached us in this country, I do not intend to create a useless synonym, and therefore introduce this beautiful bird as

CITTURA SANGHIRENSIS, sp. nov. (Plate XXVII.)

C. affinis C. cyanotidi, sed major : dorso saturatiore : fronte, superciliis, vitta lata ad latera capitis et regione oculari cum macula utrinque ad basin mandibulæ cæruleo-atris albo terminatis; tetricibus alarum saturate cæruleis; genis cum regione auriculari et gutture inferiore cum pectore superiore pulchre lilacinis violaceo lavatis.

Above dark straw-colour, lighter on the exterior edge of the scapularies, and inclining to rufous on the head; the feathers of the forehead, eyebrows, a broad band on each side of the head, and a patch of feathers extending backwards from the base of the lower mandible deep blue black, mostly pointed with white; wing-coverts deep blue black; wing-feathers blackish, the outer web of some of the feathers edged with dark blue, and the inner web whitish near the base: the innermost secondaries black, reddish towards the tip; the rump and tail-feathers deep reddish brown; chin whitish; cheeks, ear-coverts, lower part of the throat and upper part of the breast beautiful lilac, tinged with violet; lower part of the breast and abdomen pale yellowish, a little darker on the flanks and under tail-coverts; under wing-coverts whitish; bill very deep coral-red; feet red.

Length of wing $4\frac{3}{4}$ inches; length of bill, from front, $1\frac{1}{2}$ inch; length of tail 4 inches.

Hab. in insula dicta "Sanghir" maris Celebensis.

The discovery of a new species of the remarkable genus *Cittura* will be welcomed by all ornithologists. The only species previously discovered, *Cittura cyanotis* (Temm.), from Celebes, is among the rarest birds in European museums, and as yet very little known. The new *C. sanghirensis* is easily distinguished by its larger size, black forehead, and the deep blue on the wing-coverts. The broad

band also at the side of the head is blue black, instead of bright blue as in *C. cyanotis*, which also wants the white points to the feathers so distinct in *C. sanghirensis*.

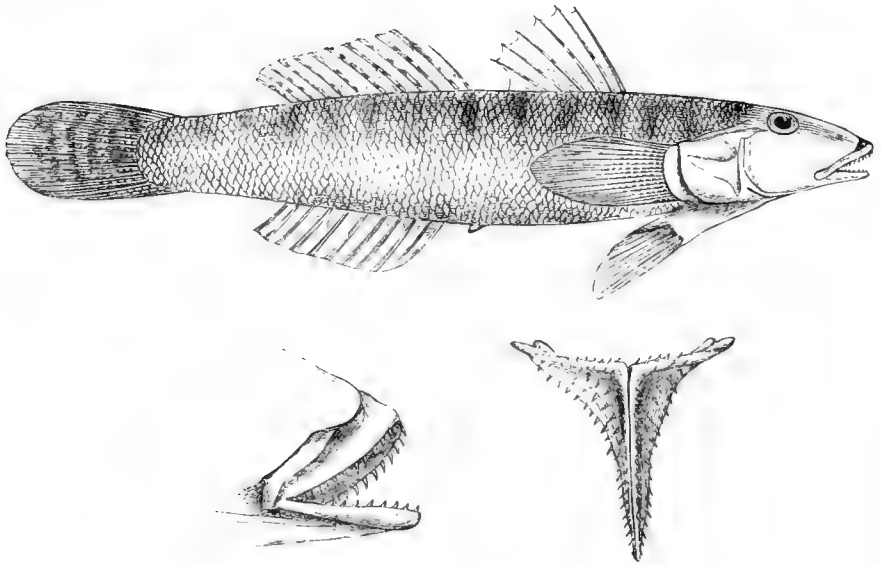
The figure has been drawn from the type specimen in my collection, and coloured from a very fine example in the Leyden Museum.

4. On a New Gobioid Fish from Madras.

By FRANCIS DAY, F.Z.S., F.L.S.

Several specimens of the following species of Acanthopterygian fish have been obtained by myself from the backwaters around Madras; some have also been received from Conjeveram through Dr. Shortt, and others from near Arcot (where they were captured by Mr. Potter).

Its characters apparently are those of the genus *Euctenogobius* of Gill, and it resembles a Goby in almost every particular; but its inferior pharyngeal bones are of a somewhat triangular shape, and with a median longitudinal suture, as in many of the Acanthopterygii pharyngognathi.



Euctenogobius striatus.

EUCTENOGOBIUS STRIATUS, sp. nov.

Coondallum, Tamil.

B. iv. D. $6\frac{1}{10}$. P. 15. V. $\frac{1}{5}$. A. 10. C. 15. L. 1. 60.
Vert. $\frac{11}{16}$.

Length of specimens from 1 to 5 inches.

Length of head $\frac{1}{4}$, of pectoral $\frac{1}{6}$, of caudal $\frac{1}{5}$, of base of first dorsal $\frac{1}{3}$, of base of second dorsal $\frac{1}{5}$, of base of anal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{6}$, of body $\frac{1}{5}$, of first dorsal $\frac{1}{9}$, of second dorsal $\frac{1}{9}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{10}$ of the total length.

Eyes directed upwards and outwards, but not prominent; diameter $\frac{1}{7}$ of length of head, nearly two diameters from end of snout, and one diameter apart.

Body subcylindrical, gradually tapering to the caudal fin; sides compressed, snout obtuse, cheeks inflated.

Head two-thirds as long as broad, no tentacles; opercles entire; gill-openings rather narrow, only extending opposite to the base of the pectoral fin, and not on to the inferior surface of the head. Mouth terminal; upper jaw slightly the longest. Lips rather thick.

Teeth tinged of a deep sienna colour, rather large and conical, in one row in the upper jaw, whilst in the lower jaw they have a fine band posterior to this external one. The outer tooth in the conical row of the lower jaw is rather larger than the others and slightly recurved. No teeth on the palate. The inferior pharyngeal bones are of an elongated triangular shape, with a median longitudinal suture, and the teeth on it are villiform. The teeth on the superior pharyngeal are in two oval patches and of the same description.

Fins. First dorsal spines weak, but without filamentous prolongations; second dorsal rays of nearly equal length. Base of pectoral fin wide. Ventrals adherent to one another, forming a sucker, the base of which is well developed; the fin is not adherent to the abdomen except at its base. Caudal rounded.

Anal papillæ well developed, and of a red colour.

Scales. Fourteen rows between the origin of the second dorsal and that of the anal fin. None on the cheeks or on the head; they are smaller over the anterior part of the body than on the sides; several rows exist anterior to the dorsal fin.

No lateral line.

Colours. Generally light fulvous, with a bluish tinge along the side, becoming dirty white below. Some irregular bands pass down from the back towards the middle of the body, whilst some thin black lines pass upwards along the abdomen opposite to the anal fin. Cheeks glossed with silver. Pectoral, ventral, and anal whitish yellow. Both dorsals diaphanous, with from five to six rows of brown dots. Caudal diaphanous, its upper half, or two-thirds, with eight or nine vertical rows of spots.

Hab. The backwaters around Madras, and tanks for at least sixty miles inland, where, however, this species is not so common as the *Gobius giuris*.

5. Observations on some of the Freshwater Fishes of India.

By FRANCIS DAY, F.L.S., F.Z.S.

I have done myself the pleasure of transmitting to the Society, by the steamer of March from Madras, nineteen living specimens of Ophiocephalidæ, commonly known in India as "Walking Fishes"*. They form a portion of Cuvier's great family of Acanthopterygian Labyrinthici, now subdivided by Bleeker, who has placed the Ophiocephalidæ, including the genus *Channa*, independent. It appears to me that this may be a good opportunity to draw especial attention to some points which seem to have been sometimes misinterpreted with reference to these and allied fishes; for, notwithstanding anatomical differences, the Ophiocephalidæ have much in common with the true Labyrinthici.

The interesting subject of the respiration of Indian freshwater fishes still needs much investigation; and I regret that at present I have not sufficient leisure to work out the required desiderata.

Most species undoubtedly respire the air in solution in the water, and find it sufficient—excepting under peculiar circumstances, when they obtain it direct from the atmosphere. But there are others, which may be called aërial, or compound breathers, which never obtain air for any length of time from the water alone, but require it direct and undiluted, no matter how cool or charged with air the water may be, and if unable to inhale atmospheric air are simply drowned. Those who keep aquaria in India can easily detect these different methods of respiration. In the Carp (*Puntius*), for instance, the mouth is frequently opened, and the gills are in constant motion, whilst they rarely rise to the surface, unless they are ill, or the water is either very hot or vitiated. The reverse is seen with some of the Acanthopterygians and a few of the Loaches and Siluroids, which do not move their gills so much in dirty water as in clean; and if the water is what they are accustomed to live in, viz. muddy, or even filthy, the gills are comparatively at rest: but these fishes may occasionally be seen rising slowly to the surface, where they discharge a bubble of air, and then sink down again. This bubble has probably had some of the oxygen removed from it, and is thus rendered unfit to support respiration. Dr. Carpenter† in Europe has observed that in some "fishes, especially such as inhabit small collections of fresh water, whose temperature is liable to be considerably raised during the heat of summer, the mucous lining of the alimentary canal appears to serve as an additional organ of respiration; for such fishes are frequently seen to rise to the surface and swallow air, which is subsequently discharged by the anus, with a large quantity of carbonic acid substituted for its oxygen. This is the case, for example, with the *Cobitis* (Loach); and it would seem as if under these circumstances some such supplementary means is required for

* Of these, six (*Ophiocephalus gachua*) arrived alive on the 21st of May, but not in good condition, and died very shortly afterwards. See Appendix.—P. L. S.

† Principles of Comparative Physiology, ed. iv. 1854, p. 324.

carrying on the respiratory process with unusual activity." This occasional swallowing of atmospheric air is also perceptible when the water becomes foul, or when the amount of air in it appears to be almost exhausted by its inhabitants; for instance, in three days in May 1867, the heat of the atmosphere and of the water in an aquarium at Madras was as follows:—

| | 8 A.M. | | 12 A.M. | | 2 P.M. | |
|----------|--------|--------|---------|--------|--------|--------|
| | Air. | Water. | Air. | Water. | Air. | Water. |
| May 26th | .. | .. | 98° | 97° | 90° | 88° |
| „ 27th | 89° | 87° | 91° | 89° | .. | .. |
| „ 28th | 90° | 87° | 92° | 89° | .. | .. |

Yet notwithstanding this heat the contained fishes did well, although they swam near the surface to obtain more oxygen, and sometimes appeared even to take in atmospheric air directly. Native fishermen maintain that the middle of the day is the best time for netting freshwater species, as they are then near the surface, no doubt from the heat of the water, and its consequent deficiency of air.

In India, instead of discharging the previously inhaled air by the anus, the fish appear to do so by the mouth; at all events the compound breathers adopt this process. Sometimes they do not emit any bubble, but seem only to take in air, whilst at other times the bubble is discharged at the bottom of the water; this is especially apparent after they have taken food. The purely water-breathers, if the term is admissible, can live without rising to the surface, unless under peculiar circumstances, whilst the compound breathers, as already mentioned, expire in a longer or shorter period if unable to reach the atmospheric air. The difference between the respiration of the compound breather and that of the water-breather is very apparent when they are lying side by side on the moist sand at the bottom of an aquarium. For instance, the *Macrones tengara* keeps its gills in constant excited motion, while the *Ophiocephalidæ* scarcely move theirs, but at intervals rise to the surface, open their mouths, and take in air. This latter phenomenon, viz. breathing the air pure, and not subsequent to its solution in the water, is especially apparent in some species, such as the *Polyacanthus cupanus*, Cuv. & Val., which dart up suddenly to the surface, descending again as rapidly into the rockwork in which they delight to make their home, and where they keep all other species at bay, and even fight amongst themselves for the possession of a coveted corner. Loaches (of the genus *Platacanthus*) also ascend in a similar manner to obtain air. The earliest observation on this peculiar mode of respiration which has fallen under my notice is made by Dr. Garden*, M.D., F.R.S., in a letter from Charles Town, South Carolina, dated August 14th, 1774, where he states, respecting the Electrical Eel, that its pectoral fins seem to be chiefly used for supporting and raising the fish's head when he wants to breathe, which he does every four or five minutes, by raising his mouth out of the water. With reference to

* Philosophical Transactions of the Royal Society of London, 1775, vol. lxxv. p. 102.

the *Callichthys asper*, it is stated that in the marshes of the Savannahs it dives into the swampy ground and is captured by making holes in the grass and digging in the mud beneath*, evidently from the Indian fishermen being aware of the fact of the fish rising to obtain air. Sir R. Schomburgk, in his 'Fishes of Guiana,' states that the *Callichthys littoralis* (*C. subulatus*, Cuv. & Val.) can exist in muddy lakes without any water whatever, and is sometimes dug up from such situations.

Mr. Boake, in an interesting paper†, makes some remarks on his experiments with reference to the respiration of fishes. Having divided his specimens into what he terms air-breathers and water-breathers, he made a diaphragm of net which he placed horizontally across the centre of an aquarium full of water so that the fish could not rise to the surface to obtain air. He found that the water-breathers were unaffected by this circumstance, while the air-breathers all died in a shorter or longer time.

Dr. Jerdon, who kept some of the Climbing Perch (*Anabas scandens*) in an aquarium, observes that they were in general very sluggish, but every now and then rose slowly near the surface of the water, then made a dash to the top, and down to the bottom again with all speed‡. This was unquestionably done to obtain atmospheric air.

Mr. Boake gives the following account of capturing fishes in Ceylon, where he found men and cattle moving about in the rank grass growing on the surface, and fishes inhabiting a watery, muddy, intermediate locality between the surface and the earth, the intermediate fluid, or diluted mud, being as thick as pea-soup. The fishes were detected in this fluid by the emission of bubbles of air when they rose to the surface to breathe. But the description is so interesting that I trust it may not be deemed too long to give in full.

"When the swamp is in a proper state for such operations, viz. when the water is neither too high nor too low, and the surface is covered, as I have described, with a firm sod with two or three feet of diluted mud beneath it, a native goes out at night when the air is still, and, walking through the swamp, listens for the peculiar sounds which the fish make in breathing. Having selected a part in which these sounds are heard so frequently as to afford a prospect of catching a considerable number, he proceeds to remove the sod from a few circular patches, each about three feet in diameter, in those places in which there already exist small holes in the sod, which the fish frequent for the purpose of breathing. When that is done he returns home for the night. I did not think it necessary to be present at the nocturnal part of the operations, but I accompanied the fishermen the following morning to the spot which he had prepared during the previous night, and I found it a most laborious effort to make my way over the treacherous surface, although the natives appeared to traverse it without any difficulty. When we reached the fishing-ground, operations were commenced by making a kind of

* Cuv. & Val. 'Hist. Nat. des Poissons,' vol. xv. p. 311.

† Journal of the Ceylon Branch of the Asiatic Society, 1865.

‡ Madras Journal of Literature and Science, vol. xv. 1818, p. 144.

enclosure, to cut off from the rest of the swamp that portion in which the circular patches had been cleared of sod the night before. This was done by breaking the sod in a narrow line encompassing the space which it was intended to enclose, and trampling a portion of it down to the more solid mud at the bottom. The long grass which is thus carried down makes a kind of fence, which is supposed to confine the fish, but which one can hardly suppose to be very efficacious, as they would have but little difficulty, if so inclined, in making their way through it. When this is done, the diluted mud in the holes that have been opened overnight is thickened by mixing it with some of the more solid mud, or peat, scooped up from beneath. Some of the long grass which grows on the surface is then laid over the thickened mud in two strata, the stalks of which the one is composed being at right angles with those composing the other. The whole is finished off with a coating of mud. Nothing then remains to be done but to watch for the appearance of the fish. The first indication of their presence is the rising of bubbles of air; and in each instance when these bubbles appeared, the natives who were standing by named correctly the species of fish by which they were emitted, being guided probably by their size and by their coming up singly or in larger numbers. After a bubble of air has appeared but a short time elapses before the head of a fish appears protruding above the surface of the mud. There is no difficulty in securing a fish when he shows himself in this way, as the blades of grass which have been arranged so as to cross each other beneath the surface of the mud form a net through which he cannot easily force his way back. I remained watching the process for about an hour, during which I saw eleven fish taken, and the natives told me that as the day advanced larger fish would be caught and in greater numbers. None of those I saw taken were large. They were of three species, *Connia* (*Ophiocephalus kelaarti*), *Magoora*, and *Hoonga* (*Clarias taysmanii*). It is obvious that this mode of catching the fish is entirely based upon the fact that they cannot breathe water, but are forced to ascend at stated intervals to the surface to breathe atmospheric air—a fact which I afterwards verified by drowning two or three specimens by inverting a net over them. . . .”

In 1866, when engaged in carrying out my experimental introduction of fishes from the plains on to the Neilgherry Hills, my attention was drawn to certain peculiarities in the respiration of the *Ophiocephalidæ* and some other genera; but it has only been recently that I have been enabled to make the following series of experiments, which, I trust, may, in conjunction with the preceding observations, assist in elucidating the question of the respiration of at least a few species. In the transportation of the *Ophiocephalidæ* I found that if mud were mixed with the water they did well, but if the water were pure they died. The solution of this is that the muddy water does not pass through their branchiæ as they respire air direct, whilst the muddy state of the water decreased the amount of agitation they were subjected to in clear water.

Experiment No. 1.—Three of the *Ophiocephalus punctatus*

(Bloch), of the respective sizes of $5\frac{6}{10}$, $4\frac{2}{10}$, and $3\frac{5}{10}$ inches in length, were placed at 6.30 in the glass globe of a hanging lamp measuring 10 inches across and 12 inches deep; this was filled two-thirds full of fresh water, the temperature being 75° Fahr. A diaphragm of net was then stretched tightly across the diameter one inch below the water, thus effectually preventing the fish from rising to the surface to obtain atmospheric air. At the end of four minutes they all became excited, and pushed vigorously against the net, which, however, they did not succeed in breaking. They continued at intervals to make these ineffectual efforts, but at 8.1 a.m. the smallest sank down and died, at 8.2 a.m. the medium-sized one, and at 8.8 a.m. the largest. Thus the largest and strongest only lived one hour and twenty-eight minutes when deprived of direct access to atmospheric air. On opening their gills under water and pressing the branchiæ no air escaped from the cavity.

Experiment No. 2.—To prove satisfactorily that death did not ensue either from deleterious properties in the water or from the exclusion of air by the diaphragm, three more were placed at 8.45 a.m. in the same vessel in which the others had died, the water not having been changed; it was covered over with the same diaphragm at about an inch *above* the water. The temperature was then 76° , at 11 a.m. 76° , 12 a.m. 80° , 4 p.m. 78° , 6 p.m. 78° , 10 p.m. 78° ; and, to prevent recapitulation, it may be as well to state that these temperatures, unless otherwise specified, prevailed throughout these experiments. But in this case the fish, being able to reach the air, did well and were taken out the next day, after they had been left in the same water for 24 hours.

Experiment No. 3.—Three specimens of Siluroid water-breathers (*Macrones tengara*) were placed in the same globe similarly prepared as in the first experiment. After 25 hours they were as lively and well as when first put in. It was impossible for them to have obtained atmospheric air direct; but they swam as near the surface as the diaphragm would permit, which may easily be accounted for by the great heat of the water, and the comparatively small amount of fluid contained in the globe. Subsequently this experiment was tried with some Cyprinidæ, two specimens of *Puntius stigma* (Cuv. & Val.), one of *Amblypharyngodon jerdoni*, all water-breathers, and three Loaches (*Platacanthus agreensis*). The water-breathers remained unaffected; but the Loaches died in eight hours. This genus of Loaches have a receptacle for air in the first vertebræ, which circumstance was overlooked when I first described them*.

Experiment No. 4.—Three more specimens of *Ophiocephalus punctatus* were placed in some wet grass in an earthen vessel, in which they were kept for upwards of three hours, or double the length of time it took to drown those excluded from atmospheric air and thus compelled to breathe water only. At the end of this time they were all alive and healthy.

Experiment No. 5.—Another specimen of the *Ophiocephalus punctatus* was held under water, and as much air as possible evacuated

* Proc. Zool. Soc. 1865, p. 298.

from the receptacle by pressing upon the superior branchiæ. Most of the air was discharged, and the specimen was placed, like the others, under the diaphragm. But death did not ensue; it remained in a sluggish state for seven hours at the bottom of the globe, not even attempting to rise and obtain air. At the end of this time another fish was placed in the same globe without having had the air removed from the receptacle, whilst the first specimen, without being allowed to rise to the surface, had the gills opened, and the whole of the air (if there was any) remaining in the cavity abstracted by means of a syringe with a long pipe. The new arrival appeared to arouse the previously dormant fish into activity, and they both dashed wildly about, but died within two hours. The exertion no doubt caused excitement of the circulation, necessitating a larger supply of air. On opening their gills under water no air escaped, thereby proving that it is not generated beneath the water.

Experiment No. 6.—A bandage was stitched pretty tightly around the head of another specimen of the same species at 8 a.m., so as to entirely prevent its opening its gills, care having been taken not to obstruct its eyesight. It was then placed in a globe of water; but this process did not appear to inconvenience it in any way, and after submitting to it for 24 hours, it was as lively as possible. In this case it was impossible that the gills could have been opened; the fish, therefore, must have sustained life by aërial respiration.

Experiment No. 7.—The same fish, without the bandage having been removed, was, after the lapse of this time, viz. 24 hours, placed in water beneath a diaphragm, in company with another which had been in the same vessel with it all the previous day. In the space of half an hour the bandaged fish died from being unable to pass water through its gills. After death the cavity contained no air. The other specimen lived for 17 hours in a sluggish state, rarely moving at the bottom of the globe, showing, as in experiment No. 5, that these fish can live in a *quiescent* state for some time in water although aërial respiration is precluded, and that they must therefore be able to take in a certain amount of air from the water by means of their branchiæ, although not in sufficient quantity to support life for more than a limited period.

Experiment No. 8.—A bandage was stitched round the head of a *Macrones tengara*, a water-breather, in the same manner as in the last experiment. It died in 34 minutes; but in this instance the gill-opening could not be entirely closed, owing to the serrated pectoral spine being beneath it.

Experiment No. 9.—A specimen of *Ophiocephalus punctatus* was placed in a dry cloth at 9.55 a.m., and left without any moisture, the temperature being at 76° Fahr. It lived until 1.20 p.m., occasionally opening its mouth and taking in air. At 12.15 it was able to move across the table, whence it fell on to the ground, and was only picked up after it had proceeded several feet across the room. This fall in its dry state may have injured it and hastened its death. At all events it lived entirely without moisture for three hours and twenty-five minutes; and it is doubtful whether it did not

survive even longer, as when it had been seven hours out of water it was opened, and the heart was found still pulsating, although the body was as hard and stiff as a piece of board from the mucus which had exuded and dried over it. A specimen of the *O. striatus*, 18 inches long, was wrapped up alive in a dry cloth and locked in a close cupboard, where it lived for 16 hours.

Experiment No. 10.—As these fishes had been proved to live for some time altogether without water, and again in water when unable to pass it through their gills, it appeared probable that the inhalation of chloroform would affect them. Therefore, at 9.30 a.m. an *Ophiocephalus striatus*, of upwards of a foot in length, was placed in the glass globe of a hanging lamp, the top of which was covered over by a thick towel; ten drops of chloroform were then administered, and repeated every minute for five doses. After half a minute the fish made snatches at the air several times in succession, after which it remained in a quiescent state for four and a half minutes, when, after the last ten drops had been administered, it became very excited, and sprang about as if greatly distressed. But it soon sank down, and rapidly became more and more comatose, until at the end of thirteen minutes from the commencement of the experiment it was in a perfectly motionless state, and in that condition was thrown into a tub of cold water, the fluid being only two inches deeper than the height of the body of the fish lying flat. Here it remained on its side (only jumping up once), giving out bubbles of air, and moving its pectoral fins backwards and forwards, at first rapidly and then gradually slower and slower, until its death, which occurred 27½ minutes from the commencement of the experiment. There was no movement of the gills whatever; and immediately after death the chest was opened, and the heart was not found pulsating, but full of very dark blood; on being touched it contracted sluggishly.

Experiment No. 11.—Wishing to collect some of the air contained in these receptacles, a specimen was held under water, and by means of pressure on the superior branchiæ all the air was discharged. Each time the operation was repeated the fish, immediately on being released, ascended to the top and took in a fresh supply of air; and the same thing occurred when it was held in the hand and lifted out of the water. In each instance after this aerial respiration air was found in the previously emptied cavities. When these fish are feeding, small bubbles of air are almost invariably discharged through the mouth, probably from the cavity, each time they swallow, and they arise almost immediately to inhale more.

Experiment No. 12.—A number of these fishes were placed in a tub with a small amount of water and plenty of common grass. No other food was allowed them; but at the end of three weeks they were perfectly well and lively.

Before drawing attention to the conclusions to be deduced from these phenomena, it may be as well to refer briefly to the opinions previously advanced by others. Commerson considered the labyrinthiform cavity in the *Osphromenus* intended for the purposes of smell, and therefore named it *Osphromenus*, and the species was

for the same reason termed *olfax*. Cuvier observes of his Labyrinthici that the superbranchial cavities are qualified to contain a certain amount of water, somewhat like the spongy stomach of a camel*. Owen says that "Accessory respiratory organs, acting chiefly as a reservoir or filter of water, are developed from the upper part of the pharynx in the climbing perch (*Anabas scandens*) and allied fishes of amphibious habits"†. Günther, with reference to this, states that the Labyrinthici "appear to contain, or to collect, a small quantity of water in the cavity in which the superbranchial organ is situated"‡, and that the "Ophiocephalidæ have a cavity accessory to the gill-cavity for the purpose of retaining water in it"§.

Following these and other authorities, it had appeared to me that this cavity was for the retention of water, to enable the fish to travel on dry ground by moistening the gills, and thus obtaining oxygen from the atmosphere. But having now had opportunities of personally investigating the question, I have drawn the following conclusions:—1st, that these fishes died, when deprived of access to atmospheric air, not from any deleterious properties either in the water or in the apparatus used, but from being unable to subsist on air obtained solely from the water, aerial respiration being indispensable; 2nd, that they can live in moisture out of water for lengthened periods, and for a short and variable time in water only; lastly, that the cavity or receptacle does not contain water, but has a moist secreting surface, in which air is retained for the purposes of respiration; and it seems probable that this air, after having been employed for this purpose, is ejected by the mouth, and not swallowed to be discharged *per anum*.

Some of the venous blood appears to be oxygenated at the gills, and the remainder in the cavity above the gills by means of air; but if the fish be kept under water without air, this cavity, which is surrounded by bony tissue, becomes filled with water, which cannot be discharged, owing to its almost non-contractile powers. There is thus no means of emptying it, and the water probably becomes carbonized and unfit for oxygenizing the blood, so that the whole of the respiration is thus thrown on the branchiæ. This will account for the fact that, when the fish is in a state of quiescence, it lives much longer than when excited, whilst the sluggishness sometimes evinced may be due to poisoned or carbonized blood.

A good example of an air-breathing fish is afforded by the singular-looking finless snake-like eel, the *Symbranchus cuchia*, Ham. Buch., in which respiration is carried on in a receptacle above the branchial arches on each side of the head—a discovery which was made many years ago by Dr. Taylor at Dacca. It is found in the Indian marshes, lurking in holes; and the following remarks are made by Professor Owen on its respiratory apparatus|| :—"The second branchial arch supports a few long fibrils, and the third a simple lamina, fringed

* Cuv. & Val. vol. viii. p. 323.

† Lectures on Comparative Anatomy, 1866, vol. i. p. 487.

‡ Catalogue of Fishes, vol. iii. p. 372. § Ibid. p. 468.

|| Anatomy of Vertebrates, 1866, vol. i. p. 487.

at its edge; the first and fourth arches have not even the rudiment of a gill. The branchial function is transferred to a receptacle on each side of the head above the branchial arches, covered by the upper part of the opercular membrane; these receptacles have a cellular and highly vascular internal surface; the cavity communicates with the mouth by an opening between the hyoid and the first branchial arch, and receives its blood from the terminal bifurcation of the branchial artery, and also from the different vessels of the rudimentary gills. Those from the supplemental lung-like vascular sacs are collected into two trunks, which unite with the posterior unbranched branchial arteries to form the aorta. Thus about one-half of the volume of the blood transmitted from the heart is conveyed to the aorta without being exposed to the action of the air."

Those who have seen these fish captured will scarcely admit their being usually sluggish. They lie about the sides of ponds in the grass, and are taken by means of baskets which the natives thrust down over them, when they can get near enough; but before this is accomplished there is almost invariably an exciting chase, as they are very active in their movements.

Much of the great tenacity of life for which many of the Indian freshwater fishes are famed is, no doubt, owing to their capability of respiring atmospheric air. As an instance of this may be adduced the *Anabas scandens*, which the fishermen in Calcutta are known to keep four or five days in earthen pots without water, using daily what they require, the fish being as well and lively as when caught. In fact the Calcutta market appears to be chiefly supplied with these fishes from extensive marshes in the Yasur district, and about 150 miles distant, whence boat-loads are brought and kept alive without water until sold*. In experiments made with these fish at Cochin, I found that they would live without moisture for about 24 or 26 hours. In India the majority of inland Acanthopterygians are compound breathers—as, for example, the whole of the hollow-headed fishes, as well as many Siluroids and some of the Loaches. This method of respiration appears to be a wise provision of nature, to enable the fish, during periodic dry seasons, to migrate from pond to pond in search of water in which their natural food still exists.

The possession of the means necessary for locomotion on land, combined with those for aerial respiration, frequently leads to their sudden appearance in unexpected places, and has given rise to numerous arguments and theories—amongst them spontaneous generation, vivification of buried ova, migration, falling from the clouds, &c.

Many instances of the migration of fishes by land, from one piece of water to another, have been recorded. On the commencement of the rains in the east, the fish become very excited and disturbed, ascending small streams, &c., and, apparently dissatisfied with the waters they inhabit, restlessly seeking other localities. This may be due to the same instinct which causes the migration of marine

* Hamilton Buchanan, 'Fishes of the Ganges,' p. 99.

fishes, and the annual visit of the Salmon to the sea, or else from a necessity of obtaining a suitable situation in which to deposit their ova. It is generally at this season that fish are seen travelling on land. By this means it may be imagined that plains only occasionally covered by water become populated with fish after a heavy fall of rain. Amongst authorities testifying to having personally witnessed this migration is Mr. Morris, the Government Agent at Trincomalee, who, in an interesting letter to Sir Emerson Tennent on this subject in 1857, states, "As the tanks dry up the fish congregate in the little pools, till at last you find them by thousands in the moistest parts of the beds, rolling in the blue mud, which is at that time about the consistence of thick gruel. As the moisture further evaporates, the surface fish are left uncovered, and they crawl away in search of fresh pools. In one place I saw hundreds diverging in every direction from the tanks they had just abandoned to a distance of fifty or sixty yards, and still travelling onwards. In going this distance, however, they must have used muscular exertion sufficient to have taken them half a mile on level ground, for at these places all the cattle and wild animals of the neighbourhood had latterly come to drink, so that the surface was everywhere indented with footmarks, in addition to the cracks in the surrounding baked mud, into which the fish tumbled in their progress. In those holes which were deep, and the sides perpendicular, they remained to die, and were carried off by kites and crows. My impression is, that this migration takes place at night or before sunrise; for it was only early in the morning that I have seen them progressing, and I found those I brought away with me in chatties appeared quiet by day, but managed to get out of the chatties at night. Some escaped altogether; others were trodden on and killed"*.

Many others, both Europeans and natives, have added their testimony to these migrations, which they have personally observed. Sir John Bowring, in his work on Siam, observes, with reference to the river Meinam, that he was amused by the novel sight "of fish leaving the river, gliding over the wet banks, and losing themselves amongst the trees in the jungles"†. And in another part of the same work he says that the very sandbanks of the Meinam were full of life, and a "sort of amphibious fish were flitting from the water to be lost amongst the roots of the jungle wood"‡. He also quotes from Bishop Pallegoix§, that some of these fishes will wander more than a league from the water||. The *Anabas scandens* is able to travel short distances on land, and has been seen to do so by many Europeans,

* Sir Emerson Tennent, 'Ceylon,' vol. i. p. 215.

† Kingdom and People of Siam, vol. i. p. 10.

‡ Ibid. vol. i. p. 392.

§ Description des Royaumes Thai ou Siam, 1854, vol. i. pp. 193, 194.

|| Pallegoix mentions that there are three species of what he calls these "Wandering Fishes," termed *pla-xon*, *pla-duk*, and *pla-mo*; but, from the absence of scientific data, they have not been identified. The *pla-xon* he describes as about the size of a Carp, very voracious, and abundant. It is exported to China, Singapore, and Java, and considered particularly wholesome as food.

especially in the early morning when the dew is on the ground. Mr. E. L. Layard once encountered a number of "Perch-like fish," probably the *Anabas*, travelling along a hot and dusty gravel road under the midday sun. This migrating propensity of some of the freshwater fishes of the East was no secret to the ancient Greeks, who frequently commented upon it; and although their statements were disbelieved by the Romans, subsequent authors corroborate their testimony on these points. In Europe it is well known that Eels leave the water at certain periods, and, in fact, that the great difficulty in the conservation of Eels arises from the trouble of restricting them to the ponds in which they were originally placed; also in the West Indies there are instances of fishes migrating or travelling by land. Dr. Hancock gives an account of the Flat-headed Hassar (*Doras hancockii*), which, when the tanks dry up, proceed in large droves, sometimes travelling an entire night in search of other water. Mr. Campbell, a friend of Dr. Hancock's, on one occasion saw a number of these fish thus marching onwards. The Indians assert that they carry a supply of water with them for the journey. They appear to possess great tenacity of life out of water, even when exposed to the heat of the sun; and their bodies exude moisture, as they are described as being very difficult to dry, and becoming moist again almost immediately*.

Another instance may be given in the *Doras crocodili*† (Humboldt), which was seen by this author advancing by leaps over the dry ground, supporting itself on its pectoral fins. Another specimen was said to have climbed a hillock of sand 20 feet in height. Again, the genus *Callichthys*, also inhabiting warm countries, is stated‡ to have great tenacity of life out of water, which enables it to seek other water when that in which it lives dries up.

Marvellous accounts of the climbing-propensities of the *Anabas scandens* have been extant from the earliest times. In the ninth century, two Mahomedan travellers left a record of what they observed in India§, and mention a sea (estuary?) fish which, leaving its natural element, climbed cocoa-nut trees (toddy palms?), and drank the juice of the plant. This idea was again revived by Lieut. Daldorf in 1791, who stated, in a letter to Sir Joseph Banks||, that he had observed this fish five feet from the ground on the stem of a palmira tree. Kirby¶ rather improves upon this by stating that they climb in pursuit of certain crustaceans which form their food. In Malabar and elsewhere the natives believe that it possesses this extraordinary power; and its Tamil designation is in consequence *panniari*, or "climber of palmira trees." Mr. Layard also mentions** that, on questioning some fishermen as to the reason why the staked enclosures for catching fish were covered with net-

* Zoological Journal, No. xiv.

† Cuv. & Val. vol. xv. p. 287.

‡ Ibid. p. 295.

§ Translated by M. Reinaud.

|| Linnean Transactions, iii. p. 62.

¶ Bridgewater Treatises, vol. i. p. 144.

** Magazine of Natural History, 1823, pp. 390-391.

ting, they told him that otherwise some of the fish would climb up the stakes and get out. It has been surmised that the species here alluded to was the *Anabas*; but nothing has been definitely ascertained, and it is probable that it may have been a *Boleophthalmus*, as the *B. boddaerti*, common on the coasts of India and Ceylon, is quite capable of crawling along stakes. Neither the *Anabas* nor the Ophiocephalidæ can be kept in an aquarium unless the top is covered over, as, even when the water is a foot or more from the surface, they always manage to jump out in the night and crawl away.

But the climbing-propensity imputed by some authors to the *Anabas* has been as strongly denied by others. Hamilton Buchanau observes that to what enjoyment this dangerous faculty could lead a wretched fish he is totally at a loss to imagine, and he therefore believed that Daldorf was mistaken. "The palm, as is often the case with those of its species, may have been growing with its lower parts nearly horizontal, and the fish may have then moved along it as well as on the land; or the palm may have been covered by knobs, often left by the cultivators when they remove the branches (stipites), and the fish have been left amongst these knobs by some bird, and might no doubt have continued wriggling among them"* . Neither Cantor† in the Malayan peninsula, nor Sir Emerson Tennent in Ceylon‡, heard of any climbing-faculties being attributed to the *Anabas* in those localities.

A curious phenomenon in the Indian rivers and tanks, and one which has never yet been altogether satisfactorily explained, is the sudden appearance of large, healthy, adult fish, with others of proportionate sizes, immediately after a heavy fall of rain, in situations which have been perfectly dry and hard for months. When the pieces of water inhabited by fish periodically dry up, what becomes of them? Yarrell§ tried to solve this question by the theory of the sudden vivification of ova, and observes it appears that "the impregnated ova of the fish of one rainy season are left unhatched in the mud through the dry season, and, from their low state of organization as ova, the vitality is preserved till the occurrence and contact of the rain and the oxygen of the next wet season, when vivification takes place from their joint influence." But in opposition to this is the fact that, in India, the ova are generally deposited at the commencement, and not at the end of the rainy season, whilst large adult fishes abound, and no very small ones are visible. Again, if ova were thus deposited, and left near the surface of the mud, they would be exposed to destruction from insects, birds, and other animals, and in the event of escaping all other enemies they would assuredly be destroyed by the heat. The fishes would therefore be obliged to bury the ova deeply in the mud; and it is not easy to imagine how they could successfully accomplish this feat.

If, when the water failed, the fishes died, some of them at least would be seen dead or dying, while many of the tanks would soon

* Fishes of the Ganges, p. 99.

† Malayan Fishes, p. 88.

‡ Ceylon, vol. i. p. 217.

§ British Fishes, vol. i. p. 25.

become depopulated. Again, the distance from other pieces of water at which they reappear, excludes in many instances the possibility of migration, which must always, to a certain extent, be regulated by distance, time, and other local circumstances.

I have already shown that some species can live in liquid mud, which they cannot employ for the purposes of aquatic respiration. The question now arises whether, during the drought when food and water fail, fish do not altogether hibernate, or rather æstivate, until the return of a more favourable season. From their low state of organization, they would undoubtedly be more likely to become torpid during the heat than many other animals possessed of a higher vitality, which have been proved to do so, such as the Batrachians, the *Emys*, the *Lepidosiren annectens*, some of the Crocodiles, and others, as well as mollusks and land-snails.

The natives of India believe this to be the case; and many of them, and some few Europeans, have asserted that they have actually seen fishes thus exhumed alive from the bottoms of perfectly hard dry tanks, and subsequently resuscitated by placing them in water. That they are capable of burrowing is easily proved by watching them in an aquarium, and is especially exemplified in the case of a small Loach (*Platacanthus madraspatensis*, Day), which, if the water is being changed, or anything occurs to alarm it, dives down into the sand, and totally disappears from view with the greatest rapidity; and so well does it conceal itself that, on several occasions, when the sand was removed from the aquarium, it was most difficult to find and capture it. It evidently employs its armed pectoral fin for the purpose of diving. The *Etropli* and many others also conceal themselves very rapidly and effectually when alarmed.

It appears probable that, as the water in the tanks becomes low, the fishes congregate together in holes and places in which some water still remains, where they may frequently be seen in numbers huddled together with only sufficient water to cover their dorsal fins. If disturbed they dive down into the thick mud, and if either a drag or cast-net be then employed it is probable that nothing will be obtained. The only way of catching fish at this time is to leave the net down and walk about in the surrounding thick mud. In the course of time they must come to the surface to breathe, and then they fall an easy prey. As the water gradually evaporates, the fishes appear to become more and more sluggish, and finally, there is every reason to believe, bury themselves in the soft mud, and in a state of torpidity await the return of their natural element. This would, if proved, only show the correctness of Dr. Hunter's assertion*, "that hibernation is apparently due to a suspension of the faculties of animals by nature during such seasons, and in such situations, that a supply of food is not obtainable."

In Europe it is known that fish hibernate during the winter months. Eels bury themselves twelve or sixteen inches deep in the

* Observations on Parts of the animal Economy, p. 88.

mud; and in Somersetshire the people know how to find the holes in which they are by the hoar frost not lying over them as it does elsewhere, and dig them out in heaps*. Dr. Mitchell† also observes that Eels in the winter lie concealed in the mud, and are taken in great numbers by spearing them. Carps bury themselves in the mud, and pass many months without eating, assembled in great numbers side by side‡. Yarrell§, quoting from a letter, says that Soles frequent the river Arun nearly as high up as the town of Arundel, and remain in it the whole year, burying themselves in the sand during the cold months. In the West Indies the genus *Callichthys* is mentioned|| as one of which the species are known to bury themselves when the tanks dry up. The *Callichthys asper* is also occasionally found when digging for wells¶. The Crocodile is frequently dug up in a torpid state, in Ceylon, from the mud of dried-up tanks during the hot months; as food and water fail him he gradually retires into the mud. Snails in the same manner glue down their operculum, and descend into the mud until released by the rains, when they immediately deposit their ova. Why should not freshwater fish in India æstivate in the same manner?

An *Anabas* was received by Sir Emerson Tennent from the Moodliar of Matura, which was stated to have been dug out of a dried-up tank, a foot and half below the surface of the earth, where the mud was still moist, although the surface was dry and hard. This gentleman also mentions that Mr. Whiting, the chief civil officer in the western province, informed him that he had accidentally been present twice when the villagers had been engaged in digging up fish. The ground was firm and hard. "As the men flung out lumps of it with a spade they fell to pieces, disclosing fish from nine to twelve inches long, which were full-grown and healthy, and jumped on the bank when exposed to the light"***.

Another question which arises is, whether these fish do not æstivate with the ova contained within them in a torpid state, ready to be deposited as soon as the return of moisture arouses the vital powers of the parent fishes. It is well known that the hatching of ova can be retarded by the use of ice, why not also by æstivation from the effects of heat? In support of this view I may mention that in 1866, when on a march to Kurnool, I witnessed a heavy shower of rain, the first which had occurred in those parts for months, the country being quite dried up from want of water. A few hours subsequently I observed a number of *Ampullariæ* in an open ditch full of water depositing their long stringy ova. They must consequently have become torpid with the ova within them, and immediately on their resuscitation they, being aroused into activity by the occurrence of rain, commenced to increase their species. And

* Yarrell's 'British Fishes,' vol. ii. p. 288.

† "Fishes of New York," Transactions of the Literary and Philosophical Society of New York.

‡ Cuvier's 'Règne Animal.'

|| Cuv. & Val. vol. xv.

** Ceylon, vol. i. p. 220.

§ British Fishes, ii. p. 258.

¶ Cuv. & Val. vol. xv.

a similar phenomenon will, I imagine, be eventually proved to occur amongst fishes.

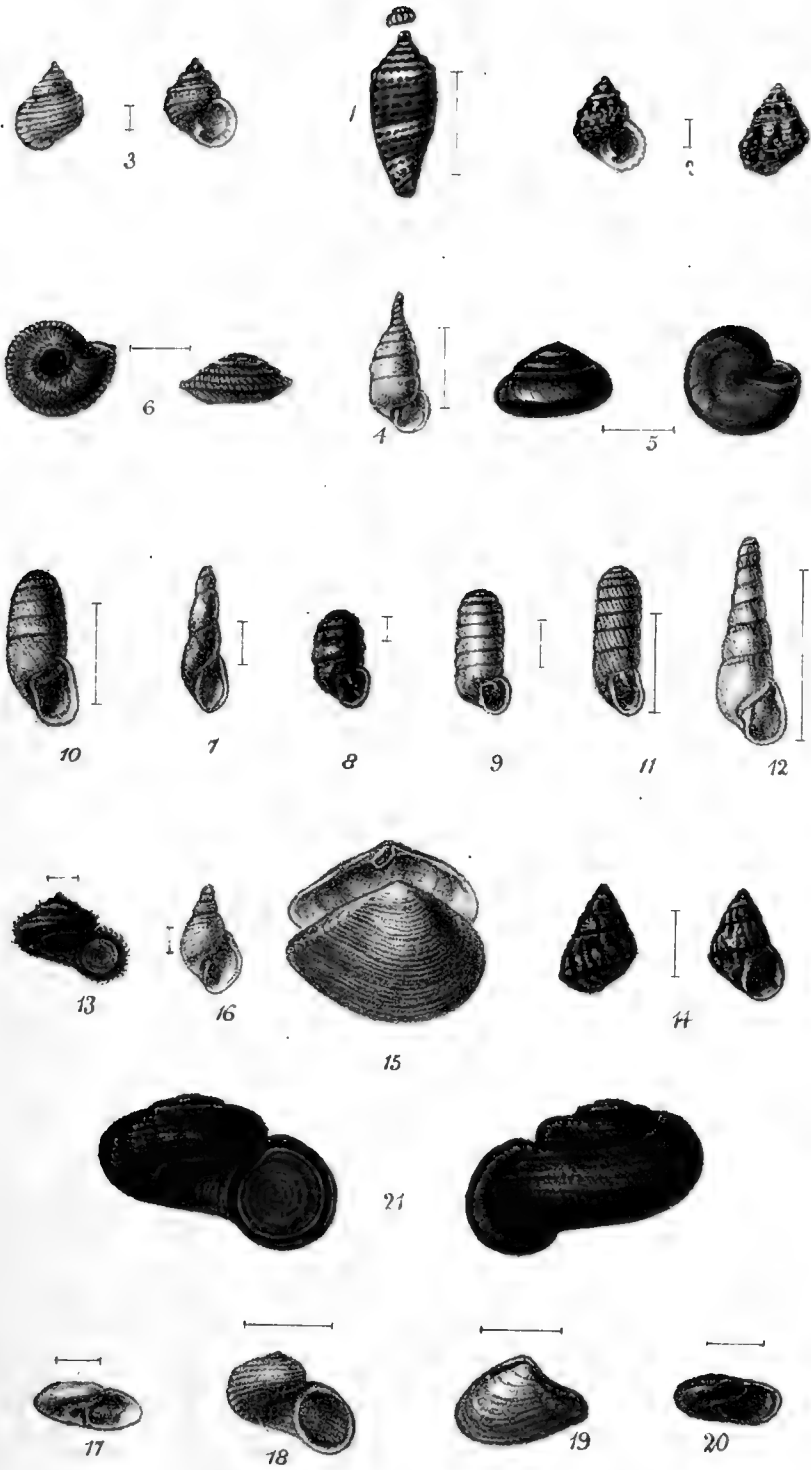
The cavity in the head cannot affect this æstivation, because it is not only the hollow-headed Acanthopterygians which thus reappear after rain, but also Cyprinidæ and others, which, if this cavity were necessary for this purpose, must die when the water dried up, and would thus soon become extinct in many places. As I have every reason to hope that some of the specimens of Ophiocephalidæ which I had the pleasure of despatching to Europe by the mail of March may arrive safely, I append a few observations respecting their habits. I have kept some of these fish for some time in aquaria at Madras. When first in confinement they were very wild and frightened; but they gradually became very tame, and fed from the hand without fear. The aquarium in which they are kept should always have plenty of clean sand at the bottom, and no rockwork, as they are apt to thrust against it violently with their noses; and in several instances their jaws were thus denuded of skin and their heads of scales, producing great irritation, which caused the cessation of the secretion of healthy mucus, and frequently resulted in death. They require very little water, and may be seen lying on the sand, occasionally lazily raising their heads, if the water is shallow, and taking in air. They are fond of grass and aquatic plants in the aquarium, and the small specimens then lie amongst them on the surface of the water, thus saving themselves the trouble of rising from the sand for air. But as they are continually biting at the grass, the water becomes very dirty; and it was therefore discontinued, and the fish did quite as well without it. If the water is dirty they scarcely appear to move their gills, but about every two or three minutes ascend to the top, emit their bubble, and descend. Their habits are dirty; and the water is constantly vitiated by the large amount of mucus they exude from their bodies, as well as by the rejection of their food in small shreds after it has been swallowed. Fresh water should be given them every day, as otherwise it becomes foul and offensive. When it is changed they become wildly excited and rush about, probably in the same manner as when aroused suddenly from their "summer sleep."

6. Descriptions of some new Species of Shells collected by Geoffrey Nevill, Esq., at Mauritius, the Isle of Bourbon, and the Seychelles. By HENRY ADAMS, F.L.S.

(Plate XXVIII.)

CONUS (CHELYCONUS) BORBONICUS, H. Ad. (Pl. XXVIII. fig 1.)

C. testa convexo-conica, angusta, lævigata, solidiuscula, antice spiritaliter lirata, rosco-lutea, fascia albida obscura in medio cincta,



et liris multis rubris interruptis ornata; spira elevata, concava, apice mamillato; anfr. 6, supera angulatis et nodulosis; apertura angusta, antice paulum dilatata; labro postice recedente.

Long. 12, diam. 5 mill.

Hab. Isle of Bourbon.

Fam. RISSOIDÆ.

Gen. NEVILLIA, H. Ad.

Testa imperforata, acuto-ovata; anfractibus convexis, spiraliter liratis, longitudinaliter striatis. Apertura ovalis; columella callosa et dente introrsum desinente munita; labro acuto, intus lævigato, extus varicoso.

This genus has much the resemblance of a minute species of *Craspedotus*; but there is no indication of nacre within the aperture, and the tooth on the columella is more like that of *Rissoa monodonta* than of the former genus; in its form and sculpture *Nevillia* approaches *Alvania*. I have dedicated it to Mr. Geoffrey Nevill.

NEVILLIA PICTA, H. Ad. (Pl. XXVIII. fig. 2.)

N. testa ovato-conica, solidula, costis spiralibus inæqualibus (in medio anfractuum una validiore) et striis minutissimis longitudinalibus sculpta; albida, maculis fulvis picta; spira conica, apice acuto, sutura distincta; anfr. 5½, angulatis; apertura ovali; dente columellari prominente; labro extus varicoso.

Long. 2½, diam. 1½ mill.

Hab. Mauritius.

NEVILLIA LUCIDA, H. Ad. (Pl. XXVIII. fig. 3.)

N. testa ovato-conica, solidiuscula, subpellucida, alba, costis spiralibus subdistantibus et striis minutissimis longitudinalibus sculpta; spira conica, apice acuto, sutura impressa; anfr. 5, convexis; apertura subcirculari; dente columellari valido, acuto; labro varice externo valido.

Long. 2, diam. 1½ mill.

Hab. Isle of Bourbon.

STYLIFER SPECIOSUS, H. Ad. (Pl. XXVIII. fig. 4.)

S. testa imperforata, ovato-subulata, tenui, subpellucida, nitida, lactea, liris capillaceis distantibus cincta; spira sursum valde attenuata, sutura distincta; anfr. 11, apicalibus 6 stylinis, deinde convexis, ultimo rotundato; apertura sublunari; columella recta, callosa; labro valde sinuato.

Long. 10, diam. 4 mill.

Hab. Mauritius.

NANINA (MACROCHLAMYS) GEOFFREYI, H. Ad. (Pl. XXVIII. fig. 5.)

N. testa minute perforata, depressa, tenui, vix nitente, sub lente minutissime spiraliter striatula, longitudinaliter obsolete irregu-

lariter striata, olivaceo-fulva; spira brevissime conoidea, apice obtuso, sutura submarginata; anfr. 6, planiusculis, ultimo antice non descendente, supra subangulato, basi paulum convexo; apertura subverticali, lunari; perist. simplici, acuto, recto, marginibus non conniventibus, columellari superne brevissime reflexo.

Diam. maj. 9, min. 8, alt. 5 mill.

Hab. Isle of Bourbon.

This species is closely allied to *N. virginia*, Morelet; but the whorls of the spire are almost flat instead of being convex, and the spiral lines are more strongly impressed, while the animal, from the subjoined note of Mr. G. Nevill, appears to differ considerably. "The animal is of a uniform black colour, and resembles that of *N. nitella*; that of *N. virginia* is yellow and black."—*G. Nevill.*

DISCUS SERRATUS, H. Ad. (Plate XXVIII. fig. 6.)

D. testa late et profunde umbilicata, lenticulari, arctispira, tenui, subpellucida, parum nitente, liris elevatis sculpta, pallide lutea; spira convexa, sutura serrata; anfr. 6, convexiusculis, ultimo ad peripheriam serrato-carinato, basi circa umbilicum rotundato; apertura obliqua, angulato-lunari; perist. simplici, acuto, recto.

Diam. maj. $6\frac{1}{2}$, min. $5\frac{3}{4}$, alt. 3 mill.

Hab. Silhouette Island, Seychelles.

ACICULA MAURITIANA, H. Ad. (Pl. XXVIII. fig. 7.)

A. testa imperforata, subulato-cylindracea, tenui, hyalina, nitida; spira subcylindracea, apice valde obtuso, sutura impressa; anfr. 5, planiusculis, ultimo basi dilatato; columella arcuata, vix truncata; apertura acuminato-ovali; perist. simplici, recto, acuto.

Long. 4, diam. 1 mill.; ap. $1\frac{1}{3}$ mill. longa.

Hab. Mauritius.

VERTIGO (ALÆA) BORBONICA, H. Ad. (Pl. XXVIII. fig. 8.)

V. testa profunde rimata, oblongo-ovata, tenui, sublaevigata, sericina, rufo-fusca; spira convexo-conica, apice obtuso, sutura impressa; anfr. 5, convexiusculis, ultimo basi subcompresso, pone aperturam tumido, scrobiculato; apertura truncato-ovali, subverticali, quadridentata; dente 1 compresso, intrante in parietem aperturalem 1 profundo in columella, 2 in palato, supero minuto; perist. expansiusculo, albo-labiato, marginibus callo tenui junctis, dextro subsinuato.

Long. $2\frac{1}{2}$, diam. $1\frac{1}{3}$ mill.

Hab. Isle of Bourbon.

GIBBUS (GIBBULINA) DESHAYESI, H. Ad. (Pl. XXVIII. fig. 9.)

G. testa profunde rimata, cylindrica, tenui, nitida, pellucida, oblique leviter striatula, pallide cornea; spira superna convexa, obtusa, sutura anguste marginata; anfr. 9, convexiusculis, ultimo antice ascendente, basi rotundato; apertura verticali, semiovali, denti-

culo parietali munita; perist. vix expanso, marginibus remotis, callo tenui junctis, dextro sinuato.

Long. $4\frac{1}{2}$, diam. 2 mill.

Hab. Isle of Bourbon.

GIBBUS (GIBBULINA) MORELETI, H. Ad. (Pl. XXVIII. fig. 10.)

G. testa rimata, ovato-cylindracea, solidiuscula, oblique confertim striata, sordide alba; spira cylindracea, apice obtuse conico, sutura submarginata; anfr. $7\frac{1}{2}$, planiusculis, ultimo basi compresso, antice leviter ascendente; columella callosoplicata; apertura parum obliqua, subtruncato-ovali, dente parietali nullo; perist. expanso et reflexiusculo, marginibus subparallelis, columellari superne paulum dilatato, patente.

Long. 11, diam. $4\frac{1}{2}$ mill.; ap. 4 mill. longa, $2\frac{3}{4}$ lata.

Hab. Silhouette Island, Seychelles.

GIBBUS (GIBBULINA) CYLINDRELLUS, H. Ad. (Pl. XXVIII. fig. 11.)

G. testa arcuato-rimata, cylindrica, tenui, oblique costata, sordide alba; spira supra medium paulo latiore, tum in conum brevem obtusum terminata, sutura mediocri; anfr. 10, subplanatis, ultimo leviter ascendente, basi compresso; apertura verticali, truncato-ovali, dente parietali valido compresso munita; perist. breviter expanso et reflexo, marginibus subparallelis, callo tenui junctis.

Long. 11, diam. $3\frac{1}{2}$ mill.; ap. 3 mill. longa, 2 lata.

Hab. Isle of Bourbon.

ENNEA (ELMA) NEVILLI, H. Ad. (Pl. XXVIII. fig. 12.)

E. testa imperforata, subcylindrica, solidula, nitidula, obsolete longitudinaliter striata, albida; spira elongata, sursum attenuata, apice obtuso, sutura marginata; anfr. 9, planiusculis, ultimo basi rotundato; columella vix torta, callosa; apertura verticali, sub-ovali, antice leviter ascendente; perist. tenui, breviter reflexo, margine dextro flexuoso, ad insertionem attenuato, basali cum columellam angulum obtusum formante.

Long. 20, diam. 5 mill.; ap. 6 mill. longa, $3\frac{1}{2}$ lata.

Hab. Seychelle Islands.

The species upon which I founded the subgenus *Elma*, viz. *E. swinhoei*, although an African form, was collected by Mr. Swinhoe in the Island of Formosa, where I presume it must at some remote period have been introduced. The other species known at the time were from Prince Edward's Island. Another, however, has been since described by Dr. Dohrn, also from the latter locality; and he, at the same time, created a genus, under the name of *Strepstostele*, to receive it. It is therefore of much interest to find an example inhabiting the Seychelles.

CYATHOPOMA BLANFORDI, H. Ad. (Pl. XXVIII. fig. 13.)

C. testa aperte umbilicata, depresso-turbinata, lirulis confertis cincta,

epidermide fusca hispida induta; spira elevata, acuta, sutura profunda; anfr. 4, rotundatis, ultimo cylindrico, vix descendente; apertura vix obliqua, circulari; perist. simplici, recto, acuto, breviter adnato. Operc. extus concavum, multispirum, marginibus simplicibus.

Diam. maj. 3, min. $2\frac{1}{2}$, alt. $1\frac{3}{4}$ mill.

Hab. Mahé Island, Seychelles.

This is an interesting addition to Mr. W. Blanford's genus *Cyathopoma*, the other species being confined to India, with the exception of *C. deccanianum*, of which I obtained a specimen from Sir David Barclay, found by him in the garden attached to his residence at Mauritius, where, however, it has probably been introduced.

OMPHALOTROPIS BORBONICA, H. Ad. (Pl. XXVIII. fig. 14.)

O. testa perforata, ovato-conica, tenui, sub lente minutissime spiraliter punctato-striata, rubido-fulva, albido variegata et strigata; spira conica, apice acuto, sutura distincta; anfr. 6, convexiusculis, ultimo ventricosus, ad peripheriam et circa perforationem compresso carinato; apertura vix obliqua, ovali; perist. simplici, recto, margine columellari subreflexo.

Long. 7, diam. 4 mill.

Hab. Isle of Bourbon.

SCROBICULARIA (CAPSA) ROSTRATA, H. Ad. (Pl. XXVIII. fig. 15.)

S. testa ovato-triangulari, convexiuscula, tenui, sordide alba, lamellis tenuibus concentricis sculpta, extremitate antica ovata, postica rostrata, compressa; umbonibus paulum antemedianis; margine ventrali postice subsinuato.

Long. 21, alt. 15, lat. 8 mill.

Hab. Seychelle Islands.

7. Descriptions of some New Species of Shells, chiefly from Ceylon. By HENRY ADAMS, F.L.S.

(Plate XXVIII.)

Fam. STYLIFERIDÆ.

Genus Plicifer, H. Ad.

Testa imperforata, ovato-subulata, non nitens; spira in stylum producta, nucleo sinistrali; columella plicata; labro flexuoso, postice sinuato; apertura antice integra.

This curious little shell was found by Mr. Hugh Nevill on coral, and in texture resembles the shell of *Leptoconchus*. It is probable that the *Hyala abnormis* of Gould is closely allied, and will form a second species of the genus.

PLICIFER NEVILLI, H. Ad. (Pl. XXVIII. fig. 16.)

P. testa ovato-subulata, tenui, semiopaca, albida; spira elevata, sutura distincta; anfr. 6½, supremis styliformibus, spiraliter liratis, ceteris convexis, flexuose irregulariter striatis, ultimo inflato; columella callosa, spiraliter plicata; labro acuto, valde flexuoso, postice profunde sinuato; apertura subovali, antice effusa.

Long. 3½, diam. 2 mill.

Hab. Ceylon (Mr. Hugh Nevill).

CYCLOSTREMA NEVILLI, H. Ad. (Pl. XXVIII. fig. 17.)

C. testa anguste umbilicata, alba, subpellucida, nitida, tenui, spiraliter lirata, et radiatim striata, ad peripheriam lævi; spira subplana, sutura vix impressa; anfr. 4, sensim accrescentibus, subplanatis; ultimo angulato, basi subconvexo; apertura ovali; labio calloso, callo circa marginem umbilici continuo; labro simplici.

Diam. maj. 4½, min. 3½, alt. 2 mill.

Hab. Ceylon (Mr. Hugh Nevill).

CYCLOSTREMA (DARONIA) SUBDISJUNCTA, H. Ad. (Pl. XXVIII. fig. 18.)

C. testa suborbiculari, nivea, subpellucida, spiraliter costulata, costellis numerosis, æquidistantibus, interstitiis transverse minutissime striatis; spira depressa, apice acutiusculo, sutura profunda; anfr. 3½, rapide accrescentibus, rotundatis, primis contiguus, ultimo antice descendente et longe disjuncto; apertura parum obliqua, subcirculari; perist. continuo, simplici, tenui, acuto.

Diam. maj. 10, min. 8, alt. 5 mill.; ap. diam. 4½ mill. longa, 4 lata.

Hab. Ceylon (Mr. Hugh Nevill).

CORBULA (AZARA) ROSTRATA, H. Ad. (Pl. XXVIII. fig. 19.)

C. testa ovato-triangulari, tumida, tenui, striis incrementi sculpta, epidermide rufescente induta; umbonibus submedianis, erosis; extremitate antica rotundata, postica truncata; margine dorsali antice arcuato, postice incurvato; margine ventrali convexiusculo; declivitate umbonali angulata.

Long. 9, alt. 6, lat. 4½ mill.

Hab. Ceylon (Mr. Hugh Nevill).

This species has much the appearance of a *Neæra*, the posterior extremity of the shell being produced into a beak as in that genus.

NANINA (MACROCHLAMYS) POWERI, H. Ad. (Pl. XXVIII. fig. 20.)

N. testa anguste perforata, depressa, tenui, subpellucida, confertissime leviter decussata sub lente, nitidiuscula, virescenti-cornea; spira parum convexa, apice obtuso, sutura marginata; anfr. 4½, vix convexis, ultimo vix descendente, compresso, superne subangulato, basi subplanato, in medio impresso; apertura obliqua, lunari; perist. simplici, acuto, recto, margine columellari supra perforationem brevissime reflexo.

Diam. maj. 8, min. 7, alt. 3½ mill.

Hab. Peter Botte Mountain, Mauritius (*Dr. Power*).

For an example of this species I am indebted to the kindness of *Dr. Power*, who collected it. It was sent to me under the name of *vittata*, by which it appears it has been long known at Mauritius.

CYCLOPHORUS LAYARDI, H. Ad. (Pl. XXVIII. fig. 21.)

C. testa late umbilicata, depressa, solidula, confertim oblique striata et liris pluribus distantibus sculpta, sub epidermide fusca flavidula; spira parum elevata, apice obtusulo, sutura profunda; anfr. 5, convexis, ultimo antice descendente; apertura obliqua, subcirculari, superne angulari; perist. continuo, duplici, interno breviter expanso, albido, externo expanso, superne dilatato, adnato. Op. corneum, tenue, extus subconcauum, arctispirum.

Diam. maj. 26, min. 22, alt. 11 mill.

Hab. Ceylon (*Mr. Thwaites*).

DESCRIPTION OF PLATE XXVIII.

- Fig. 1. *Conus (Chelyconus) borbonicus*, p. 288.
- 2. *Nevillia picta*, p. 289.
- 3. — *lucida*, p. 289.
- 4. *Stylifer speciosus*, p. 289.
- 5. *Nanina (Macrochlamys) geoffreyi*, p. 289.
- 6. *Discus serratus*, p. 290.
- 7. *Acicula mauritiana*, p. 290.
- 8. *Vertigo (Alæa) borbonica*, p. 290.
- 9. *Gibbus (Gibbulina) deshayesi*, p. 290.
- 10. — (—) *moreleti*, p. 291.
- 11. — (—) *cylindrellus*, p. 291.
- 12. *Ennea (Elma) nevilli*, p. 291.
- 13. *Cyathopoma blanfordi*, p. 291.
- 14. *Omphalotropis borbonica*, p. 292.
- 15. *Scrobicularia (Capsa) rostrata*, p. 292.
- 16. *Placifer nevilli*, p. 293.
- 17. *Cyclostrema nevilli*, p. 293.
- 18. — (*Daronia*) *subdisjuncta*, p. 293.
- 19. *Corbula (Azara) rostrata*, p. 293.
- 20. *Nanina (Macrochlamys) poweri*, p. 293.
- 21. *Cyclophorus layardi*, p. 294.

8. On the Classification and Distribution of the *Alectoromorphæ* and *Heteromorphæ*. By T. H. HUXLEY, F.R.S., V.P.Z.S., &c.

[With a Map.]

The characters and affinities of the Gallinaceous Birds, or *Alectoromorphæ*, have been discussed within the last few years by two very competent writers—*M. Blanchard** and *Mr. Parker*. The memoir “On the Gallinaceous Birds and Tinamous” † by the latter

* “De la détermination de quelques Oiseaux Fossiles et des caractères Ostéologiques des Gallinacés ou Gallides” (Ann. d. Sc. Nat. sér. 4^e, 1857, t. vii.).

† Transactions of the Zoological Society, vol. v. p. 149 (1864).



James Wylde, 457 Strand.

LECTOROMORPHÆ

A R C T O G E A

TETRAONIDE

TETRAONIDE

PHASIAXIDE

MELEGRIDÆ

MEGAPODIDE

MEGAPODIDE

CRACIDÆ

N O T O G E A

SCHEMATIC REPRESENTATION OF THE DISTRIBUTION OF THE ALECTOROMORPHÆ

James W. Ward 437 Strand

author is, in fact, a perfect mine of information for those who do not mind the trouble of digging, and I shall frequently have to express my concurrence with the views therein expressed.

But, in attempting to discover the affinities of *Opisthocomus*, I have been led to believe that a good deal yet remains to be done in the way of defining the limits of the *Alectoromorphæ*, the value of the subdivisions of the group, and the relation of these subdivisions to zoogeography.

I propose to make a contribution towards these objects in the present paper by discussing:—1st, the proper limits of the group *Alectoromorphæ* and of its subdivisions; 2ndly, the relations of sundry outlying forms, commonly regarded as Gallinaceous birds, with the *Alectoromorphæ* and adjacent groups; 3rdly, the geographical distribution of the *Alectoromorphæ* in relation to geographical distribution generally.

I. *The proper limits of the Group Alectoromorphæ and of its subdivisions.*

In my paper "On the Classification of Birds"* I have included the *Pteroclidæ* and the *Turnicidæ* with the *Phasianidæ*, *Megapodidæ*, and *Cracidæ* in one division, *Alectoromorphæ*, though the aberrant characters of the *Turnicidæ* and *Pteroclidæ* are fully recognized. I am now convinced that it will be much more convenient to restrict the title of *Alectoromorphæ* to the three latter groups, which agree with one another, and differ from the other two in the following osteological characters:—

1. The last cervical vertebra and the anterior dorsals are always ankylosed together in the adult. One of the posterior dorsals (generally, if not always, the penultimate) remains free, while the hindermost becomes ankylosed with the lumbar vertebræ to form part of the so-called "sacrum."

2. The number of the præsacral vertebræ in the different regions of the body is very constantly, if not always, 16 cervical, 5 dorsal, and 3 lumbar. The total number of these vertebræ is therefore 24, or the same as in Man.

3. The maxillo-palatines vary greatly in form and size, and in the degree to which they are ossified, but they are always lamellar or conchoidal. They unite in the middle line with an ossified septum only in some *Cracidæ*.

4. There are oval, sessile basiptyergoid facets, situated far forwards upon the rostrum of the sphenoid.

5. The palatines are long and narrow, with obsolete internal laminæ and rounded-off postero-external angles.

6. The angle of the mandible is produced and recurved, and the oral margins of the rami are not flanged out.

7. The external xiphoid processes of the sternum (which are much shorter than the internal ones) are bent outwards over the hinder ribs and have expanded ends.

* Proc. Zool. Soc. 1867, p. 415.

8. The coracoid has no subclavicular process.

9. The scapular end of the furcula is not expanded; but it forms almost the whole, or the greater part, of the inner wall of the canal for the tendon of the middle pectoral muscle. The hypocleidium* is well developed, and presents very various shapes.

10. The acromial process of the scapula is very short.

11. The humerus has no supinator spine, and the anterior edge of the deltoid crest is obliquely bevelled off.

12. The hypotarsus (commonly called the calcaneal process of the tarso-metatarsus) is traversed by a single canal.

13. The hallux is always present, though it varies greatly in size and position.

The *Alectoromorphæ*, distinguished from all other birds by the totality of these characters, are divisible into two primary groups, which I shall term the *Peristeropodes* and the *Alectoropodes*. In the former division the foot is Pigeon-like, the long hallux being on a level with the other toes; while in the latter it is Fowl-like, the hallux being short and raised.

The *Peristeropodes* have the following osteological characters:—

1. In the sternum the osseous junction of the metosteon with the lophosteon is broad, the inner notch being less than half as long as the sternum itself (fig. 1, p. 297).

2. The pleurostea end in front in short and obtuse "costal processes" (*c. p.*, fig. 1), the anterior edges of which are at right angles, or nearly so, with the axis of the sternum.

3. The hallux is on a level with the other toes; and its basal phalanx is about as long as, or may be longer than, that of the third digit.

These characters are diagnostic of the *Peristeropodes*. In addition, the second metacarpal presents no backward process near its proximal end; the phalanx of the third digit of the manus has no basal projection or tubercle; and, in the pelvis, an ileo-pectineal process is generally absent; if present, it is weak. In all those species in which I have been able to observe it, the vomer is strong, and compressed from side to side.

The *Cracidæ* and *Megapodidæ* compose this group. It may excite surprise that birds so unlike in habit should be arranged even in the same division; but I must go further, and declare that after a careful examination of the genera *Talegalla*, *Megapodius*, *Crax*, (*Pauxi*), *Penelope*, *Oreophasis*, and *Ortalia*, I am at a loss to discover any important *osteological* differences whatever between the *Megapodidæ* and the *Cracidæ*†. The hind toe, however, appears to be longer in proportion to the rest, and all the toes in proportion to the tarso-metatarsus, in the *Megapodidæ*.

It is a singular circumstance, however, that the form of the pelvis

* The process developed from the symphysis of the conjoined clavicles.

† In the degree of pneumaticity of the bones, the *Cracidæ* and the *Megapodidæ* differ immensely, as Mr. Parker has already shown; but this is a character of no systematic value.

varies a good deal both in the *Megapodidæ* and in the *Cracidæ*. If we term the moiety of the dorsal aspect of the pelvis which is bounded in front by a transverse line drawn through the acetabula the *postacetabular area*, each group will be found to present some forms in which the postacetabular area is broad, and some in which it is relatively narrow.

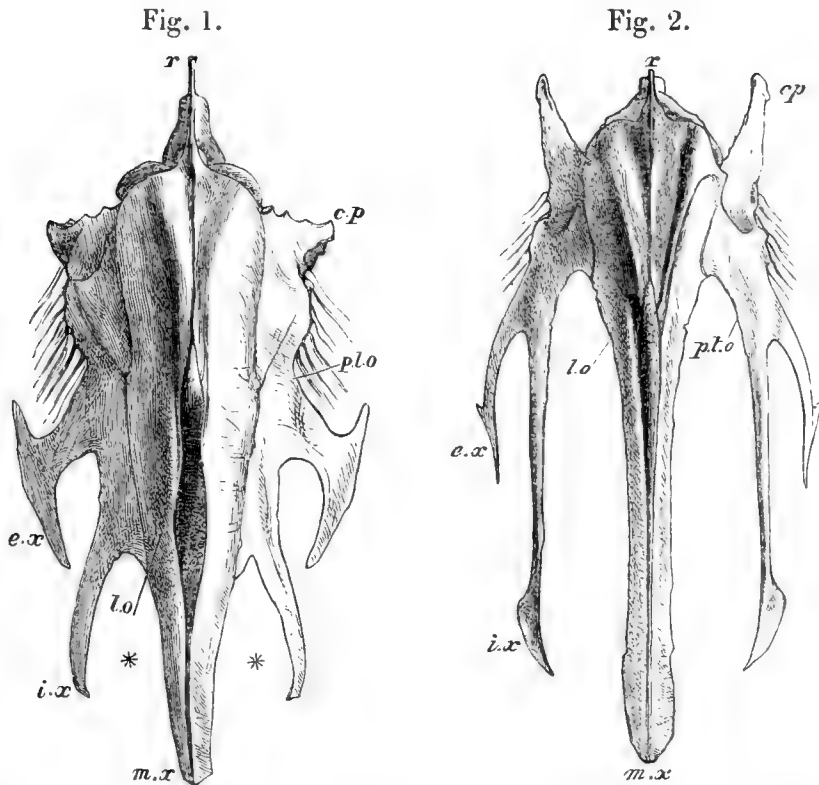


Fig. 1. The sternum of *Crax globicera*.—*r.* Rostrum. *c.p.* Costal process. *pl.o.* Pleurosteon. *e.x.* External xiphoid process; and *i.x.* internal xiphoid process of the metosteon. *l.o.* Lophosteon bearing the carina and ending behind in *m.x.*, the middle xiphoid process. ** The inner notches.

Fig. 2. The sternum of *Lophophorus impeyanus*. The letters as before, except *pt.o.*, metosteon.

Thus *Talegalla* has the postacetabular area broad, while *Megapodius* has it narrow.

The *Penelopinæ* (*Penelope*, *Oreophasis*, *Ortalida*) have the postacetabular area broad; but in the *Cracinæ* (*Crax*, *Pauxi*) it is narrow (figs. 3 & 4, p. 298).

M. Blanchard has already indicated some of the differences between the *Cracidæ* and the ordinary Gallinaceous birds.

“Les types essentiellement Américains, comme les Alectors, c’est à dire les genres *Urax*, *Crax*, et *Penelope*, s’éloignent à quelques

égards des types de l'ancien continent ; leur crâne est allongé, à côtés presque parallèles, rappelant la forme de la tête des Pigeons ; c'est que leur frontaux sont larges, et leurs lacrymaux très-développés, au lieu d'être rejetés en dehors, sont exactement emboîtés entre les os nasaux et les frontaux ; ensuite les apophyses temporale et mastoïdienne se trouvent être écartées davantage ; la région pariétale est presque plane comme la région frontale ; enfin le vomer est toujours libre et très-développé, ce qui n'a pas lieu dans les autres, où il paraît se souder complètement avec la cloison interorbitaire. On voit d'après cela que les types Américains se séparent d'une manière assez prononcée de tous les autres Gallides, auxquels ils ressemblent cependant par l'ensemble de leurs caractères."—*l. c.* pp. 102, 103.

Fig. 3.

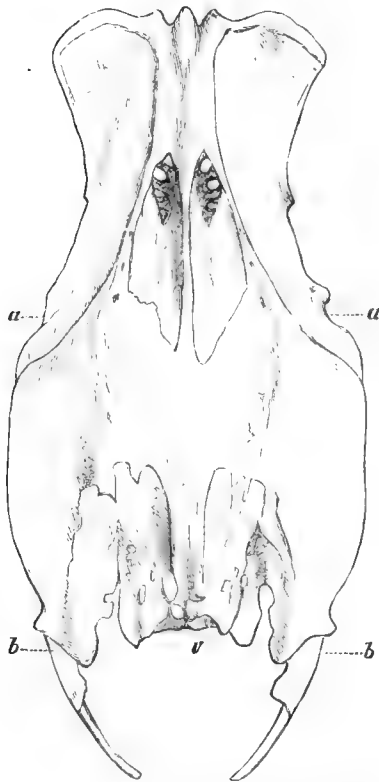


Fig. 3. The dorsal aspect of the pelvis of *Crax globicera*.—*a a*. A transverse line drawn through the centres of the acetabula. *b b*. A transverse line drawn through the posterior extremities of the ilia. The area included between these lines is the "postacetabular area."

Fig. 4.

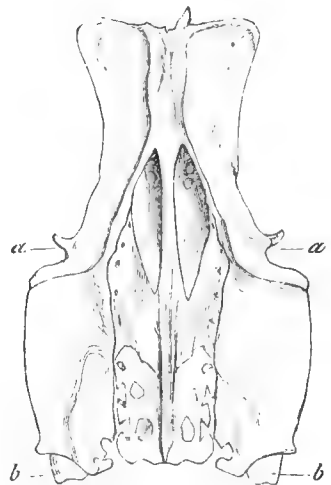


Fig. 4. A corresponding view of the pelvis of *Penelope cristata*.

Mr. Parker has also many valuable remarks upon the *Cracidaë* ; but, like M. Blanchard, he leaves out of sight the very intimate relation between this group and the *Megapodidæ*.

In the *Alectoropodes*—

1. The osseous junction of the lophosteon and metosteon is narrow, the inner notch being always more than half as long as the sternum (fig. 2, p. 297).

2. The costal processes of the pleurostea (*c p*, fig. 2) are more prolonged and more nearly parallel with the axis of the sternum than in the preceding case.

3. The hallux is raised above the level of the other toes, and its basal phalanx is much shorter than that of the third toe.

With a single exception, the second metacarpal always has a backward process*. A tubercle is very commonly present upon the posterior edge of the base of the phalanx of the third digit; and the ilio-pectineal processes are generally very well developed. The vomer, wherever I have been able to observe it, has been weak and flattened from above downwards.

Three groups are readily distinguishable by osteological characters among the *Alectoropodes*.

The *Numididæ*† differ from the other members of this division in the absence of any backward process of the second metacarpal, and in the obtuseness and somewhat outward inclination of the costal processes. The acromial process of the scapula is also singularly recurved.

In all the rest the backward process of the second metacarpal is distinctly developed, and the costal processes are more acute (generally very much so) and pass more directly forwards. Among these the *Meleagridæ* are peculiar in three respects.

1. The length of the ilium from the centre of the acetabulum to its posterior margin (which may be called the *postacetabular length*) is greater than the distance from the same point to the anterior margin of the ilium (or *præacetabular length*).

2. Viewing the pelvis from above, the postacetabular area is longer than it is broad (fig. 5, p. 300).

3. The furcula is singularly weak and straight (viewed laterally), and has a straight rod-like hypocleidium.

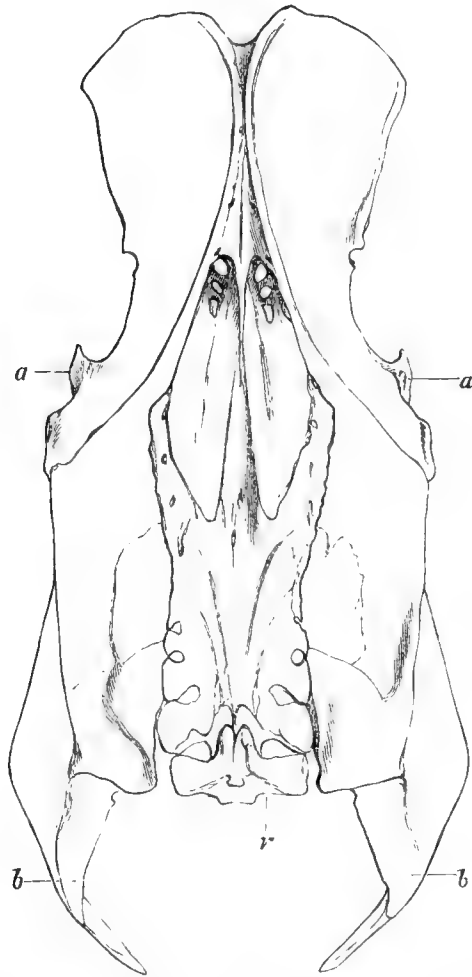
In all the other genera which I have examined, the præacetabular length is greater than, or, in the solitary case of *Tetrao cupido*, equal to, the postacetabular. The postacetabular area is broader than it is long; the lateral contour of the furcula more curved; and the hypocleidium expanded antero-posteriorly.

The great series of Galline, Pavnine, Phasianine, and Tetraonine birds included under the title of *Phasianidæ*, which offer these characters, present two types of structure, the one of which may be termed *Galline*, and the other *Tetraonine*, and which are well defined and contrasted in their extreme forms, though I am by no means clear that they do not graduate into one another.

* M. Blanchard (*l. c.* p. 99) gives the presence of this process as a universal character of the "Gallinacés," merely mentioning that "dans les Hocos et les Pénélopes elle s'affaiblit beaucoup."

† That is to say, the species of the genus *Numida*. I have seen no skeletons of *Agelastus* or *Phasidus*.

Fig. 5.



The dorsal aspect of the pelvis of *Meleagris gallopavo*.
The letters as before. *v*. The last sacral vertebra. (The letters *b b* are placed too far back, as they are likewise, to a less extent, in fig. 7, p. 301.)

In the *Galline* or *Fowl* type—

1. The postacetabular area is moderately broad (fig. 6, p. 301), and the inner and posterior angles of the ilia are produced beyond the level of the last sacral vertebra.

2. The ulnar edge of the distal end of the basal phalanx of the second digit is rounded off; and the base of the phalanx of the third digit has no tubercle, or only a small one.

3. The anterior margin of the deltoid crest of the humerus is long and oblique.

4. The hypocleidium is more or less broadly oval in contour, with curved margins.

5. The tarso-metatarsus is more than half as long as the tibia.

6. The mandibular foramen is small.

Fig. 7.

Fig. 6.

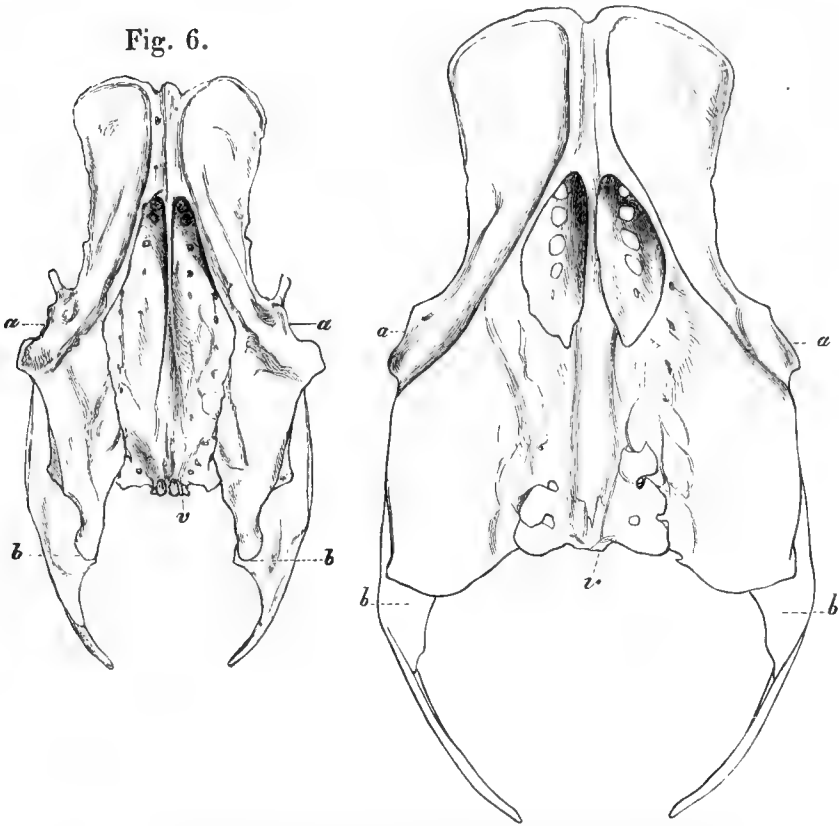


Fig. 6. The dorsal aspect of the pelvis of *Gallus domesticus*.
 7. The dorsal aspect of the pelvis of *Tetrao urogallus*.
 (The letters as before.)

In the *Tetraonine* or *Grouse type*, on the other hand—

1. The postacetabular region is very broad (fig. 7, p. 301); the ilia are truncated nearly opposite the end of the sacrum, and it is the external angle of the posterior edge of the ilium which is rather the longer.

2. The ulnar and distal edge of the basal phalanx of the second digit is produced; and the phalanx of the third digit has a strong basal tubercle.

3. The anterior margin of the deltoid crest is less oblique, and the angle of the crest is sharper and more prominent.

4. The hypocleidium has straight edges and a triangular form, the apex of the triangle being directed forwards.

5. The tarso-metatarsus is not half as long as the tibia.

6. The mandibular foramen is very large.

The two series of forms meet among the Partridges and Quails—*Perdix** lying on the *Tetraonine*, *Caccabis*, *Rollulus*, *Francolinus*, and *Coturnix* on the Galline side of the boundary.

* This has already been pointed out by Mr. Parker, "Gallinaceous Birds and Tinamous" (Trans. Zool. Soc. v. p. 155).

I have not sufficient materials to decide the point; but the *Odontophorinæ* appear to go with *Perdix*.

In the proper *Phasianinæ* (*Phasianus*, *Thaumalea*) and in *Pucrasia*, the pelvis has reached an indifferent point, being neither specially Tetraonine nor specially Galline; but that of the *Lophophorinæ* (*Lophophorus*, *Tetraogallus*) is more decidedly Galline.

The Peacocks are the most aberrant forms of this series, from the curious modification of the postacetabular area of the pelvis. The costal processes of the sternum are obtuse and relatively short, the acromion is somewhat recurved, and the backward process of the second metacarpal is small. In several of these circumstances they come nearer *Numida* than any other of the Gallotetraonine series do. On the other hand, they seem to be closely allied to *Lophophorus*, in which genus the pelvis exhibits a tendency towards the Pavonine form, and the acromion is slightly recurved.

II. *The relations of the Pteroclidæ and Hemipodidæ to the true Alectoromorphæ.*

In almost all those respects in which the Grouse differ from the Fowls they approach the Pigeons; and an absolute transition between these groups is effected by the *Pteroclidæ*, whose popular name of "Sand-Grouse" might fitly be exchanged for that of "Pigeon-Grouse."

1. I find the vertebræ in the cervical, dorsal, lumbar, and sacral regions to have the same number in *Pterocles* and *Syrnhaptés* as in the *Alectoromorphæ*; and ankylosis takes place in the same manner.

The *Peristeromorphæ* in general agree with the *Alectoromorphæ* in having the penultimate dorsal free. Very often the last cervical is ankylosed with the first dorsal; but in this respect, as in the number of dorsal vertebræ (defined by the connexion of the ribs with the sternum), individual variations are common among the Pigeons. On the other hand, the total number of cervico-dorsal vertebræ appears to be very constant, viz. nineteen—or two fewer than the number (twenty-one) so generally met with in the *Alectoromorphæ*. The fifteenth vertebra is very generally ankylosed with the sixteenth and seventeenth; the eighteenth appears always to be free, the nineteenth always ankylosed with the lumbar series.

The fifteenth vertebra is very generally the last cervical; but sometimes it becomes connected with the sternum by a sternal rib, and then must be counted as first dorsal*. In one specimen of *Goura* the sixteenth is cervical.

2. In the skull, the palatines, the maxillo-palatines, and the mandibles resemble the corresponding parts in the *Alectoromorphæ*; the

* I find the vertebral formula of ordinary Pigeons and of *Didunculus* to be:—C. fourteen, D. five, L. three, Sacrals and Urosacrals ten, Free caudals six. *Goura coronata* has C. fifteen or sixteen, D. four or three, L. three, Sacrals and Urosacrals twelve, Free caudals six. In the increased number of the sacral and urosacral vertebræ *Goura* resembles *Didus*, which also has twelve of these vertebræ.

pterygoid and the basipterygoid processes, on the other hand, are like those of the *Peristeromorphæ*.

3. The sternum and furcula, as well as the coracoid (in its shortness, breadth, and the presence of a subclavicular process), are completely *Peristeromorphæ*; and so is the whole fore limb.

4. The pelvis has resemblances both to that of the Grouse and that of the Pigeons, but has some peculiarities of its own.

5. The foot contrasts strongly with that of the Pigeons in the extreme brevity of the tarso-metatarsus and toes, and in the reduction of the hallux, but may be regarded as an exaggeration of that of the Grouse.

According to Nitzsch, the pterylosis is *Peristeromorphæ*; and Mr. Parker (*l. c.* p. 150) has shown that while the vocal organs are Pigeon-like, the digestive organs are *Tetraonine*.

Thus the *Pteroclidæ* are completely intermediate between the *Alectoromorphæ* and the *Peristeromorphæ**. They cannot be included within either of these groups without destroying its definition, while they are perfectly definable in themselves. Hence, I think, the only advisable course is to make them into a group by themselves, of equal value with the other two, under the head of *Pterocloromorphæ*.

The *Hemipodidæ* differ much more from the *Alectoromorphæ*, *Pterocloromorphæ*, and *Peristeromorphæ* than these groups do from one another.

1. The number of the cervical, dorsal, and lumbar vertebræ is indeed the same; but that ankylosis which is so constant and so remarkable among the birds which have been already mentioned is absent. All the vertebræ are distinct from one another, as Mr. Parker has already noticed (*l. c.* p. 184).

2. The palatines, pterygoids, and basipterygoids are more *Pluvialine*, though there is a touch of the Pigeon both in these parts and in the mandible. They are very different from the corresponding bones in the *Alectoromorphæ* and *Pterocloromorphæ*. The broad flat vomer, however, is not *Pluvialine*, but is more *Grouse-like*.

3. The sternum appears to me to be, as nearly as may be, intermediate between that of the *Pterocloromorphæ* and that of the *Tinamorphæ*. If the inner notch, which is already so small in *Syrhaptés*, were reduced to nothing, the sternum would differ from that of *Hemipodius* in very little but the breadth of its middle xiphial process. In fact, it seems to me to be demonstrable that the long xiphial process of the sternum of *Hemipodius* answers to the outer of the two metosteal processes of the *Alectoromorphæ*,—and not to the inner, as Mr. Parker supposes in his paper on the Gallinaceous birds—or to the inner and outer together, as he suggests in

* M. Blanchard excludes *Pterocles* from the "Gallinacés," and expresses, "without the least doubt," the opinion that this genus should be ranged among the Pigeons. "La forme de leur sternum, de leur bassin, de leurs membres antérieurs, de leur humérus notamment, ne peut laisser à cet égard la moindre incertitude" (Blanchard, *l. c.* p. 93). M. Blanchard does not mention *Hemipodius*, and is uncertain about the affinities of *Tinamus*.

his great work "On the Shoulder-girdle and Sternum" (p. 187). Thus the sternum of *Hemipodius* is strongly Tinamine.

4. The furcula is peculiar, but has been compared by Mr. Parker to that of the Lapwings. The coracoid has a subclavicular process, as in *Pteroclomorphæ*, *Peristeromorphæ*, and *Charadriomorphæ*. This process does not exist in *Tinamus*.

5. The pelvis in some respects resembles that of *Syrrhaptēs*, in others that of the Plovers, but has peculiarities of its own. In no respect is it Alectoromorphie.

6. The tarso-metatarsus is quite Pteroclomorphie. Mr. Parker thinks *Hemipodius* to be intermediate between *Pterocles* and *Syrrhaptēs* in this part of its organization.

The same writer has already pointed out the osteological affinities of *Hemipodius* to the Plovers on the one hand, and to *Tinamus* on the other. In his memoir on the sternum and shoulder-girdle (p. 185) he goes so far as to say that "the Hemipodine family is interposed bodily between the Tinamous and the true Gallinæ."

I think that this is a very just estimate of the position of the group, if the *Pteroclomorphæ* are included under the head of *Gallinæ*. For it is obvious that the chief relations of *Hemipodius* are on one side with *Tinamus*, on another with *Syrrhaptēs*, and on a third with the Plovers, *Pedionomus* being perhaps the connecting link between the latter and it.

But it appears to me impossible to include *Hemipodius* with either the *Tinamorphæ* or the *Charadriomorphæ*, and still less with the *Pteroclomorphæ*; and I see no alternative but to make it the type of an independent group, which may be called the *Turnicimorphæ*.

III. *The affinities of Opisthocomus.*

Many of the peculiarities of *Opisthocomus* have already been described and discussed by L'Herminier*, Deville†, and Gervais‡; and the latter author has given a figure of the skeleton.

L'Herminier is of opinion that the sum of the characters of the bird incline it towards the *Gallinacæ*. He puts it, with Vieillot and Latreille, in the distinct family of the *Dysodes*, before the Pigeons and Gallinaceous birds.

M. Gervais (*l. c.* p. 72), on the contrary, denies that *Opisthocomus* has anything to do either with the Gallinaceous birds or with the Pigeons. He considers that it forms part of the great series of "passeriform birds," but is so different from the others that it ought to form a separate order in this series, near the *Scansores*, and "near the *Musophagidæ*, though its affinities with the group may have been exaggerated."

* Recherches Anatomiques sur quelques genres d'Oiseaux rares (Comptes Rendus, v. 1837, p. 433).

† Observations faits en Amérique (Revue et Magasin de Zoologie, ser. 2. t. iv. 1852).

‡ Castelnau, Expédition dans les parties centrales de l'Amérique du Sud, 7^{me} partie, Zoologie.

In my paper on the Classification of Birds I have described the palate of *Opisthocomus* (p. 435), and have shown that it has an Alectoromorphic tarso-metatarsus (p. 460); but I have expressed the opinion that its other peculiarities necessitate the placing of the bird in a special division of the *Schizognathæ*. At the same time, I mentioned that this opinion was based upon the examination of only an incomplete skull and the bones of the feet.

M. Alphonse Milne-Edwards, noting this indication of the paucity of my materials, with a liberality and courtesy for which I gladly express myself his debtor, placed an excellent mounted skeleton and some detached bones of the Hoazin, in his collection, at my disposition; and Mr. Eyton, with no less kindly readiness, has supplied me with another mounted skeleton of the same bird.

I have thus been enabled to make a tolerably complete investigation of its osteology, the result of which has been entirely to confirm the conclusions of L'Herminier, that *Opisthocomus* resembles the Fowls and the Pigeons in almost all those respects in which it is like other birds, while in many points it is altogether peculiar, and only in one or two features resembles the *Musophagidæ*.

I find the number of the vertebræ to be 19 cervical, 5 dorsal, 3 lumbar, 4 sacral, 6 urosacral, and 4 free caudal. To these succeeds the pygostyle, the number of the vertebræ in which is not ascertainable.

In the large number of its cervical vertebræ, *Opisthocomus* is unlike any of the birds belonging to the groups which have already been discussed; *Tinamus*, however, has 18 cervicals.

The two or three last cervical vertebræ are ankylosed with one another and with the two anterior dorsals*.

The third dorsal is free; but the fourth and fifth are united together and with the succeeding vertebræ to form the "sacrum," and are overlapped by the ilia.

Thus it is the antepenultimate (and not the penultimate) dorsal which is free; and in this respect *Opisthocomus* differs not only from all the *Alectoromorpha*, *Pterocloromorpha*, and *Peristeromorpha*, but from the only other birds (the Falcons and Flamingos) in which a similar ankylosis of the hindermost cervical with more or fewer of the anterior dorsal vertebræ takes place. In *Corythaix* no ankylosis occurs.

Only the hindermost six or seven cervical vertebræ have median inferior crests, and these are very weak; the inferior faces of the centra of the dorsal vertebræ are all flattened and devoid of crests. In this respect *Opisthocomus* departs alike from the Gallinaceous birds and the Touracos, and, indeed, from the great majority of its class.

In M. A. Milne-Edwards's specimen the eighteenth cervical vertebra bears small and slender ribs; of the nineteenth the ribs are broader, but have no unciform process. In Mr. Eyton's specimen the seventeenth cervical has short ribs; the eighteenth a broader and longer rib, with a rudimentary unciform process; and the

* In Mr. Eyton's specimen the second dorsal appears to be free.

nineteenth bears ribs which are nearly as long as those of the first dorsal and possess very deep, though short, unciform processes. On the right side, the rib of this vertebra is connected with the sternum by an incompletely ossified sternal rib.

The vertebral ribs of the dorsal region are remarkably broad; and in the three anterior pairs a considerable extent of the posterior margin is occupied by the unciform process, which is always shorter than the intercostal space.

In the breadth of the ribs, and depth and relative shortness of the unciform processes, the ordinary Pigeons come nearest *Opisthocomus*. The ribs of *Corythaix* have a totally different character.

Fig. 8.

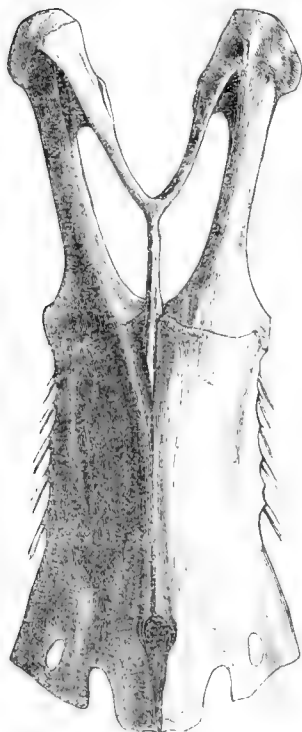


Fig. 9.



Fig. 8, front, and Fig. 9, side view, of the sternum and shoulder-girdle of *Opisthocomus cristatus*.

The sternum, as several observers have already pointed out, is one of the most anomalous parts of the organization of *Opisthocomus*. Its lateral edges remain nearly parallel for about two-thirds of its length, and then diverge, causing the transverse diameter to be considerably wider posteriorly than anteriorly. The external xiphoid processes are but little shorter than the middle xiphoid; and the posterior edge is evenly curved backwards. It presents two notches, of which the outer pair may be converted into foramina. The inner pair are deeper than the outer, but do not extend for a sixth of the

length of the whole sternum. There are no proper costal processes, the anterior lateral angle of the sternum being rounded off, in such a manner that the middle of the anterior edge of the sternum (apart from the manubrium) is far in advance of the antero-lateral angles. A straight, styliform, osseous process, compressed from side to side and continuous with a slight crest which runs for a short distance down the anterior face of the sternum, takes the place of both manubrium and hypocleidium, being continuous, on the one hand, with the sternum, and, on the other, with the furcula.

The keel of the sternum is extraordinarily small and cut away in front, the angle formed by the union of the anterior and ventral margins being situated opposite the junction of the third and last fourths of the length of the bone. The anterior contour is at first concave, afterwards slightly convex. The ventral edge is at first concave and expanded from side to side, but afterwards becomes slightly convex.

The sternal ribs are attached along the anterior half of the lateral contour of the sternum.

The ridge which bounds the origin of the middle pectoral muscle externally, extends from the outer end of the articular fossa for the coracoid to the summit of the inner notch, and thence a little way upon the middle xiphoid process. The surface left between this line and the attachment of the sternal ribs is extremely narrow.

The form of sternum thus described appears to be altogether peculiar to *Opisthocomus*, and to be as remote from the Musophagine as it is from the Gallinaceous type.

The carina is much what that of *Crax* would be if the anterior edge were further cut away; but it is still more like that of an unhatched chick.

The coracoids are similar to those of the Pigeons, and have very strong subclavicular processes. They are ankylosed with the clavicles—a rare peculiarity, which has been observed in *Didus*.

The furcula is shaped like a fork with nearly straight tines, and is remarkably short, having not much more than the half the length of the coracoids. Its proximal ends are so completely ankylosed with the coracoids that no trace of the primitive distinctness of the bones is discernible; inferiorly, as has been mentioned, the straight hypocleidium is as completely ankylosed with the manubrium. In the ankylosis of the furcula with the manubrium, *Opisthocomus* stands alone. For, in the other birds (such as the Pelicans, Frigate-bird, Cranes, *Balænicæps*) which have the furcula united with the sternum, the ankylosis takes place between the furcula and the carina.

Crax globicera has a remarkably short furcula, with a long straight hypocleidium; and the furcula is almost as little curved, and has a no less straight hypocleidium, in *Meleagris*.

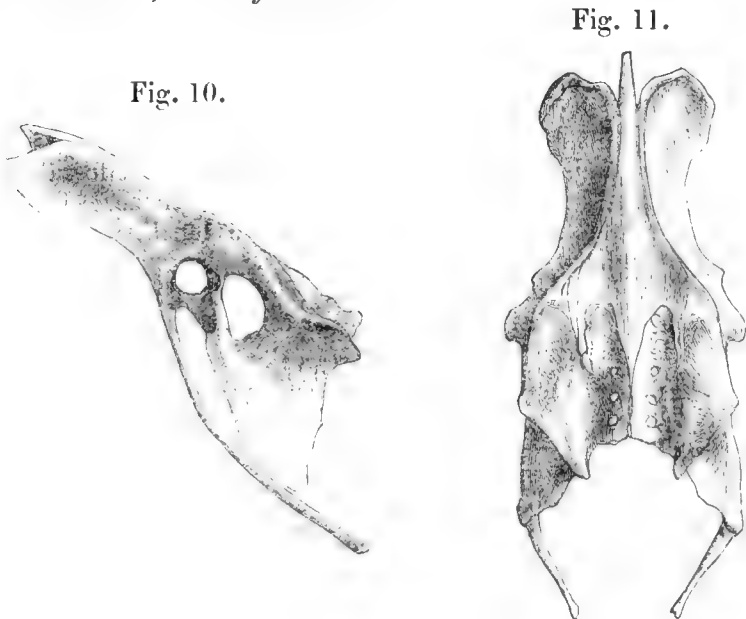
The scapula has a long and strong acromial process, which extends forwards to the clavicle (with which it is not ankylosed), and forms the entire inner boundary of the large canal for the tendon of the middle pectoral muscle.

The acromial process is very small in the *Alectoromorphæ*, but

becomes larger in the *Peristeromorphæ* and in many other birds, the *Musophagidæ* among the rest.

The bones of the fore limb in part resemble those of the Fowls, and in part those of the Pigeons; while the humerus has a great deal of resemblance to that of *Corythaix*; indeed it holds a midway place between *Corythaix* and *Crax*. The bones of the antibrachium and the manus, on the other hand, are much nearer to those of the Pigeons than they are to those of *Corythaix*.

The pelvis (figs. 10 & 11) is more like that of *Coturnix* than that of *Corythaix*; but, though it resembles both, it differs from both in the absence of any ilio-pectineal process, and in the circumstance that the ilio-sacral fossæ are completely roofed over by bone. The obturator foramen, as in many Gallinaceous birds, is not bounded by bone behind; in *Corythaix* it is.



Figs. 10 & 11. Lateral and dorsal view of the pelvis of *Opisthocomus*.

The relative proportions and form of the femur and the tibia are very nearly such as are observable in the ordinary Pigeons. The metatarsus is longer in proportion to the tibia than in the ordinary Pigeons, shorter than it is in *Goura*.

The tarso-metatarsus itself (fig. 12, p. 309) very closely resembles that of the Pigeons, though the form of the distal articular surface of the metatarsal of the hallux is more like that of *Crax*. The tarso-metatarsus of *Corythaix* is very different.

The middle toe is considerably longer than the tarso-metatarsus, and slightly longer than the femur. It is not so long as the femur in any Gallinaceous bird, nor in *Corythaix*. In the ordinary Pigeons it is considerably longer than the tarso-metatarsus; in *Corythaix* just as long.

Fig. 12.

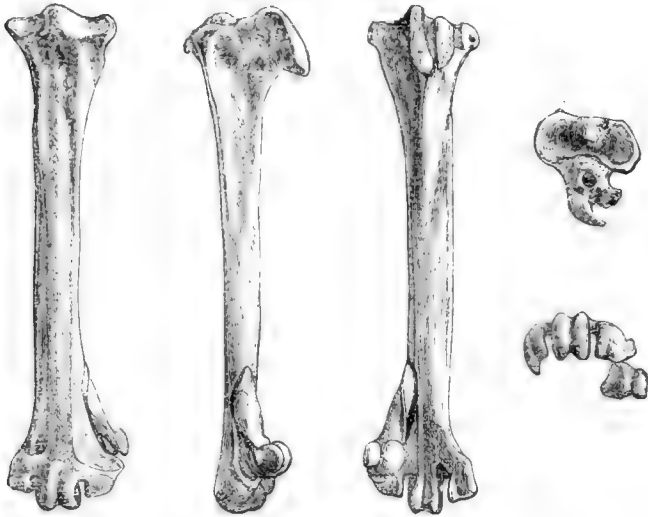


Fig. 12. The right tarso-metatarsus of *Opisthocomus*, viewed from in front, the side, and behind, with the proximal and distal ends.

The basal phalanx of the hallux is slender, curved, and considerably longer than that of the middle digit, as in the Pigeons. In *Corythaix* the two are equal in length.

In the skull, the strong rostrum, united with the frontal region by a well-marked transverse hinge (figs. 13, 14, p. 310), and the forward extension of the nasal bones, narrowing the nasal apertures, gives the cranium a superficial resemblance to that of the *Musophagidæ*. Closer examination, however, shows that the two are extremely different. In *Corythaix* the hinge lies, as usual, in front of the lachrymal bones, which are connected by sutural union altogether with the frontals, and the rostrum is formed by the præmaxillæ and nasals. But in *Opisthocomus* the hinge lies behind the lachrymals, which have completely coalesced with the nasals and form an integral part of the rostrum.

In *Tetrao urogallus* and in *Crax*, the inner margins of the lachrymals are connected almost wholly with the nasals, and their posterior margins are truncated and unite with the frontals only by a short, more or less transverse, suture. If the sutures between the nasals and præmaxillæ, on the one hand, and the frontals, on the other, were as open as this is, the rostrum would have a hinge just like that of *Opisthocomus*; and ankylosis of the lachrymals with the nasals would complete the resemblance.

The mandible of *Corythaix* bears a good deal of general resemblance to that of a Pigeon. In *Opisthocomus*, the mandible is like that of *Didunculus* in general form, and has the peculiar flanging out of the upper margins of the rami, which is absent in *Corythaix*, but is so characteristic of the mandible in most Pigeons.

The palatine bones (fig. 16, p. 311) have much resemblance to

those of the Pigeons in their general form, and particularly in the development of the inner lamina. The maxillo-palatines, on the other hand, are as ill-developed as in many *Alectoropodes*; and there is not the slightest approximation to the desmognathous arrangement of *Corythaix*. The vomer, as already described, is slender and compressed from side to side, though it tends to expand in front. It resembles the vomer in the *Peristeropodes*, which is as distinctly ossified, slender, and compressed from side to side, but tapers to a point in front.

Fig. 13.

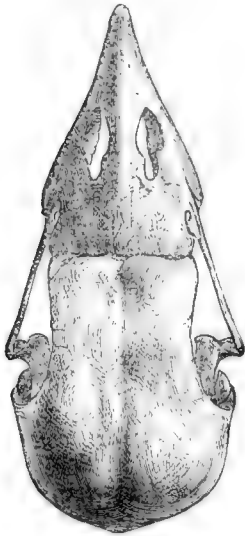


Fig. 14.

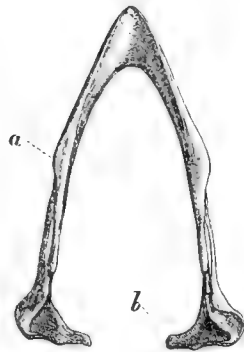
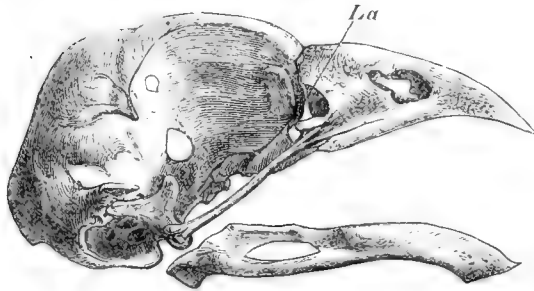


Fig. 15.

Fig. 13. The skull of *Opisthocomus*, viewed from above.

14. The mandible, viewed from above.

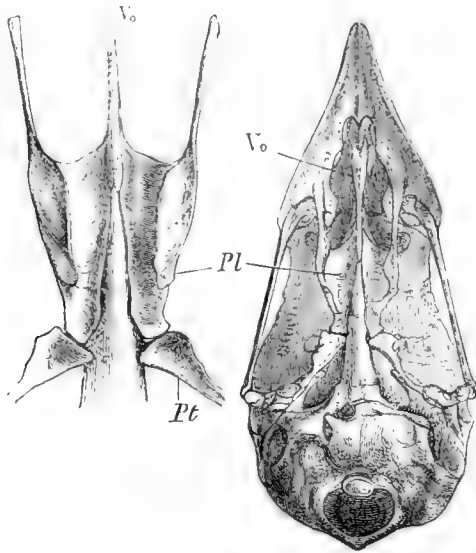
15. Side view of the skull of *Opisthocomus*.

There are no basipterygoid processes—a circumstance in which *Opisthocomus* differs from all the *Alectoromorphæ* and most of the Pigeons*. In the antero-posterior convexity of the basitemporals

* In *Goura* they are sometimes almost obsolete; and they are absent in *Didus* and *Pezophaps*.

and their extension outwards beneath the tympanum, *Opisthocomus* resembles the *Alectoromorphæ*.

Fig. 16.



The skull of *Opisthocomus cristatus*, viewed from below, with the palatine bones enlarged, from another specimen.

Vo. Vomer. *Pl.* Palatine bones. *Pt.* Pterygoid.

Upon the whole, then, I think it may be said that, in skull, vertebral column, pectoral arch, and fore limb (except, perhaps, the scapula and the humerus), pelvis, and hind limb, *Opisthocomus* resembles the ordinary Gallinaceous birds and the Pigeons more than it does any others, and that when it diverges from them it is either *sui generis* or approaches the *Musophagidæ*.

I propose to consider it as the type and sole member of a group which may be termed HETEROMORPHÆ.

IV. Taxonomic conclusions.

The only other birds, in addition to those which have now been mentioned, which come into direct relation with the *Alectoromorphæ* are the *Tinamomorphæ*, *Chenomorphæ*, and, perhaps, the Birds of prey; but I do not purpose to enter upon the discussion of the affinities of these groups at present.

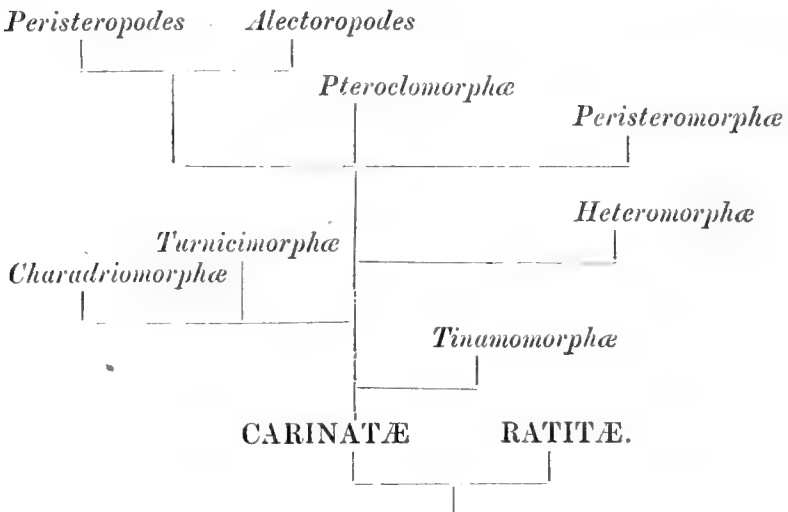
To sum up the taxonomic results of the preceding (somewhat lengthy) discussion of the characters of the *Alectoromorphæ*, *Pterocloromorphæ*, *Turnicimorphæ*, and *Heteromorphæ*, I think it can be proved that the *Alectoromorphæ*, the *Pterocloromorphæ*, and the *Peristeromorphæ* form an extremely natural series; and if the words "*Gallinæ*" and "*Gallinaceous*" had not been already used in so many senses, I should propose to employ them to designate it. As matters stand, there will be less chance of confusion and misunder-

standing if I speak of them as the GALLO-COLUMBINE series. The best mark of the birds of this series is the sternum, which is almost always very readily recognizable, great as its variations are.

I have endeavoured to show that the *Pterocloromorphæ* completely connect the Pigeons and the Tetraonine division of the *Alectoromorphæ*. M. Blanchard has observed that "les *Alectors*, c'est-à-dire les genres *Crax*, *Urax*, *Pénélope*, ont des rapports étroits avec les Tétrao, en même temps qu'ils indiquent l'affinité dont il a été question entre les deux familles des Gallides et des Columbides" (*l. c.* p. 104). I confess I cannot perceive any close relation between the *Peristeropodes* and the *Tetraoninæ*. On the contrary, the former appear to me to be more directly connected with the *Gallinæ*, and especially with *Numida*. And though there are unmistakable resemblances between the *Peristeropodes* and the Pigeons in the form of the feet and in that of the sternum, I am inclined to think, in view of the many differences of these birds, that they do not indicate any very close affinity.

From the point of view of the Evolution theory, all the Gallo-columbine birds must be regarded as descendants of a single primitive stock; and the relations of the different groups should be capable of representation by a genealogical tree, or *phylum* as Haeckel calls it in his remarkable 'Generelle Morphologie.' Such a phylum can only be put forward with confidence when a tolerably complete knowledge of the development and of the palæontological history of a group has been obtained.

But if, with our present information, I were called upon to draw out such a phylum of the Gallo-columbine birds, I should suggest some such scheme as the subjoined:—



Such a scheme implies that all the Gallo-columbine birds have had a common ancestry, and that the *Pterocloromorphæ* are the nearest representatives in the direct line of that ancestry. This, of

course, no more obliges us to believe that the original Gallo-columbine bird was just like *Pterocles*, than the fact that a given nobleman is directly descended from a Norman baron compels us to think that a photograph of the one would serve for a portrait of the other.

I cannot understand the general resemblances combined with the particular differences of *Opisthocomus*, without the supposition that it is a highly modified form derived from the primitive Gallo-columbine stock.

But the resemblances between the Gallo-columbines and the *Charadriomorphæ* (or rather the *Alco-pluvialine* series) are such that, if the theory of evolution be correct, they also must have had a common stock; and I presume that the *Turnicimorphæ* may be the nearest representatives of that stock.

All these, again, are modifications of that primary form of the *Carinatae* of which I am disposed to think *Tinamus* the only living representative; while the *Ratitæ* are the scanty modern heirs of the great multitude of ornithoid creatures which once connected Birds with Reptiles.

V. *The geographical distribution of Alectoromorphæ.*

The geographical distribution of the *Alectoromorphæ* is related in a highly interesting manner to that classification of its members which has been shown above to flow from the comparison of their most important anatomical characters.

Thus, the *Peristeropodes* occupy a vast area which lies largely, though by no means wholly, upon the southern side of the equator. All distributional boundary lines can be but roughly and broadly drawn; but such a line, limiting the northern extension of the *Peristeropodes*, would cross the American continent on the northern frontier of Mexico, and then, sweeping southward and eastward across the Atlantic round the Cape of Good Hope, would leave Africa altogether to the north*. Passing south of India and Indo-Malaysia, but north of the Nicobar islands, the boundary in question would coincide with what may be called "Wallace's line," between the Indian and the Papuan divisions of the Malay archipelago. But it would run northward as far as the Philippines, and, passing between them and Formosa, would trend southward and eastward to the Samoan archipelago. (See Map, p. 294.)

The *Peristeropodes* are not found on the north side of the irregularly waved line which has been thus defined. The *Alectoropodes*, on the other hand, occupy the great northern region thus excluded, only a few Quails, Odontophorines, and *Meleagris* extending to the south of the frontier line.

Thus, if we consider the distribution of the *Alectoromorphæ* alone, the whole surface of the globe must be primarily subdivided into two principal areas—a northern and a southern. And I think it is

* I have not seen the skeleton of the genus *Mesites*; but Dr. Selater, who has examined the only specimen of this Madekass bird which has been brought to Europe, tells me that he does not believe it to be Gallinaceous.

not difficult to show, from other considerations, that these are really the most important divisions which can be established for the geographical distribution of both Birds and Mammals.

Thus, in addition to the *Alectoropodes*, the following important groups of Birds are either confined to the northern area, or are represented elsewhere by not more than one or two species—

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| <i>Pteroclidæ</i> , | <i>Vulturidæ</i> , |
| <i>Otididæ</i> , | <i>Upupidæ</i> , |
| <i>Gruidæ</i> , | <i>Bucerotidæ</i> , |

while, in comparison with the southern area, it is very poor in

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| <i>Ratitæ</i> , | <i>Psittacomorphæ</i> , |
| <i>Peristeromorphæ</i> , | <i>Caprimulgidæ</i> . |

With respect to Mammals, the northern area is almost coincident with the distribution of the *Insectivora*, and it is the headquarters of the *Ungulata*; Catarrhine Apes and Lemurs are confined to it; and it contains only two species of *Marsupialia*, and very few of *Edentata*. Among the lower *Vertebrata*, Ganoid fishes are not found outside this area.

To the southern area, on the other hand, are restricted:—

The *Ratitæ* (except *Struthio*).

The *Tinamomorphæ*.

The *Cathartidæ*.

The majority of the Pigeons and Parrots, and all the most peculiar types of both.

The *Trochilidæ* and the *Aptenodytidæ*, with few exceptions.

Many annectent, or apparently isolated, forms of birds, such as the *Palamedeidæ*, *Psophidæ*, *Dicholophidæ*, *Heteromorphæ*.

Among Mammals, the *Marsupialia* are as nearly confined to and coextensive with it, as the *Insectivora* are in respect of the northern area. The Platyrrhine and Arctopithecine Monkeys and the *Monotremata* are confined to it. It is the headquarters of the *Edentata*, and is very poor in *Ungulata*—so as exactly to reverse the characters of the northern area in these respects.

In a well-known and very valuable essay on the Geographical Distribution of Birds*, Dr. Sclater divides the surface of the globe primarily into an eastern and a western area, which he terms respectively *Palæogæa* and *Neogæa*. However, if we take into consideration not merely the minor differences on which the species and genera of Birds and Mammals are often based, but weigh the morphological value of groups, I think it becomes clear that the Nearctic province is really far more closely allied with the Palæarctic than with the Neotropical region, and that the inhabitants of the Indian and the Æthiopian regions are much more nearly connected with one another and with those of the Palæarctic region than they are with those of *Australia*†.

And if the great frontier line is latitudinal rather than longitu-

* Journ. Proc. Linn. Soc. Zool. vol. ii. p. 120.

† M. Pucheran has insisted very strongly and, as I think, justly on the essential unity of the fauna of Europe, Asia, and Africa.

dinal, and divides a north world from a south world, we must speak of *Arctogæa* and *Notogæa* rather than of *Neogæa* and *Palæogæa* as the primary distributional arææ.

The secondary divisions, or geographical provinces, proposed by Dr. Scater, answer, in great measure, to those which are suggested by the distribution of the *Alectoromorphæ*—except that, in common with many other naturalists, I think it would be convenient to recognize a *circumpolar* province, as distinct from the Nearctic and Palæarctic regions. It is characterized, so far as the *Alectoromorphæ* are concerned, by the *Tetraoninæ*. The temperate and warmer parts of the Nearctic province are marked by the *Odontophorinæ* and the *Meleagridæ*. The Æthiopian province is distinguished by *Numididæ*; the Indian by the abundance of *Phasianidæ*; while the temperate and warmer parts of the Palæarctic region can hardly be said to have any great distinctive features apart from the continuous Indian, Æthiopian, and circumpolar provinces.

No one can doubt the distributional importance and distinctness of Dr. Scater's "Neotropical" province—though I confess I should prefer some such name as "Austro-Columbia" for it, so much of this province lying outside the tropics.

Not only is this province the exclusive home of the *Cracidæ*, but a greater number of morphologically distinct groups of birds than can be found anywhere else are completely, or almost, confined to it. These are the

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| <i>Rheidæ</i> , | <i>Psophidæ</i> , |
| <i>Tinamomorphæ</i> , | <i>Ramphastidæ</i> , |
| <i>Heteromorphæ</i> , | <i>Cathartidæ</i> , |
| <i>Palamedidæ</i> , | <i>Trochilidæ</i> . |
| <i>Dicholophidæ</i> , | |

Parrakeets, Short-tailed Parrots, and the Pair-toed *Coccygomorphæ* (such as Cuckoos and Woodpeckers) abound in it.

No less exclusively characteristic, positively, are the Mammalian groups of Llamas and Peccaries among the *Artiodactyla*, of Sloths and Armadillos among the *Edentata*, of Platyrrhine and Arctopithecinæ *Primates*, of Opossums (with *Cheironectes*) among *Marsupialia*; while, negatively, the absence of *Insectivora**, of *Viverridæ*, of all other *Ungulata* except *Cervidæ*, of all other *Marsupialia*, is not less remarkable.

Again, I cannot but think that the "Australian, or Eastern Palæotropical," province is certainly as distinct from the Old World proper as South America is †, if we consider both its Birds and its Mammals—and that no fitting idea of its importance is given by

* *Solenodon* is confined to two West-Indian islands—Cuba and Haiti; *Bassaris* is but a doubtful Viverrine, and gets no further south than Mexico.

† "Quelles que soient du reste les destinées ultérieures du principe que je viens d'émettre relativement au mode à suivre pour la détermination des faunes spéciales, il est impossible de nier que, sous ce point de vue, l'Amérique méridionale, d'une part, la Nouvelle Hollande, d'autre part, doivent être séparées du reste du monde."—PUCHERAN, *Sur les indications que peut fournir la Zoologie*, &c. (*Revue et Magasin de Zoologie*, 1865, p. 162).

making it a mere subdivision of the Old World. Exclusively confined to it are the

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| <i>Dromæidæ,</i> | <i>Strigopinæ,</i> |
| <i>Dinornithidæ,</i> | <i>Plectolophinæ,</i> |
| <i>Apterygida,</i> | <i>Trichoglossinæ,</i> |
| <i>Didunculidæ,</i> | <i>Menuridæ.</i> |
| <i>Dididæ,</i> | |

Like Austro-Columbia it abounds in Parrakeets and Pigeons; but Woodpeckers are entirely absent, and only a few Cuckoos represent the Pair-toed *Coccygomorphæ*.

Positively, this region is characterized by the abundance of Marsupials (except Opossums) over a large part of its area, by the presence of Monotremes in a small part; negatively, by the absence of almost all other terrestrial Mammals.

In fact the population of this great region (which I should prefer to call "Australasia") is so very different not only from that of Arctogæa, but from that of Austro-Columbia, that a good case might be made out for regarding it as a primary division in zoogeography, of the same value as Arctogæa and Austro-Columbia. Indeed I am not disposed to weigh lightly the claims of the New-Zealand islands to a similar distinction. This region of the world alone possesses two families of *Ratitæ* which are exclusively confined to itself. The *Alectoromorphæ* are represented only by a Quail. Again, in the absence of all *Ophidia* and *Chelonia*, and of all terrestrial *Mammalia* with the doubtful exception of a Rodent or two, New Zealand is without a parallel in lands of its size.

If this view were admitted, it would be requisite to divide the earth's surface, for the purpose of geographical zoology, into four primary regions:—I. Arctogæa. II. Austro-Columbia. III. Australasia. IV. New Zealand. But this arrangement would leave out of sight the important fact that in some respects the three latter are less unlike one another than they are unlike the first—for example, in the paucity or absence of Ungulate Mammals, the abundance of Edentates and Marsupials among Mammals; and, in the class of Birds, nothing can be more remarkable than the great development of the *Psittacomorphæ* in both Australasia and Austro-Columbia, while they are, comparatively, so feebly represented in India and South Africa, and are absent, save a stray species or two, in North America*. Not only in this circumstance, but in the wonderful uniformity of their osteology, the *Psittacomorphæ*† nearly repeat the phenomena presented by the *Peristopodes*, and help, with them and the three-toed *Ratitæ*, to bind together the widely sepa-

* The *Peristeromorphæ* resemble the Parrots in their remarkable development in Australasia and Austro-Columbia, and in their comparative paucity in India and Africa. But the contrast is less marked; and they extend over all the temperate portions of Arctogæa. See Wallace "On the Pigeons of the Malay Archipelago" (Ibis, 1865, p. 365).

† See Wallace, "On the Parrots of the Malayan Region" (Proc. Zool. Soc. 1864, p. 272), and Finsch, "Die Papageien."

rated portions of the south world, and justify the adoption for it of the title of *Notogæa*, in contrast to the north world, or *Arctogæa*.

The eastern boundary between *Arctogæa* and *Australasia* is formed, not by a line, but by a broad zone of border islands, extending between Asia and Australia from the Philippines, or even Formosa, to Madagascar. As a distributional area, it is characterized by *Le-murini* or *Catarrhini*, or both—by large Insectivores where there are no Marsupials, or small Insectivores where there are—by frugivorous Bats and viverrine *Carnivora*—and by the paucity of other *Mammalia*.

It does not appear that there is anything independent about this fauna. So far as I know, it presents no considerable group of either Mammals or Birds which is not to be met with in the great provinces which it separates. Negatively, however, it is extremely remarkable*; why Borneo and the Philippines should have, at once, so much and so little in common with Asia, New Guinea with Australia, Madagascar with Africa, are problems not easy of solution, though Mr. Murray's ingenious suggestions as to the possible influence of partial submersion appear to me to be worthy of much attention †.

The western frontier of *Arctogæa* is formed by an area of the North-American continent, which extends from the Pacific to the Atlantic, and has no definite boundaries—southern forms and northern forms overlapping, more or less, from the isthmus to the lakes. If this portion of North America were now to be partially submerged and broken up into islands, Mexico would stand in the same relation to Austro-Columbia as Sumatra does to India; and the population of the country north of the lakes would resemble that of Northern Asia more than the fauna of New Guinea does that of Australia. The intermediate islands would correspond with the chain of the Indian archipelago.

It is a trite remark that none of the great zoogeographical provinces, however we may circumscribe them, are sharply defined from one another, if the larger groups, such as genera and families, are taken into consideration. Each province has its *characteristic groups* limited to itself; but every two are also united by *annectent groups*.

If we consider *Arctogæa* as having Austro-Columbia on the west, and Australasia on the east, these annectent groups will be divisible into eastern and western. Now it is a remarkable circumstance that a large proportion of these annectent groups, whether eastern or western, are restricted to the two provinces which they connect, and do not extend into the third.

Thus the following eastern annectent groups extend from Australia over a very wide extent of *Arctogæa*, while they are wholly wanting in Austro-Columbia:—

Hemipodidæ,
Otididæ,
Glareolidæ,

Gruidæ,
Meropidæ,
Coracidæ,

among Birds; and the Frugivorous Bats among *Mammalia*.

* See Mr. Wallace's remarks on the fauna of these islands, P. Z. S. 1864. p. 277.

† See 'The Geographical Distribution of Mammals,' p. 83.

Others have the converse distribution; that is to say, they exist in Austro-Columbia and over a large part of Arctogæa, but are absent in Australia:—

Psittacinæ,
Trogonidæ,

Celeomorpha,
Amphimorpha,

among Birds; and

Primates (except Man),
Carnivora,

Ungulata,
Edentata,

among the *Mammalia*. And it is further remarkable that, among these western annectent *Mammalia*, there are sundry important families, such as the *Camelidæ*, *Cervidæ*, *Tapiridæ*, *Ursidæ*, *Subursidæ*, and (with one or two exceptions) the *Melidæ* and *Mustelidæ*, which are found both in Austro-Columbia and Asiatic Arctogæa, but are absent in South Africa.

I am not aware that any important group of birds has the same distribution.

Among land-animals, a single group of these western annectent *Mammalia*, the *Echimyini*, is found only in Austro-Columbia and South Africa. The genus *Manatus*, among *Mammals*, and the order *Dipnoi*, among *Fishes*, are aquatic animals with a similarly remarkable distribution. I do not know of any exactly corresponding case among *Birds*; but I may remark that two most peculiar groups of South African *Birds*, the *Musophagidæ* and the *Struthionidæ*, come nearer the Austro-Columbian *Rhamphastidæ* and *Rheidæ* than to any other forms.

The existence of these western annectent groups, now in many cases confined to the southern parts of the New and Old Worlds, and separated by thousands of miles of sea, is utterly unintelligible and inexplicable without the aid of palæontology, which demonstrates that, in the earlier part of the tertiary epoch, Western and Northern Arctogæa, from Nebraska through Central Europe to the Siwalik Hills, was inhabited by a fauna which, so far as *Mammals* are concerned, was competent to supply Africa and India with their Apes, their *Ungulata*, their *Carnivora*, and to furnish Austro-Columbia with the *Proboscidea*, Horses, and *Machairodus*, which it once possessed, and with its existing *Tapirs*, and *Cameline* and *Marsupial quadrupeds*.

We may expect a great deal of important information respecting miocene birds from M. Alphonse Milne-Edwards, who has already demonstrated the existence of several species of Flamingos in France during the miocene epoch, and has thus connected the existing distributional areas of these birds, just as the miocene Tapir of Europe connects the Indian and South-American Tapir.

But, it is very interesting to remark, the European miocene and eocene formations have, as yet, yielded no trace of Armadillos or of Sloths, of Kangaroos, Phalangers, Wombats, *Dasyures*, *Thylacines*, or *Monotremes*; and, so far as existing evidence may be trusted, it is highly probable that the three great distributional provinces of Arctogæa, Austro-Columbia, and Australasia were as dis-

inct in the early tertiary epoch as they are now. It is in accordance with this supposition that the remains of *Alectoropodes*, but not of *Peristeropodes*, have been found in the older tertiary deposits of Europe.

I watch the progress of M. Alphonse Milne-Edwards's researches with great interest, to know whether Parrots, Pigeons, *Dromæidæ*, and *Rheidæ* occur in force, or at all, among the miocene birds. If they are absent from the miocene fauna of Arctogæa, it will be necessary to suppose that these groups of birds are of sufficiently ancient origin to have been segregated, even before the miocene epoch, in Austro-Columbia and Australasia, whence they have subsequently colonized parts of Arctogæa; while, on the other hand, their presence in European miocene formations will render it possible that the colonization has taken place the other way, and that these birds have attained their wonderful multiplicity and diversity of forms in Austro-Columbia and Australasia simply in consequence of the very favourable nature of the conditions to which they have been exposed in that country.

I confess I incline to the latter supposition. The distribution of *Psittacula*, for instance, is quite unintelligible to me upon any other supposition than that this genus existed in the miocene epoch, or earlier, in Northern Arctogæa, and has thence spread into Austro-Columbia, South Africa, India, and the Papuan islands, where it is now found.

May 28, 1868.

George Busk, Esq., F.R.S., V.P., in the Chair.

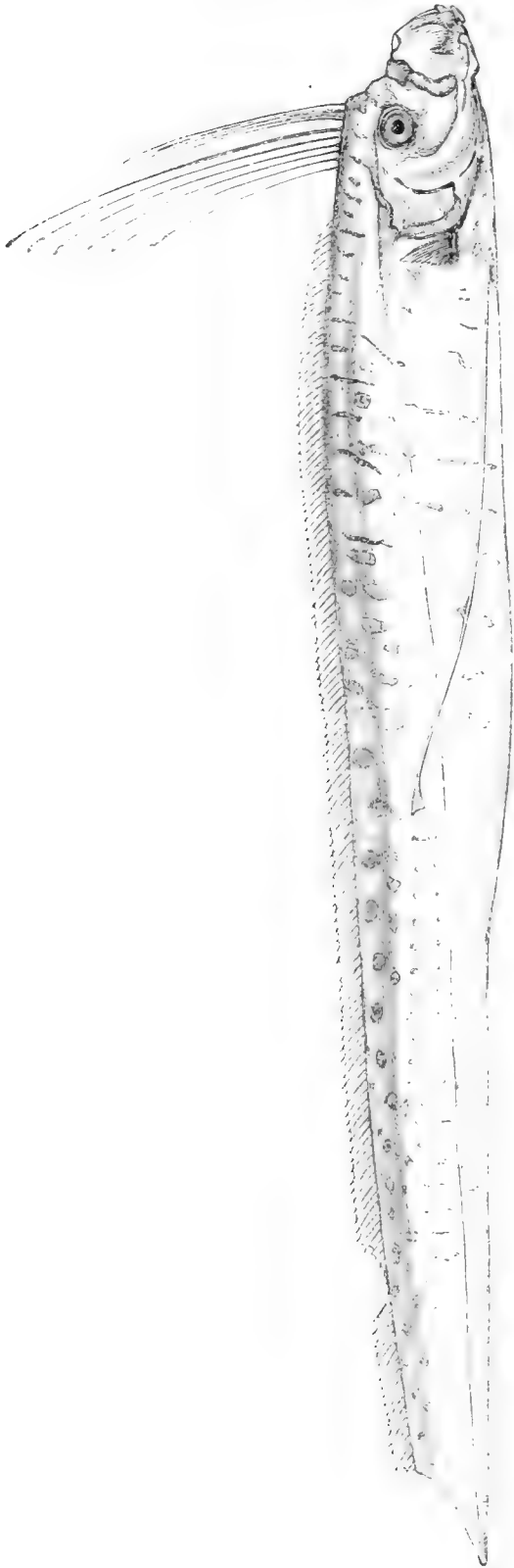
The Secretary reported that two living examples of Owen's Apteryx (*Apteryx owenii*), destined for the Society's Menagerie, had been recently shipped from Australia (one by Dr. George Bennett, F.Z.S., of Sydney, and the other by Mr. E. S. Hill, C.M.Z.S., of Wollahra, Sydney), but that they had both, unfortunately, died on the voyage home.

Dr. Günther exhibited specimens of the ova and young of the Axolotl (*Siredon mexicanum*) which had been deposited and hatched in a freshwater tank in this country, and made remarks on the strange facts connected with the development of this animal and its systematic position.

The following letter was read, addressed to the Secretary by Mr. E. L. Layard, of Cape Town, F.Z.S. :—

“ South-African Museum, Cape Town,
Cape of Good Hope, February 1868.

“ SIR,—Herewith I forward, for the purpose of being laid before



Equichthys capensis (?), from sketches by Mr. D. Krynauw.

the Society, a description, together with some sketches by my friend Mr. D. Krynauw, of a fine *Gymnetrus*, which came ashore alive on the beach at Pappendorp, a little below Cape Town, in Table Bay, a few days ago.

“The extreme length was 10' 2", breadth 1' 2", thickness 2½"; height of back fin 2½"; length of ventral fins 3' 8", of filaments on head 2' 1", pectoral fin 3", from vent to end of body 4' 9"; head and mouth extended 11"; body just across the vent 10". Ends of ventral fins broadly spatulate; the whole fin furnished with a narrow membrane on the upper side, which at about two-thirds of the length rose up into a triangular-shaped peak. The filaments on the head were also slightly spatulate. I take them to be modifications of the dorsal fin, and as such I shall write of them. First dorsal long and strongest; second, third, fourth, and fifth thinner, and joined to the first by a thin membrane of a light pink colour with dark pink spots on it; sixth longest of all; seventh, eighth, ninth, tenth, eleventh, and twelfth graduated, smaller from the sixth, and only united at their bases by a thin membrane. The proper dorsal extended from the shoulder to near the end of the body (as shown in the figure, p.320), the body then sloped away to the tail, which was wanting, the end vertebra being exposed, having been apparently bitten off; it was, however, very minute, and could only have supported a very small tail—probably a single filament. The general colour was white silvered over. There was a streak on the back, 3½" wide, of a pale blue black; and in this were the chief markings. The first third was striped with rather dark streaks, the last two-thirds with blotches of bluish brown. The parts just below the edge of the gill-covers black. Dorsal fin (including long filaments) rich pink vermilion, changing into orange at the base of last third of the length; ventral fins also of the same colour, the spatulate ends very dark. Eye white, with black centre, total diam. 1¾". Medial line raised and strongly marked. Four rows of slightly raised small dusky specks ran the whole length of the body. Scales none. Teeth none. Mouth opening and shutting like the hood of a phaeton! Gill-covers hard bony plates; sides of the mouth the same. Sex ♀. On opening the fish to preserve it, it was found full of spawn from the head to the vent. This consisted of clear transparent globules, not unlike frog-spawn, but without the black dot. The stomach about 1' long, and a simple bag full of some yellow matter. The day after its capture the flesh was so decomposed (though not offensive) that it resembled slime. Near the tail was a gash extending across the body, and part of the dorsal fin had been bitten away. Skin very thin and tender.

“This specimen was seen by some boys to run ashore on the beach; they immediately informed a zealous friend of the Museum, Mr. Adams of Pappendorp, who at once secured it, and laying it on a long plank had it brought to me; it was, however, dead when it reached me. Its colours soon faded out, and it is now nearly white. Mr. Adams says that in dying it exhibited iridescent hues.

“Comparing it mentally with fragments of another fish of the same genus which reached me from Simon’s Bay, I should say it was a second species found on this coast; the former was not nearly so broad, and yet of equal length. I cannot identify it with either *G. ascanii*, *G. hawkenii*, or Russel’s *Gymnetrus*, descriptions of which are in Shaw. It is probably *G. capensis*, Cuvier (Hist. des Poissons, vol. x. p. 376). That was described from an imperfect specimen; but Cuvier says it much resembles his *G. gladius*, a figure of which is given (No. 298). My fish does resemble it; but the caudal extremity is different, and so are the markings. I therefore offer the accompanying sketches and description to the Zoological Society. The hard bony plates of the head and the dorsal filaments of *G. gladius* are very like those of my fish.

“I am, Sir, yours &c.,

“E. L. LAYARD.”

The following papers were read:—

1. Descriptions of New or little-known American Birds of the Families *Fringillidæ*, *Oxyrhamphidæ*, *Bucconidæ*, and *Strigidæ*. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.L.S., &c.

(Plate XXIX.)

1. *PEUCEÆA NOTOSTICTA*, sp. nov.

Supra fuscescenti-cinerea, interscapulio et alarum tectricibus distincte nigro striatis: pileo medio cinereo, utrinque rufescenti-brunneo nigro striato: superciliis et oculorum ambitu albis: alis et cauda nigricanti-cinereis, plumarum marginibus dilutionibus, secundarius extus brunnescente limbatis: subtus alba, cinereo, præcipue in pectore et lateribus, lavata; ventre medio et crisso dilute cinnamomeis: striga mentali utrinque nigricante: rostro nigro: pedibus flavicantibus: long. tota 6·5, alæ 2·7, caudæ 3, tarsi 0·7 poll. Angl.

Hab. in Mexico meridionali (*Boucard*).

Obs. Similis *P. boucardi*, sed pilei lateribus rufescenti-brunneis nigro striatis, et interscapulio nigro distincte strigato diversa.

Mus. Salvino-Godmannico.

M. Boucard’s recent collections from the States of Puebla and Mexico contained a single skin of the present species, which, although very closely allied to *P. boucardi*, is certainly distinct, and may be easily recognized by the characters pointed out above.

In the single specimen obtained the bill is black; but this may be a seasonal character. The wings are rather longer than in *P. boucardi*, the fourth primary being longest and slightly exceeding the third and fifth, which are equal. The first primary is 0¹¹·4 shorter than the fourth.

We are acquainted with five species of *Peuceæa*, which we divide



mit lith.

M & N. Hanhart, imp

GYMNOGLAUX LAWRENCII



(following Baird) into two groups:—first, those without any rictal streak and with the bend of the wing yellowish; and, secondly, those with a rictal streak, and with the bend of the wing whitish.

a. *Sp. striga rictali nulla: campterio flavicante.*

(1) PEUCÆA ÆSTIVALIS.

Fringilla æstivalis, Licht.: *Fr. bachmanni*, Aud.: *Peucæa æstivalis*, Baird, B. N. A. p. 484.

Hab. North America, Georgia (*Baird*).

Mus. P. L. S. et Salvino-Godmannico.

(2) PEUCÆA BOTTERII.

Zonotrichia botterii, Sclater, P. Z. S. 1857, p. 214.

Peucæa botterii, Sclater, Cat. A. B. p. 116.

Hab. Mexico merid.: Orizaba (*Botteri*); Atlisco (*Boucard*).

Mus. P. L. S. et S.-G.

This species was originally described by Sclater from a single indifferently skin obtained by Botteri near Orizaba. The specimens *b*, *c*, and *d* of his American Catalogue, subsequently referred to it, have since been found to belong to *P. boucardi*. But Salvin has obtained from M. Boucard's recent collection a second (good) example of the bird. This shows that it is a species very closely allied to *P. æstivalis*, but differing in its larger size, paler chest, longer and stouter tarsi, and larger feet. In the colouring of the body above, the two species approximate very closely.

(3) PEUCÆA CASSINI.

Zonotrichia cassinii, Woodhouse.

P. cassinii, Baird, B. N. A. p. 485.

Hab. Texas, San Antonio (*Woodhouse et Dresser*); Sonora (*Kennerly*).

Mus. P. L. S.

b. *Sp. striga rictali nigra; campterio albicante.*

(4) PEUCÆA BOUCARDI.

Zonotrichia boucardi, Sclater, P. Z. S. 1867, p. 1, t. 1.

Hab. Mexico merid.: Orizaba (*Botteri*); Atlisco et La Puebla (*Boucard*).

Mus. P. L. S. et S.-G.

(5) PEUCÆA NOTOSTICTA, nobis.

We have not yet seen specimens of *P. ruficeps* (Baird, B. N. A. p. 486) from California, which seems to be a good species of the second section.

2. ZONOTRICHIA QUINQUESTRIATA, sp. nov.

Schistacea, interscapulio vinaceo tincto: alis caudaque fusco-

nigricantibus, secundariorum et tectricum majorum marginibus externis brunnescentibus: superciliis, striga rictali utrinque et gula media albis: gula superiore utrinque et inferiore tota cum pectore medio nigris, ventre medio, hypochondriis et crissi plumarum marginibus nigris: rostro nigricanti-corneo, mandibula flavo notata: pedibus corylinis: long. tota 6.5, ala 2.8, caudæ 2.5, tarsi 0.7.

Hab. Mexico.

Mus. P. L. S.

We describe this well-marked species from a single indifferent skin, which has long remained without a name, in Sclater's collection. It was obtained by him some years ago from Mr. Gould, who received it along with a collection of Mexican Humming-birds.

The species differs in several respects from the members of the genus *Zonotrichia* as restricted by recent systematists, but we know not where else to place it. The wings are short and much rounded, the third, fourth, and fifth primaries being equal and longest, the second being only slightly shorter. The first primary is 0.35 shorter than the longest, and longer than is usual in typical *Zonotrichia*. The tail is short and slightly rounded, and bears no markings on the outer rectrices. We have named it *quinquestriata*, from the five white lines which originate from the bill. These are two short superciliary stripes, two rictal stripes, and one rather broader stripe in the centre of the black throat. In this respect our bird somewhat resembles *Z. mystacalis*, which, however, is readily distinguishable by the bright reddish-brown rump and longitudinal stripes on the head and interscapularies.

3. PYRGISOMA CABANISI.

Melozone biarcuata, Cab. J. f. O. 1860, p. 412.

Pyrgisoma kieneri, Cassin, Proc. Acad. Phil. 1865, p. 169; Lawrence, Ann. L. N. Y. viii. p. 481.

Supra fuscum, pileo et plumis auricularibus castaneis: fronte nigra, loris et regione oculari albis: subtus cinereum, medialiter album, striga utrinque rictali et plaga pectorali media nigris: subalaribus albis: rostro nigro, pedibus corylinis.

Hab. San José, Costa Rica (*Hoffmann*).

Mus. Parisiensi, Berolin. et P. L. S.

Obs. Simile *P. biarcuato*, sed regione parotica castanea et plaga pectorali nigra facile distinguendum.

It is unfortunate that all the naturalists who have met with specimens of the present bird should have identified it wrongly. Dr. Cabanis has referred it to the *Pyrgita biarcuata*, Prévost, a well-known Guatemalan species of the same genus, from which it is easily distinguishable, as above noted. Messrs. Cassin and Lawrence have supposed it to be *Pyrgisoma kieneri* of Bonaparte, overlooking the fact that the latter species is characterized as being, in comparison with *P. biarcuatum*, "*valde majus et rostro robustiore*," whereas

the present bird is of exactly the same form as *P. biarcuatum*, and rather smaller in dimensions.

4. PYRGISOMA KIENERI.

Pyrgisoma kieneri, Bp. Consp. i. p. 486.

Fusum, pileo et capitis lateribus rufis: plumis auricularibus dorso concoloribus, harum autem apicibus castaneis, loris albescens, fronte et genis fuscescenti-nigris: subtus album, hypochondriis dorso concoloribus, macula pectorali indistincta nigra; crisso rufescente; rostro nigricanti-corneo, pedibus pallide corylinis: long. tota 7.3, alæ 3.3, caudæ 2.9, tarsi 1.

Hab. Western Mexico (?).

Mus. Paris.

Obs. Similis *P. rubricato*, sed rostro magis crasso, pedibus robustioribus, et colore corporis superi brunnescentiore.

The insufficient diagnosis of *Pyrgisoma kieneri* given in the 'Conspectus' has principally caused the great confusion which now prevails among the species of this group, and which, having lately inspected the typical example of this species in the Paris Museum, we now hope to clear up. *Pyrgisoma kieneri* of Bonaparte is founded on a single skin in the Paris Museum, collected during the voyage of the 'Danaïde' in May 1843. The locality is not given; but the bird was in all probability obtained somewhere on the western coast of Mexico. In general plumage *P. kieneri* is more like *P. rubricatum* than any other species of the group; but it is at once distinguishable from all its congeners by its stouter bill, and larger and stronger tarsi and toes. It was, no doubt, these characters that induced Prince Bonaparte subsequently to remove it from *Pyrgisoma* and to associate it with the Brown Pipilos (*P. fuscus*, &c.) as a separate genus *Kieneria**. It is, in fact, rather difficult to decide whether to arrange *Pyrgisoma kieneri* with the other *Pyrgisomas* or with these Pipilos. But, upon the whole, we prefer to adopt the former course, as it would be unnatural to dissociate it from *P. rubricatum*, with which it so closely agrees in plumage. But *P. rubricatum* is certainly a typical species of *Pyrgisoma*, as is allowed by all writers upon the group.

The five species of *Pyrgisoma* known to us may be arranged as follows:—

Sect. a. *Species pileo castaneo, gutture albo.*

a'. *pectore immaculato.*

(1) PYRGISOMA BIARCUATUM.

Pyrgita biarcuata, Prév. Voy. Vénus, Ois. t. 6.

Pyrgisoma biarcuatum, Bp. Consp. p. 486; Sci. & Salv. Ibis, 1859, pp. 5, 18.

Hab. Guatemala (*Salvin*).

Mus. P. L. S. et S.-G.

* Compt. Rend. xl. p. 356 (1855).

b'. *plaga pectorali nigra.*

(2) PYRGISOMA CABANISI, nobis.

Hab. Costa Rica.*Mus.* Paris. et P. L. S.

(3) PYRGISOMA RUBRICATUM.

Tanagra rubricata, Licht. in Mus. Berol.*Atlapetes rubricatus*, Cab. Mus. Hein. i. p. 140.*Melozone rubricata*, Cab. J. f. O. 1860, p. 413, et 1866, p. 234.*Pyrgisoma xanthusi*, Baird; Lawr. Ann. N. Y. Lyc. viii. p. 480.*Hab.* Mexico: Plains of Colima (*Xanthus*); Atlisco (*Boucard*).*Mus.* S.-G.

(4) PYRGISOMA KIENERI.

Pyrgisoma kieneri, Bp. Consp. i. p. 486.

Similis præcedenti, sed rostro magis crasso, pedibus robustioribus, et colore corporis superi brunnescentiore: regione parotica dorso concolori.

Hab. Western Mexico (?).*Mus.* Paris.

Sect. b. *Pileo medio cinereo, lateraliter nigro: gutture toto nigro.*

(5) PYRGISOMA LEUCOTE.

Melozone leucotis, Cab. J. f. Orn. 1860, p. 413; Cassin, Pr. Ac. Phil. 1865, p. 169.

"*Chamæospiza torquata*," Scl. & Salv. Ibis, 1860, p. 274.

Pyrgisoma leucote, Salv. Ibis, 1866, p. 205.

Hab. Costa Rica (*Hoffmann, Carmiol*); Guatemala (*Salvin*).

Mus. P. L. S. et S.-G.

5. OXYRHAMPHUS FRATER, sp. nov.

Clare viridis; pileo nigro variegato, crista mediali coccinea: alis caudaque nigris extus viridi limbatis, secundariorum et tectricum marginibus externis et caudæ apice extremo pallide flavis: subtus pallide flavus, nigro squamatus, ventris medii et crissi maculis fere evanescentibus: rostro corneo, pedibus plumbeis: long. tota 6·5, alæ 3·5, caudæ 2·1, rostri a rictu 0·85, tarsi 0·8.

Hab. Veragua (*Arcé*).

Mus. S.-G.

Obs. Similis *O. flammicipiti* quoad colores, sed rostro longiore, alis brevioribus et cauda multo breviora distinguendus.

Arcé's last collection contains two skins of this northern representative of the Brazilian *Oxyrhamphus flammiceps*, from which it is easily distinguishable by its short tail. In coloration it scarcely differs, except in its generally brighter plumage, and rather broader cream-coloured edgings to the outer webs of the secondaries and wing-coverts.

It is rather surprising to meet with a second species of this pecu-

liar form in Central America, when nothing is known of its occurrence elsewhere, except in the wood-region of Brazil. We have little doubt, however, that some species of the genus will eventually be found somewhere in the more northern part of South America.

Arcé's specimens of this species were obtained at Calovevora, in Veragua. The example described is marked "female;" but the sexes are probably alike. The second is a young bird of the same sex, in which the scarlet crest is only just commencing to show itself.

6. *MONASA GRANDIOR*, sp. nov.

Schistacea; capite undique, alis et cauda nigricantibus, aeneo perfusis: fronte, loris et gula albis: rostro ruberrimo, pedibus nigris: long. tota, 12, alæ 5·7, caudæ 5·4.

Hab. Costa Rica, Angostura (*Carmioli*); Mosquitia (*Bell*).

Mus. S.-G.

Obs. Similis *M. morpheo* ex Brasilia, et crassitie majore et capite undique nigricantiore vix diversa.

A Costa-Rican collection recently received from Mr. Carmiol contains a single skin of this *Monasa*, which, as above pointed out, is so like the Brazilian *M. morpheus* that we have had some difficulty in distinguishing it. As, however, the intermediate territory between the ranges of these two near allies is occupied by two other species (viz. *M. pallescens*, Cass., of New Granada, and *M. peruana*, Bp., of Upper Amazonia), both of which are recognized as distinct, we have deemed it advisable, in conformity with the laws of geographical distribution, to bestow a name upon the present bird, although its distinctive characters are not very pronounced. In some drawings of birds collected on the Mosquito coast by Mr. Bell, submitted some years ago to Sclater, was a figure which there can be little doubt (from Sclater's notes taken at the time) must have been intended to represent this species. We may therefore conclude that it extends its range northwards into Mosquitia.

A complete synonymy of the six known species of *Monasa* is given by Mr. Cassin in the 'Proceedings of the Academy of Sciences of Philadelphia' for 1860 (p. 135). The present bird makes the seventh of the genus. See also 'Museum Heineanum,' *Scansores* (p. 126 *et seq.*), where a good account of the group is given.

7. *GYMNOGLAUX LAWRENCII*. (Plate XXIX.)

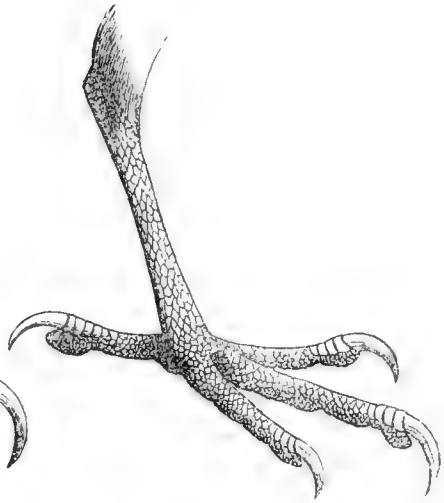
In an article on Cuban birds in the 'Annals of the Lyceum of New York' (vol. vii. p. 247), Mr. Lawrence has correctly pointed out the differences which subsist between the two known species of the Antillean genus *Gymnoglaux*, but has unfortunately committed an error in their nomenclature. Mr. Lawrence has referred the Cuban bird to the *Strix nudipes* of Daudin, and has proposed to call the species of the Virgin Islands *Gymnoglaux newtoni*. A recent inspection of the type specimens of *Strix nudipes* in the Paris Museum (those obtained by Maugé in Porto Rico), and a comparison of them with a skin from St. Thomas's, has convinced us that these birds are identical, and perfectly distinct from their Cuban

representative. It becomes therefore necessary to bestow a new name upon the latter; and we have great pleasure in calling it *Gymnoglaux lawrencii*, after our friend Mr. Lawrence, who has so well pointed out its distinctive characters.

Fig. 1.

Foot of *G. nudipes*.

Fig. 2.

Foot of *G. lawrencii*.

The synonymy of the only two known species of the genus *Gymnoglaux* will therefore stand as follows:—

(1) GYMNOGLAUX NUDIPES.

Strix nudipes, Daud. Tr. d'Orn. ii. p. 199; Shaw, Gen. Zool. vii. p. 269; Vieill. Ois. de l'Am. Sept. i. p. 45, t. 16.

Gymnoglaux nudipes, A. & E. Newton, Ibis, 1859, p. 64, t. 1.

Syrnium nudipes, Kp. Trans. Z. S. iv. p. 250.

Gymnoglaux newtoni, Lawr. Ann. N. Y. Lyc. viii. p. 258.

Major: supra fusca nigro vermiculata: tarsi partim plumosis, dimidio inferiore nudo. (Cf. fig. 1.)

Hab. Porto Rico (*Maugé*); St. Thomas (*Rüise et Swift*); S. Croix (*Newton*).

(2) GYMNOGLAUX LAWRENCII. (Plate XXIX.)

Noctua nudipes, Lembeye, Aves de Cuba, p. 23, t. 4. f. 2.

Gymnoglaux nudipes, Cab. J. f. O. 1855, p. 465; Lawr. Ann. Lyc. N. Y. vii. p. 257; Gundlach, Repert. F. N. i. p. 226.

Minor: supra fusca unicolor, maculis albis aspersa: tarsi fere omnino nudis. (Cf. fig. 2.)

Hab. Cuba (*Lembeye et Gundlach*).

Of this latter species we have examined two specimens in a series of American Strigidæ, kindly submitted to our inspection by the authorities of the Smithsonian Institution. One of these was col-

lected by Mr. Nathaniel H. Bishop at Remedios, in Cuba, in October 1863; the other by Mr. Charles Wright at Monte Verde, in the same island, in August 1861. There is likewise a single example of this bird in the Paris Museum.

2. On the Incubation of the Apteryx.

By A. D. BARTLETT, Superintendent of the Society's Gardens.

In the second volume of Mr. Gould's book upon the Birds of Australia, at page 570, will be found several statements made with reference to the mode of reproduction of the Apteryx. As these strange stories are most of them derived from the natives of New Zealand, and do not appear to have been verified by any one upon whom we can place much reliance, it may be as well to record a few facts that have occurred under my own observation in the Society's Gardens.

In 1851 Lieut.-Governor Eyre presented to the Society an Apteryx. This bird proved to be a female of *Apteryx mantelli*. In the year 1859 she laid her first egg, and has continued to lay one or two eggs every year since that time. In 1865 a male bird was presented by Henry Slade, Esq. During the last year these birds showed symptoms of a desire to pair. This was known by the loud calling of the male, which was answered by the female in a much lower and shorter note. They were particularly noisy during the night, but altogether silent in the daytime. On the 2nd of January the first egg was laid, and for a day or more the female remained on the egg; but as soon as she quitted the nest the male bird took to it, and remained constantly sitting. On the 7th of February the second egg was laid, the female leaving the nest as soon as the egg was deposited. The two birds now occupied the two opposite corners of the room in which they were kept, the male on the two eggs in the nest under the straw, the female concealed in her corner, also under a bundle of straw placed against the wall. During the time of incubation they ceased to call at night, in fact were perfectly silent, and kept apart. I found the eggs in a hollow formed on the ground in the earth and straw, and placed lengthwise side by side. The male bird lay across them, his narrow body appearing not sufficiently broad to cover them in any other way; the ends of the eggs could be seen projecting from the side of the bird. The male continued to sit in the most persevering manner until the 25th of April, at which time he was much exhausted, and left the nest. On examining the eggs I found no traces of young birds.

Notwithstanding the failure of reproducing the Apteryx, I think sufficient has been witnessed to show that this bird's mode of reproduction does not differ essentially from that of the allied Struthious birds, in all cases of which that have come under my observation the male bird only sits. I have witnessed the breeding of the Mooruk, the Cassowary, the Emu, and the Rhea; and the mode of proceeding of the Apteryx fully justifies me in believing the habits of this bird to be in no way materially different from those of its allies.

3. On the Mammalian Fauna of Greenland.

By ROBERT BROWN, F.R.G.S. &c. &c.

[Communicated by Dr. James Murie.]

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1. *History of the Subject.*

In entering upon a review of the Greenlandic species of Mammalia, it may be a matter of surprise to some that anything remains to be said concerning the larger animals of a country so comparatively near home, and regarding which so much has been written, where Ægede, Fabricius, Vahl, and Rink lived, and regarding which we possess the remarks of such excellent naturalists as the acute authors of the 'Fauna Grœnlandica' and 'Grønland Geographisk og Statistisk.' Between the dates of the publication of these two works an interval of upwards of seventy years extends, so that one might suppose that any errors of the first work might have been fully discovered in the interval and corrected in the second. All surprise vanishes, however, when we find that the contrary holds true, and that to-day we know almost as little about the Mammals of Greenland as we did when Fabricius gave us the first systematic account of them. The fact of the matter is that naturalists who have visited Greenland have been too much interested in other departments of natural history to pay attention to the larger members of the fauna, or have supposed that there was nothing worth adding to or (what is just as important) subtracting from it. Accordingly, we find all authors on Arctic animals merely contenting themselves with giving a list of Fabricius's species, and at the same time perpetuating the errors which he fell into through ignorance or credulity, independently of the fact that he only wrote of that limited portion of the country then inhabited by the natives over which his authority as a "Grønlandske Missionair" extended. Can we therefore be astonished if we find the fauna of Greenland, in the class Mammalia, burdened with species which have no existence save in the vivid imagination of the Eskimo or the overlearned acuteness of zoologists, and bereft of others which ought to take their place—their history poisoned with fables only worthy of the belief of the last century, and their geographical range in the country over which they are distributed scarcely touched on, or wrongly described. The accounts of the older writers on Greenland (Ægede-Saabye, Cranz, &c.) were very unsatisfactory; but a new era in the history of northern zoology dawned when Otto Fabricius, who had passed several years in Greenland as a Missionary, published his 'Fauna Grœnlandica'*. This work, far in advance of its age, and which for the conciseness and accuracy of its descriptions has rarely been surpassed, has most deservedly retained its place as our standard au-

* Hafniæ et Lipsiæ, 1780.

thority on the zoology of Danish Greenland*. Herein are enumerated thirty-one species of Mammalia indigenous to the country, exclusive of Man and those which have been introduced by man's agency. Four of these species I have shown in this memoir to have been entered upon imperfect grounds, one was mistaken for another (*Ovibos moschatus* for *Bos grunniens*), and several are now known to be only synonyms of other species. The species of Cetacea are, as might be expected, the most obscurely described of all, and have occasioned much controversy; and more superabundance of literary acumen has been spent on these descriptions than the nature of them will allow of.

Subsequently the elder Reinhardt gave some notes on the Greenland Mammalia in the 'Isis' for 1848, which, in the main, are only a reproduction of the earlier account of Fabricius; and in 1857, the present Professor Reinhardt, of Copenhagen, in the Appendix to Rink's 'Grönland'† furnished a list of the species, also following Fabricius. He has, however, entered the only species then added to the list, viz. *Mus grönlandicus* of Traill‡, discovered by Scoresby on the east coast in 1822, under the name of *Hypudæus grönlandicus*§, and attempts to make out what was the *amarok* of the older authors, Fabricius's *Gulo luscus*, the *Phoca ursina*, which Fabricius enters as a member of the Greenland fauna, the *Trichechus manatus*, &c., and with some success, though, not having visited Greenland himself, he is not so successful as he otherwise might have been. This list, as all the others, solely relates to Danish Greenland, extending from Cape Farewell (lat. 59° 49' N., long. 43° 54' W.) to Upernavik (lat. 72° 48' N., long. 55° 54' W.), and is valuable as expressing the state of knowledge regarding the Mammalia of Greenland in Denmark, represented by a naturalist who has paid much attention to the Arctic fauna, in the elucidation of some of the marine Mammalia of which he has so highly distinguished himself. This, as far as I am aware, is all that immediately relates to the arctic Mammals in Greenland. Various other writings have thrown much light on their *general* history; but it is with their *special* history and geographical distribution in Greenland that I have to deal. Among these memoirs, I ought not to omit mentioning the excellent paper on the Mammalia of the northern countries by Professor Malmgren||, who ac-

* In 1867, whilst staying at Claushavn, I occupied as my *study* a little room in the old Pastor's house, now deserted and used to accommodate any stray wayfaring men like myself. This was said to be the "dark closet" where Fabricius wrought at his Fauna, Lexicon, and other works: it was afterwards the residence of Saabye the grandson of Egede, who also wrote on Greenland.

† Grönland Geographisk og Statistisk beskrevet &c. Band ii. Tillaeg Nr. i. (Pattedyr). This appendix was also published separately, 'Naturhistoriske Bidrag til en Beskrivelse af Grönland,' pp. 1-12.

‡ Scoresby, 'Journal of a Voyage to the Northern Whale fishery, &c.,' Appendix.

§ Prof. Reinhardt obligingly informs me (March 1868) that he is now quite convinced that this is a *Myodes*, though he only knows it from description.

|| "Beobachtungen und Anzeichnungen über die Säugethierfauna Fimmarkens und Spitzbergens," in Wiegmann's Archiv für Naturgeschichte, (Berlin,) 1864, pp. 63-97, translated from Öfersigt af Kong. Svensk. Akad. &c. (1863) ii. pp. 127-155.

accompanied the Swedish Expedition of Otto Torell to Spitzbergen*. He has added, incidentally, not a little to our knowledge; but his treatise is mostly a compilation, and, not looking upon the arctic fauna in a comprehensive view, he has fallen into many errors in zoogeography. For instance, I cannot understand why he has excluded *Balanoptera gigas*, Eschr., and *B. rostrata*, Fab., from the Spitzbergen fauna, nor still less why *Balæna mysticetus*, Linn., is not classed among the Mammals of the seas around. This last is assuredly found there. In Smeerenberg Bay the Dutch used to catch it in abundance, and even erected boiling-houses on shore to "try" out its oil; and the two former are also found there. Indeed nearly all of the Greenland marine Mammalia are also found in Spitzbergen; and certainly Dr. Malmgren's stay was much too short to allow him to come to any decision on the matter.

Eschricht and J. T. Reinhardt's memoirs on the Greenland Whale† have added directly to our knowledge; while the numerous papers and catalogues of Gray‡ and Lilljeborg§ on the British and Scandinavian Cetacea (most of which are also found in Greenland) have helped us to a right understanding of that order. Nilsson has disentangled the northern Pinnipedia in his History of Scandinavian Mammals||; and so has Gray¶ and, more closely relating to Greenland, Fabricius**, in a supplementary paper to his Fauna, and Dr. Wallace in the short abstract of one read before the Royal Physical Society of Edinburgh††, on those killed by the northern Seal-hunters. But nearly all of these papers are only local, or relate merely to questions of specific distinctions and synonyms, and touch but lightly upon the Seals either as animals of Greenland, or on their migrations from one part of the Arctic regions to another. Our own Arctic Expeditions halting little, if at all, on the Greenland coast, and many of them being unprovided with competent naturalists, have added almost nothing to our knowledge of the Arctic or Greenland Mammals; but the American Expeditions to Smith's Sound, under Drs. Kane‡‡ and Hayes§§, have supplied us with many interesting notes on the range and habits of species. I wish I could say the same for all the describers of their collections. Professor

* Svenska Expeditionen till Spetsbergen år 1861, under ledning af Otto Torell—ur detagarnes Anteckningar och andra handlingar skildrad af K. Cheydenius (Stockholm, 1865). *Vide* the account of the Walrus in that work, pp. 168–183 (with plate and woodcut), the excellent figures of Näbbblvalar (*Hyperoodon butzkopf*, Lacép.) facing p. 480, &c.

† Ray Society's Memoirs on the Cetacea, 1866.

‡ Catalogue of Seals and Whales in the British Museum, 1866; and Proceedings of the Zoological Society, and Annals of Nat. Hist., *passim*.

§ Ray Soc. Mem. Cet.

|| Skandinavisk Fauna, Första Delen, Daggadjuren, pp. 268–326 (1847), also translated in Wiegmann's Archiv für Naturgeschichte, Bd. vii. &c.

¶ *Lib. et locc. citt.*

** Naturhistoriske Selskabets Skrivter, Bd. i.

†† Proceedings of the Royal Physical Society of Edinb. 1862–63.

‡‡ Arctic Explorations, 2 vols. 1855.

§§ Voyage towards the open Polar Sea (made in 1860), 1867.

Cope* has attempted to establish several new (*sic*) species of *Beluga* from Hayes's collection; but none of them (in my opinion) have the slightest claims to specific distinction†, the supposed differences being merely such as age or the ordinary variations between one individual and another would produce. By such well-meaning efforts, misdirected, science loses rather than gains.

Other contributions to Arctic Mammalogy I shall have occasion to notice as I proceed.

2. *Systematic Distribution of the Greenland Mammalian Fauna.*

As might be expected, the character of the Greenland Mammalian fauna partakes of a sarcophagous type, the phytophagous species proper being only three, and the marine species far exceeding in number the terrestrial species. In the nomenclature of the Mammalia, though only a secondary matter, in a paper of this nature, so long as they are correctly named, I have followed some standard author, without inquiring too strictly into the soundness or priority of the specific names applied, or the value of the tribal or generic divisions under which these authors have classed them.

This subject I may return to more critically at another time; but in a paper of this nature, I have allowed convenience of reference to overrule other considerations, considering that the eminence of the zoologists followed will be a sufficient safeguard that no great error has been committed. Accordingly the nomenclature of Baird's 'General Report on the Mammalia of North America' is chiefly followed, as far as relates to the Greenland terrestrial species, and Dr. Gray's British-Museum Catalogue (1866) for the marine species, with only a few trifling exceptions, having a view to certain points of the synonymy of Fabricius's species of Cetacea, to be afterwards discussed. I have, however, ventured to differ with Dr. Gray as to the relative rank of the group of Seals, believing, with Illiger‡, that they are entitled to ordinal rank, and have accordingly designated them *Pinnipedia* (Illig.)—forming Gray's tribes *Phocina*, *Trichechina*, and *Cystophorina*, for the sake of uniformity, into families under the titles of *Phocidæ*, *Trichechidæ*, and *Cystophoridæ*, comprising the same species as the former tribes, without, however, committing myself to an opinion regarding the advisability of so many generic and other subdivisions of so natural a group, or of the good taste displayed by M. Frédéric Cuvier in the formation of some of his genera. Thus, with Professor Nilsson§, I cannot see why, in the formation of the genus *Callocephale*|| (*Callocephalus*), Linné's *Phoca vitulina* should have been chosen as the type of the genus, while

* Proceedings of the Philadelphia Academy of Sciences.

† Prof. Reinhardt, who, as Inspector of the Zoological Museum of Copenhagen, has every means of arriving at a determination from an examination of a large number of skulls, writes to me that he has arrived at the same opinion.

‡ Prodomus, p. 138 (1811).

§ Skand. Faun. i. p. 275.

|| F. Cuvier, Mémoires du Muséum, xi. p. 182.

Phoca barbata, Fab., should have been retained as the type of the genus *Phoca**.

Dr. Gray's nomenclature and classification of the Cetacea I have followed almost literally, though some of his species, such as *Lagenorhynchus albirostris*, *L. leucopleurus*, *Delphinus euprosyne* (*D. holböllii*, Eschr.), and *Hyperoodon (Lagenocetus) latifrons*, are only known from skulls or skeletons. The localities are also very vaguely known; so that in the absence of all details in reference to their habits and distribution, and from the fact, moreover, of their specific (and still more their generic) claims not being in every case universally conceded, the physical geographer or naturalist (strictly speaking) can have little to say regarding them. I have, however, entered them as members of the Greenland fauna, in deference to the opinion of their founder, who, since the death of the lamented Eschricht stands alone in his knowledge of the systematic history of the marine Mammalia. The following table will show the general arrangement, the tribal and numerical distribution of the Mammalia of Greenland, exclusive of all introduced species and others which have been erroneously included in former lists, and of the first with whom Fabricius heads his fauna, "*Homo sapiens, sine deo, sine domino*:"—

MAMMALIA GRÆNLANDICA.

Order CARNIVORA.

Family Ursidæ.

Genus Ursus (Thalaretos).

U. maritimus, Linn.

Family Canidæ.

Genus Vulpes.

V. lagopus (Linn.), Rich.

Genus Canis.

C. familiaris, Linn., var. *borealis*.

Order RODENTIA.

Family Arvicolinæ.

Genus Myodes.

M. torquatus (Pall.), Keys. & Blas.

* Even Nilsson's genus *Cystophora*, though faultless in aptitude, is liable to the objection that it has also been applied to a genus of Algæ by J. Agardh. This awkward confusion, however, is so common that it is only just to criticise the fault in the abstract.

Family Leporidae.

Genus Lepus.

L. glacialis, Leach.

Order RUMINANTIA.

Family Bovidae.

Genus Ovibos.

O. moschatus (Gm.), Blainv.

Family Cervidae.

Genus Rangifer.

R. tarandus (L.), Baird.

Order PINNIPEDIA.

Family Phocidae.

Genus Callocephalus.

C. vitulinus (L.), F. Cuv.

Genus Pagomys.

P. foetidus (Müll.), Gray.

Genus Pagophilus.

P. grænlandicus (Müll.), Gray.

Genus Phoca.

P. barbata, O. Fab.

Family Trichechidae.

Genus Trichechus.

T. rosmarus, Linn.

Genus Halichærus.

H. grypus (O. Fab.), Nilss.

Family Cystophoridae.

Genus Cystophora.

C. cristata (Erxl.), Nilss.

Order CETACEA.

Family Balænidæ.

Genus Balæna.

B. mysticetus, Linn.

*Family Balænopteridæ.**Genus Physalus.**P. antiquorum*, Gray.*Genus Balænoptera.**B. gigas*, Eschr.**B. rostrata* (Müll.), Gray.*Genus Megaptera.**M. longimana*, Gray.*Family Catodontidæ.**Genus Catodon.**C. macrocephalus* (Linn.), Lacép.*Family Delphinidæ.**Genus Delphinus.**D. euphrosyne*, Gray.*Genus Lagenorhynchus.**L. albirostris*, Gray.*L. leucopleurus* (Rasch), Gray.*Genus Orca.**O. gladiator* (Bonn.), Sund.*Genus Phocæna.**P. communis*, Brookes.*Genus Beluga.**B. catodon* (Linn.), Gray.*Genus Monodon.**M. monoceros*, Linn.*Genus Globiocephalus.**G. svineval* (Lacép.), Gray †.*Family Ziphiidæ.**Genus Hyperoodon.**H. butzkopf* (Bonn.), Lacép.*H. latifrons*, Gray.* *Sibbaldius borealis* (Less.), Gray, Proc. Zool. Soc. 1864, p. 223.† *Delphinus tursio*, O. Fab. (*Tursio truncatus*, Gray); Groenl. *Nesernak*.

3. *Geographical Distribution of Greenlandic Mammalia.*

Similarity of physical contour and a general uniformity of climate, varying, no doubt, in degree, but still sufficiently inhospitable throughout, with an abundance of the food on which all of them subsist throughout the habitable tracks and in the sea washing the shores of Greenland, have failed, contrary to what might have been expected, to produce a geographical distribution of the Mammalia in a like universal manner, or at all corresponding to the physical uniformity hinted at. It is only in the sea and on a narrow strip of land skirting the shores of Greenland that animal life has yet been found. The whole interior of the country appears to be merely a frozen waste, overlain to a depth of many feet by a huge *mer de glace*, extending, so far as yet known, over its entire extent (with the exception of the strip named) from north to south—a sea of freshwater ice whereon no creature lives, a death-like desert with nought to relieve the eye, its silence enlivened by the sound or sight of no breathing thing. This is the *Inlands Iis* of the Danish colonists; the outer strip, with its mossy valleys and ice-plained hills, is the well-remembered *Fastland*. Dreary, doubtless, it is to eyes only schooled in the scenery of more southern lands; but, with its covies of Ptarmigans flying up at your feet, with their *whir!*, the arctic fox barking its *huc, huc*, on the rocks, and the Reindeer browsing in the glens covered with the creeping birch (*Betula nana*, L.), the arctic willows (*Salix herbacea*, L., *S. arctica*, Pall., *S. glauca*, L., &c.), the crow-berry (*Empetrum*), the Vacciniums, and the yellow poppies (*Papaver nudicaule*, L.), it is a place of life, compared with the cheerless waste lying beyond. It is with it, therefore, and the sea circling around, that we have to deal.

Many of the animals comprising the mammalian fauna, influenced by no apparent physical cause, have but a limited geographical distribution, not extending south of a certain latitude, or north of another, while other species have a range over the shores of the frozen sea skirting three quarters of the world. Some species of Seals are migratory, while others are not; and the same is true of various species of Cetacea. All of the terrestrial species proper are indigenous all the year round, confined to the country by its insularity. I have drawn up a Table (pp. 340 & 341) expressing at a glance the degree and nature of their geographical distribution, local and general. In this Table I have divided the distribution under three main heads:—(1) general distribution over the range of the species, (2) nature of its distribution in Greenland, and (3) its local distribution in Greenland. I have, for the sake of convenience, divided the general range of Greenland species into six subdivisions, viz.:—(α) Circumpolar, comprehending the regions around the most northern limits yet reached by man, the particular locality within that region for each species being limited by the nature of its habitat; thus the Bear occupies the shores or frequents the ice-fields and the sea, the Seals the sea and the shore, or the ice-fields,

the dog the vicinity of man's dwellings, and the Hare the land generally, while the Fox keeps more by the shore, but not in the sea, and rarely ventures out on the ice-fields; (β) Circumarctic America and (γ) Circumarctic Europe comprehend all the region about Greenland and south of the head of Baffin's Bay, down Davis's Strait, and other places south of the former limits, Hudson's Bay, Labrador, &c., on the one hand, and on the other the Icelandic seas and shores, the regions of Europe generally within or about the Arctic Circle. It may be called also subpolar, and has been formed to take in the distribution of some species of Seals and Cetacea. The two regions are about the same in zoogeography.

(δ) Circumarctic Asia comprehends similar limits on the Asiatic continent, and is made to take in the range of the Fox, Lemming, and a few other animals, which extend their range so far east and west. I have not thought fit to create in this table an *Arctic* division proper, limiting it by the arbitrary divisions of geography, divisions which, though necessary enough for the astronomical description of the earth, yet serve no purpose to the physical geographer in tracing the distribution of plants and animals over it. This division is comprehended under my *circumpolar* range, which ends on the seas adjoining Greenland about the head of Baffin's Bay. I have given its general limits there, as many species do not go beyond that barrier, and others do not come south of it. I am well aware that this may appear a somewhat loose way of expressing the limits of regions; but at the same time the species the range of which these divisions are made to express are most wonderfully careless of the degrees, minutes, and seconds which the geographer may erect as their limits, and we can therefore only express their divisional boundaries in an equally elastic manner. I trust, however, that they are sufficiently intelligible.

(ϵ) To give the southern range of certain species of Seals and Cetacea, I have erected a division for *temperate Europe*, comprehending the British and Scandinavian seas; and in the range of the same latitudes on the shores of the British provinces and the United States of America a (ζ) *temperate American division*. I have not, as in the circumarctic range, erected a division for temperate Asia, as I do not think there is a single species of Seal or Cetacea, found in the seas (and certainly no Mammals on the land) of temperate Asia, found in the corresponding seas of Europe and America, though, as several of the species are common to the circumarctic and circumpolar divisions of all three, some may yet be found. In preparing this table I have endeavoured to give the *natural* range of the species, and have not entered a species in any division because it has been, as an evident *straggler*, seen within that division. For instance, *Balæna mysticetus*, *Beluga catodon*, *Monodon monoceros*, and *Trichechus rosmarus* have all of them more than once found their way to the British seas, yet no zoogeographer would ever think of representing the Right Whale, the White Whale, the Narwhal, or the Walrus as regular members of the British fauna. On the other hand, I need scarcely say that when I put an animal into any division I do not thereby

say that it is limited to that division (for, as shown on the table, many extend through several of these divisions), nor that they are found over all that division or series of divisions or regions. I have already explained that the range of each is limited according to its habitat and habits.

I have made these explanations because, as all rules are liable to exceptions, so are systems and systematic divisions. Nature abhors being confined between parallel lines.

Under the division of "Nature of its Distribution in Greenland" I have divided them into (α) Introduced species, (β) Migratory species, and (γ) Species indigenous all the year round.

(α) In Fabricius's day the following Mammals had been introduced into the country, but chiefly into South Greenland:—*Canis familiaris* (European breeds), *Felis domestica*, *Ovis aries*, *Capra hircus*, *Bos taurus*, *Sus scrofa*, *Mus decumanus*, and *Mus musculus*. All of these species are yet at times living in the country, but none of them can be said to be acclimatized. The Horse (*Nersasoak*) was once introduced into Greenland, but only remained for a short time. As far as I can discover, its importation was for the purpose of Major Oscean and Capt. Landorff, who in 1728 proposed the mad-cap scheme of "riding across Greenland!"

(β) As the winter approaches, most of the birds leave the country, and do not return again until spring. The terrestrial Mammals are prohibited, by the insularity of the country, from resorting to this method of escaping the rigours of the climate, or the scarcity of food. The Bear to some extent hibernates, though, as I shall afterwards show, this hibernation is not so complete as is usually supposed. The migratory Mammals are therefore limited to the marine species.

All of the Seals, with the exception of *Trichechus rosmarus*, *Callocephalus vitulinus*, and *Pagomys fœtidus*, leave the coast during a portion of the winter, and even of the summer: the migration of the Seals is too complicated a subject to be discussed in a general review; under my notes on each species I shall have occasion to recur to it. In like manner all the Cetacea leave the seas in the winter, with the exception of *Monodon monoceros* and *Beluga catodon*, which can be seen at open places in the ice all the winter through. Why these species should be winter denizens in preference to the others it is difficult to decide. Several species have what may be called a *local migration*, moving from one portion of the coast to another, north and south, during the summer, according to the state of the ice, &c.,—all of which will be noticed in another place.

(γ) The species indigenous all the year round are therefore the terrestrial Mammals and the remainder of the marine species not already mentioned as migratory, viz. *Ursus maritimus*, *Canis familiaris*, var. *borealis*, *Vulpes lagopus*, *Lepus glacialis*, *Myodes torquatus*, (?) *Ovibos moschatus*, *Rangifer tarandus*, *Trichechus rosmarus*, *Callocephalus vitulinus*, *Pagomys fœtidus*, *Monodon monoceros*, and *Beluga catodon*.

| Name of Species. | General distribution. | | | | | | Nature of distribution in Greenland. | | |
|--|-----------------------|-----------------------|----------------------|--------------------|-------------------|--------------------|--------------------------------------|------------|--------------------------------|
| | Circumpolar. | Circumarctic America. | Circumarctic Europe. | Circumarctic Asia. | Temperate Europe. | Temperate America. | Introduced. | Migratory. | Indigenous all the year round. |
| <i>Ursus maritimus</i> | * | * | * | * | .. | .. | .. | .. | * |
| <i>Vulpes lagopus</i> | * | * | * | * | .. | .. | .. | .. | * |
| <i>Canis familiaris</i> , var. <i>borealis</i> | * | * | .. | * | .. | .. | .. | .. | * |
| [<i>Felis domestica</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| <i>Myodes torquatus</i> | .. | * | .. | * | .. | .. | .. | .. | .. |
| [<i>Mus decumanus</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| [— <i>musculus</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| <i>Lepus glacialis</i> | * | * | * | * | .. | .. | .. | .. | * |
| [<i>Sus scrofa</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| <i>Ovibos moschatus</i> | * | * | .. | .. | .. | .. | .. | .. | * |
| <i>Rangifer tarandus</i> | * | * | * | * | .. | .. | .. | .. | * |
| [<i>Ovis aries</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| [<i>Bos taurus</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| [<i>Capra hircus</i>] | .. | .. | .. | .. | .. | .. | * | .. | .. |
| <i>Callocephalus vitulinus</i> | .. | * | * | * | * | * | .. | .. | * |
| <i>Pagomys fœtidus</i> | * | * | * | * | * | * | .. | .. | * |
| <i>Pagophilus grœnlandicus</i> | * | * | * | * | * | * | .. | .. | * |
| <i>Phoca barbata</i> | * | * | * | * | * | * | .. | .. | * |
| <i>Trichechus rosmarus</i> | * | * | * | * | .. | .. | .. | .. | * |
| <i>Halichoerus grypus</i> | * | * | * | * | * | * | .. | .. | .. |
| <i>Cystophora cristata</i> | * | * | * | * | * | * | .. | .. | .. |
| <i>Balæna mysticetus</i> | .. | * | * | * | * | * | .. | .. | .. |
| <i>Phylalus antiquorum</i> | .. | * | * | * | * | * | .. | .. | .. |
| <i>Balænoptera gigas</i> | .. | * | * | * | * | * | .. | .. | .. |
| — <i>rostrata</i> | .. | * | * | * | * | * | .. | .. | .. |
| <i>Megaptera longimana</i> | .. | * | * | * | * | * | .. | .. | .. |
| <i>Catodon microcephalus</i> | .. | * | * | .. | * | * | .. | .. | .. |
| <i>Delphinus euphrosyne</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| <i>Lagenorhynchus albirostris</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| — <i>leucopleurus</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| <i>Orca gladiator</i> | .. | * | * | * | * | * | .. | .. | .. |
| <i>Phocæna communis</i> | .. | * | * | * | * | * | .. | .. | .. |
| <i>Beluga catodon</i> | * | * | * | * | .. | * | .. | .. | * |
| <i>Monodon monoceros</i> | * | * | * | * | .. | .. | .. | .. | * |
| <i>Globiocephalus svineval</i> | .. | * | * | * | * | .. | .. | .. | .. |
| <i>Hyperoodon butzkopf</i> | .. | * | * | .. | * | * | .. | .. | .. |
| — <i>latifrons</i> | .. | .. | .. | .. | .. | .. | * | .. | .. |
| Numerical summary of distribution | 13 | 26 | 23 | 9 | 15 | 14 | 7 | 19 | 11 |

NOTE.—This Table is manifestly imperfect, and the limits of species

| Local distribution in Greenland according to latitude and coast. | | | | | | | | | | Remarks. | |
|--|---|-------------------------------------|---------------------------------------|---|------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|----------|--|
| From Cape Farewell to northern limits. | From Cape Farewell to opening of Smith's Sound. | From Cape Farewell to Melville Bay. | From 67° N. lat. to northerly limits. | From 63° N. lat. to opening of Smith's Sound. | Cape Farewell to 72° N. lat. | Cape Farewell to 69° N. lat. | Cape Farewell to 67° N. lat. | Not north of 61° N. lat. | Not south of 76° N. lat. | | Found on the east coast only. |
| .. | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | Properly speaking, only to most northerly outpost of Upernavik. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | Doubtful if indigenous all the year round, or if at all. |
| .. | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | Limits of Danish Greenland? |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Do. do. |
| .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | Not south of Wolstenholme Sound. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | * | .. | Not north of Holsteensborg. |
| .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | Possibly not north of Melville Bay. |
| .. | .. | .. | * | .. | .. | .. | .. | .. | .. | .. | Range rather doubtful. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Rare north of 70°. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Very rarely seen N. of 73° and S. of 65°. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Range doubtful. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Range unknown. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | Those species of Cetacea marked as extending north only to Melville Bay, probably occasionally reach a higher latitude; but this bay is the usual limit, and north of this the species is rarely seen. |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | |
| 10 | 1 | 9 | 2 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | |

given are only, in most cases, approximate or provisional.

In addition to these well-established species there are others frequently entered among the Greenland Mammalia, some of which have but scant right to a place, and others are entirely mythical, as I will show in a section on these animals. Among these I class *Gulo borealis* (*Ursus luscus*), *Phoca ursina* (*Callorhinus ursinus*), and *Trichechus manatus* (*Rhytina gigas*) as animals with little or no claim to be admitted members of the Arctic fauna.

The columns for the "local distribution in Greenland" are arranged solely with reference to our present knowledge of the range of the species in the country, and, being only temporary and to a great extent artificial, are subject to changes as our knowledge of the species extends. At the same time I think it only right to say that they have been very carefully compiled, after considerable study of the *natural range* of the species, and upon principles akin to those for the general distribution of the species.

The column headed "East coast only" I have erected for the reception of *Myodes torquatus* solely, all the species of the east coast, so far as we know, being, with this exception, also common to the west. The east coast has, however, been very little explored, and no doubt something remains to be added to our knowledge of the range of species on that coast.

On a comparison of the Greenland fauna with that of other portions of the Arctic regions, we can see no reason for looking upon it, in common with the flora and the avi- and ichthyo-faunas, as other than essentially Arctic-European, all of the species of Mammalia, with the exception of *Ovibos moschatos*, being found in either Spitzbergen or Nova Zembla, while many of the Arctic-American species are not found in Greenland. The only true American Mammal found in Greenland is the Musk-Ox, which might have crossed from the western shores of Smith's Sound (where Eskimo tradition describes it as once abundant) on the ice to the eastern shore, where alone in Greenland it seems to be now found, the great glaciers and ice-floes about Melville Bay seeming to act as a barrier to the southern and northern migrations of the animals on either side of them, and of Man equally with the lower animals.

Looking at the fauna of Spitzbergen *, if we take exception to the very dubious omission which Malmgren has made, we find that there is only one species of mammal found in these islands not found in Greenland; and this exception is *Mustela erminea*, which the author named even marks as doubtful (?); and the same is true of the mammals of Nova Zembla, if we take Von Baer's list † as representing the present state of our knowledge, though published more than thirty years ago. In this the exception is also a doubtful one ("a little white animal, species uncertain"), but probably an Ermine. I therefore think that we are justified in looking upon the mammalian fauna of Greenland as Arctic-European, and not Arctic-Ame-

* Malmgren, *loc. cit.*; Scoresby, 'Arctic Regions'; Phipps's 'Voyage'; Parry's 'Attempt'; Laing's 'Voyage to Spitzbergen,' &c. &c.

† K. E. von Baer, Wiegmann's Archiv für Naturgeschichte (1839), pt. vii. (*vide* Murray, 'Geogr. Distrib. Mamm.').

rican, though I am aware that opposite views are entertained by naturalists of high eminence.

The mammalian fauna of Iceland has no connexion with that of either Greenland or Europe, that island not possessing a single species of mammal indigenous to it; all have been introduced by man, or, like the *Ursus maritimus* and *Vulpes lagopus*, have drifted from Greenland on ice-floes.

My friend Mr. Andrew Murray* seems to take exception to a Mouse which is said to be found in Iceland, and regarding which wonderful tales are told †; and, contrary to the opinion of Povelsen, who considers it *Mus sylvaticus*, L., and of the intelligent Icelanders, who, as represented by Sir W. J. Hooker, do not believe in its existence, thinks that it is *Myodes torquatus* (*hudsonius*, Forst. = *grönländicus*, Tr.). If such is the case, it might have been brought over on ice from the east coast of Greenland; but the probability is that it does not exist, and that the only Mice in Iceland are the ones introduced by man, the ordinary *Mus decumanus* and *M. musculus*, almost cosmopolitan in their range.

From these facts I believe that the island of Iceland is of a newer date than any portion of Scandinavia or Greenland, and, being of a volcanic nature, was formed posterior to the date of the present distribution of land and water in the North Sea. I can see no other conclusion which can be arrived at ‡.

4. Notes on the Habits, Distribution, and Synonymy of the Terrestrial Mammalia of Greenland.

The following notes on certain of the terrestrial species of Mammalia are not intended as either a complete or systematic history of the species, but merely as stray notes on some points in their history hitherto passed over, and on the species as a Greenland animal. I have delayed entering upon the history of the Marine Mammalia until another time, my observations on these species being too extensive to be included within the limits of one paper; and, as I shall treat of them on a more comprehensive plan than as mere Greenland species, they do not properly come within the scope of a paper on Greenland Mammals.

These notes comprehend my own observations during voyages to the Spitzbergen, Iceland, and Jan Mayen seas, and along the eastern and western shores of Davis's Strait and Baffin's Bay, to near the mouth of Smith's Sound, in 1861. During the past summer I have again visited Danish Greenland for scientific purposes, but have added little or nothing to my former notes, having seen few Mammalia, except some of the species of Pinnipedia and a Cetacean or

* Geographical Distribution of Mammals (1866).

† Pennant, 'Arctic Zoology,' Introduction, p. lxx; Hooker's 'Tour in Iceland,' i. pp. 51-52.

‡ Vide J. D. Hooker, Linn. Trans. 1862; Asa Gray, 'American Journal of Science,' 1862; J. W. Dawson, 'Canadian Naturalist and Geologist,' 1862, pp. 334-344; and Murray, 'Geogr. Dist. Mamm.,' for the phytogeographical views of the origin of the Greenland flora and fauna at present received.

two in the sea, and, from our travels extending over but a limited portion of the vicinity of Disco Bay, had but few opportunities of adding to our knowledge of their habits.

I was fortunate enough, however, to obtain the assistance of my friends Herren Knud Gelmeiden Fleischer, Carl Bolbroe, and Octavius Neilsen, whose long acquaintance with the Eskimo language enabled me to discover some of the errors which Fabricius fell into in deciphering the mythical species; and our intelligent travelling companion Hr. Anthon P. Tegner kindly gave me the benefit of his experience. These notes I have incorporated in the body of this paper at the proper place.

I have also examined, through the kindness of the curators, the Greenland Mammals in the Copenhagen Museums, and those in the Museum of Science and Art in Edinburgh, comprising many of the the typical specimens of Scoresby, Richardson, &c. For this latter favour my thanks are especially due to Professors Archer and Allman and to Mr. J. B. Davies.

1. URSUS MARITIMUS, Linn.

Grænl. Nennok (*o* guttural).

The well-known "Polar" or "Ice Bear" is found along the whole coast of Greenland from north to south, but not nearly so numerous as in former times, or as is popularly supposed. There are more in the northern than in the southern portion of the country; and it is very seldom seen in mid-Greenland, *i. e.* between about 69° and 66° N. lat. There are yearly killed from thirty to sixty of them. The Company of Royal Merchants in Greenland give the natives about five rigsdaler (11s. 3d.) for the skins. Occasionally there are a number killed near Cape Farewell which have come round on the annual ice-drift. Here a curious custom prevails, *viz.*, that whosoever sights the Bear first, man, woman, or child, is entitled to the skin, and the person who has shot it only to the blubber and flesh*. It is of light creamy colour, rarely pure white, except when young; hence the Scotch whalers call it the "Brounie" or "Brownie," and sometimes the "Farmer," from its very agricultural appearance as it stalks leisurely over the furrowed fields of ice. Its principal food consists of Seals, which it persecutes most indefatigably; but it is somewhat omnivorous in its diet, and will often clear an islet of eider-duck eggs in the course of a few hours. I have seen it watch a Seal for half a day, the Seal continually escaping just as the Bear was about putting its paw on it, at the "*atluk*" (or escape hole) in the ice. Finally, it tried to circumvent its prey in another manner. It swam off to a distance, and when the Seal was again half asleep at its *atluk*, the Bear swam under the ice, with a view to cut off its retreat. It failed, however, and the Seal finally escaped. The rage of the animal was

* The flesh, and especially the liver, is said to often prove poisonous when eaten. The Eskimo on the western shores of Davis's Strait, carefully prohibit their dogs from devouring any portion of it.

boundless; it roared hideously, tossing the snow in the air, and trotted off in a most indignant state of mind!

During the Sealing-season, both in Greenland and in the Spitzbergen seas, the Bear is a constant attendant on the sealer for the sake of the carcasses, in the pursuit of which it is sometimes "more free than welcome." I have often also seen it feeding on Whales of different species, which are found floating dead. In 1861 I saw upwards of twenty all busily devouring the huge inflated carcass of a *Balæna mysticetus* in Pond's Bay, on the western shores of Davis's Strait. We were foolish enough to fire a few shots among them, when the Bears sprang furiously from the carcass and made for our boat. One succeeded in getting its paws on to the gunwale; and it was only by the vigorous application of an axe that we succeeded in relieving ourselves of so unwelcome an addition to our crew.

On the whole, I do not think that the Polar Bear is a very fierce animal, when not enraged; and I cannot help thinking that a great deal of the impressions which we have imbibed regarding its ferocity are more due to old notions of what it *ought to be*, rather than what *it is*, and that the tales related by Barentz, Edward Pelham, and other old navigators regarding its bloodthirstiness during the time they wintered in Spitzbergen were a good deal exaggerated. When enraged, or emboldened by hunger, I can, however, quite well understand that, like all wild, and even domesticated animals, it may be dangerous to man. I have chased it over the floes of Pond's Bay; and the Bear's only thought seemed to be how best to escape from its pursuers. I should have hesitated a good deal before making so free with the grizzly bear of the Californian wilds (*Ursus ferox*), which is, perhaps, the most ferocious animal on the American continent. Though seemingly so unwieldy, the *nemok* runs with great speed; and being almost marine in its habits, it swims well. I have chased it with a picked crew of eight whalers, and yet the Bear has managed to distance us in the race for the ice-fields. It would every now and again, when its two cubs were getting left in the rear, stop and (literally) push them up behind; and on reaching the steep edge of the ice-floe, finding that we were fast reaching them, it lifted each of them up on the ice with its teeth, seizing the loose skin at the back of the neck. Once on the ice, they were safe.

It is often found swimming at great distances from land (*vide* the statements in 'Arctic Voyages,' and the works of Richardson, Parry, &c., *passim*). The stories of its making ice-houses, and of their gambols therein, as related by Fabricius, as well as of its combats with the Walrus, are still prevalent in Greenland.

It is curious that the old Eskimo stories about the Polar Bear having no evacuations during the season of hibernation, and being itself the means of preventing them by stopping all the natural passages with moss, grass, or earth (Richardson's 'Fauna Bor.-Am.' i. 34), prevail also among the North-western American Indians on the other side of the continent, in reference to the Brown Bear (*Ursus americanus*), the substance used in stopping the passages

varying according to the tribe among whom the myth is prevalent, from a ball of clay to one of pine-resin!

I do not think that it hibernates during the whole winter, as usually supposed; at all events they are often seen during the winter, though these are probably old males. It is probable that the females, when not pregnant, roam all winter like the males. Unlike its congeners, it does not *hug*, but *bites*; and it will not eat its prey until it is dead, playing with it like a cat with a mouse. I have known many men who, while sitting watching or skinning Seals, have had its rough hand laid on their shoulder. Their only chance has been then to feign being dead, and manage to shoot it while the Bear was sitting at a distance watching its intended victim. Though Eskimo are often seen who have been scarred by it, yet I repeat that, unless attacked, or rendered fierce by hunger, it rarely attacks man. During our last trip to Greenland none of our party saw one; indeed they are only killed in the vicinity of Disco Bay during the winter or spring, when they have either come or drifted south on the ice-floes. Six were killed in the vicinity of Omenak during the winter of 1866-67.

2. VULPES LAGOPUS (Linn.); Rich. F. B. A. i. 83.

Grœnl. Terienniak, Kaka.

The Arctic Fox is very numerous in south and mid Greenland, more seldom in the north of the Danish possessions, but is quite plentiful again north of Upernavik to high up in Smith's Sound.

There are two varieties, the blue and the white. This colour is not dependent on the season. The white variety is also more numerous and much less valued than the blue; but, again, the blue and the white varieties interbreed, and often, the Eskimo say, there is a white mother with blue young, and *vice versa*. The blue Fox is very valuable, the price for the best kind of skin being from six to seven times as much as for that of the white. Some have been sold at the annual auction of the Greenland furs, in Copenhagen, at over twenty rigsdaler (nine rigsdaler = £1 sterling). There are yearly killed from 1000 to 3000 of the white and blue foxes, two-thirds being blue and one-third white. In Greenland the white is traded for three marks (1s. 1½d.), and the blue for two rigsdaler (4s. 6d.). It is not killed by the Greenlanders in summer, as its summer coat is not valuable. At this time it is found in the mountains preying on the young Ptarmigan (*Tetrao reinhardti*, Brehm). In winter it comes down to prey on shellfish or other marine produce, at the open places near the shore when the tide breaks the ice. About this period it can often be seen barking most impudently at the solitary hunter.

3. CANIS FAMILIARIS, Linn.

a. Var. *borealis*.

Grœnl. Kemmek or Kremmek.

(a) The Dog of the Eskimo is the same species all over the

American continent; at least, I have seen dogs from Kamschatka, Sitka, the western shores of Davis's Strait, and from Greenland which it was impossible to deny were of one species.

(β) Besides this there is, in Danish Greenland, another breed of Dogs of mixed native and European descent, the latter being imported by the whites. These are called by the natives "Meëkë." I have not the slightest doubt that the original breed of the Arctic Dog was the Wolf (*Canis occidentalis*, var. *griseo-albus*, Baird). In its every disposition it agrees with that animal, and there is no point which has been supposed to separate the one from the other which is not common to both of them. I have seen skins of the Wolf which have hair for hair agreed with the typical Arctic Dog. The Wolf is not, however, found in Greenland, unless, as I shall afterwards discuss, the "Amarok," which Fabricius erroneously described in his fauna as *Ursus luscus*, be merely a Dog run wild and returned to its original type. The Dog is found as far north as man lives, but is not used by the Eskimo south of Holsteensborg, the sea not being sufficiently frozen over during the winter to permit of sledging. The use of the Dog as a sledge-animal has been so often described* that I may pass it over here without further reference. Being only required during the winter, they lead during the summer and autumn months an idle life, hanging round the settlements, sleeping on the top of the flat earth-huts of their masters, snarling at every one's heels, but running at the first appearance of a stick or stone, snatching up every bit of edible garbage round a village, and, in fact, becoming such a pest to the women when pressing a seal on the rocks, or when drying meat for winter use, that they are often left to look out for themselves on some barren uninhabited islet. During the summer they are never fed; and often you may pass old Eskimo encampments where the only inhabitants are a few hungry dogs howling from the rock, disconsolate until their lords return. The *appearance* of a stone is enough to send them howling far and near. It is rarely that they bark, generally preferring, with their wolfish instinct, to sit and howl monotonously on some elevated point, and regularly "making night horrible" with their "long cry." The ringing of the workmen's morning and evening bell at the Danish settlements used to be the signal for the commencement of this hyperborean music. It can only be kept in subjection by being treated to the most unmerciful lashing; for its savage nature will out. When at Clyde River in 1861 I heard of a most horrible tragedy which had been enacted there a few years before. A man, a boy, and a little girl landed from an *omiak* (or open skin boat) on an island where, as is usual, some dogs were confined. Before the poor people could escape to their boat, the animals, infuriated by hunger, sprang upon them. The man and the boy, though much lacerated, managed to regain the *omiak*; but the poor girl was torn to pieces.

When the Greenland dogs die off, the Greenlander must become

* *Vide* particularly Kane, 'Arctic Explorations,' and Hayes, 'Voyage towards the open Polar Sea.'

extinct, more certainly even than must the "Plain" Indian when the last buffalo is shot. It is impossible for him to drag home the seals, sharks, white whales, or Narwhals which he may have shot in the winter at the "strom-holes" in the ice without his dogs—or for the wild native in the Far North to make his long migrations, with his family and household goods, from one hunting-ground to another without these domestic animals of his. Yet that sad event seems to be not far distant. About fifteen years ago, a curious disease, the nature of which has puzzled veterinarians, appeared among the Arctic dogs, from high up in Smith's Sound down the whole coast of Greenland to Jakobshavn ($69^{\circ} 13' N.$ lat.), where the ice-fjord stops it from going further south; and the government uses every endeavour to stop its spread beyond that barrier, by preventing the native dogs north and south from commingling. Kane and Hayes lost most of their dogs through this disease; and at every settlement in Danish Greenland the natives are impoverished through the death of their teams. It is noticed that whenever a native loses his dogs he goes very rapidly downhill in the sliding scale of Arctic respectability, becoming a sort of hanger-on of the fortunate possessor of a sledge-team.

During the latter portion of our stay in Jakobshavn, scarcely a day elapsed during which some of the dogs were not ordered to be killed, on account of their having caught this fatal epidemic.

The Dog is seized with madness, bites at all other dogs, and even at human beings. It is soon unable to swallow its food, and constipation ensues. It howls loudly during the continuance of the disease, but generally dies in the course of a day, with its teeth firmly transfixing its tongue. It has thus something of the nature of hydrophobia, but differs from that disease in not being communicable by bite, though otherwise contagious among dogs. The government sent out a veterinary surgeon to investigate the nature of the distemper; but he failed to suggest any remedy, and it is now being "stamped out" by killing the dogs whenever seized—an heroic mode of treatment, which will only be successful when the last dog becomes extinct in Greenland.

Strange to say, the dogs in Kamschatka are also being decimated by a very similar disease; and, in a recent communication received from that region, it is said that so scarce have dogs become, that the natives do not care to sell them, and that 100 roubles have been refused for a team of six. Fortunately for the Kamschatkans, they have the Reindeer as an ulterior beast of draught and burden. Hr. Otto Torell brought several dogs from Greenland for the use of his expedition to Spitzbergen in 1861; but I believe that, finding them useless (on account of open water), he set them free on Spitzbergen, where they are now rapidly increasing, and will, doubtless, soon return to the original Wolf type.

Their use in Greenland is almost wholly as sledge-animals. Among the Eskimo on the western shores of Davis's Strait, a loose dog usually precedes the sledge, and, by carefully avoiding broken places in the ice, acts as a guide to the sledge-team, which carefully

follows his lead. *En passant* I may remark that dog-driving is by no means an easily acquired or a light labour: In North Greenland and among the wild Arctic highlanders of Cape York and Smith's Sound, dogs are also valuable assistants, by attacking the Polar Bear while the hunter plants his spears in the animal*. They are also used a little in Seal-hunting. Their flesh is also highly appreciated, but rather too valuable for anything except an occasional dainty. The skin is highly valued for socks, and that of the pups for winter clothing; but so scarce have they become, that it is now very hard to raise enough for an *anarak* (jumper), and one of our party paid 18 rigsdaler (£2) for enough to make an overcoat. No longer, as in Giesecke's day †, is it rejected as an article of trade on account of its disagreeable odour.

[4. FELIS DOMESTICA, Briss.

Grænl. Kitsungoak.

The Domestic Cat has been kept in Greenland ever since the Danish women came, and it follows them in all their sojournings north and south. In Fabricius's day it was already not uncommon. At present there are many in Julianeshaab district, where mice are quite abundant and troublesome.]

5. MYODES TORQUATUS (Pall.), Keys. & Blas.

This Lemming was found by Capt. Scoresby, in the year 1822, near Scoresby's Sound, on the east coast of Greenland, lat. 69°, and was described by the late Professor Traill, in the Appendix to Scoresby's Voyage to Greenland, as a new species under the name of *Mus grænlændicus*. From a careful examination of the original and only specimen, now in the Edinburgh Museum of Science and Art, I am inclined to believe, with Middendorff ‡, that it is not distinct from those already described, and that the *Myodes hudsonius* of Forster (*Mus hudsonius*, Forster in Phil. Trans. lxi. p. 379; *Lemmus hudsonius*, Sab., Parry's Voyage, p. clxxxv) and the *Mus grænlændicus*, Tr. (*Myodes grænlændicus*, Wag. and J. E. Gray §, Proc. Zool. Soc. London, xvi. 1848, p. 43, and *Id.* in Rae's Narrative, 1850), are identical with the Siberian *Myodes torquatus* (Pall.), Keys. & Blas.

It can only be classed as a very rare and local (possibly accidental) member of the fauna of Greenland, as it has never since been found in the country; Graah || did not see it in his two years' journey, nor even hear of its existence. No doubt the east coast of Greenland is almost unapproachable for ice, and has never been visited since Graah's day, except for a little way round Cape Farewell. Whalers, however, have been known to have landed near Scoresby's Sound; but

* *Vide* an interesting account in Kane's 'Arctic Explorations.'

† Giesecke, article "Greenland," in 'Brewster's Encyclopædia.'

‡ Sib. Reise, II. ii. 1853, p. 87, pls. 4-7 & 10.

§ *Arvicola grænlændiæ*, Rich. l. c. 134; *vide* also Schreber, 'Säugethiere,' iii. p. 604; Giebel, 'Die Säugethiere' &c. (1859), p. 605.

|| Narrative of an Expedition to the East Coast of Greenland, Engl. transl. (1837). The original Danish edition in 4to (Undersøgelses-Reise til Ostkysten af Grønland, 1832), however, is much superior in many respects.

they saw nothing of it, and it may be safely said not to be an inhabitant of the west coast, either within or outside of the Danish possessions.

From Upernavik southward, the Danes have been on the coast, either settled or trading, for at least 120 years, and during that time not a few collectors have visited the country; but, notwithstanding all their exertions and those of the stationary officers of the government there, no specimen of this Mouse has as yet been obtained, nor do the Eskimo know of the existence of such. Murray has therefore taken too wide a generalization, when he portrays, on map lxxxv. of his laborious and generally accurate work the 'Geographical Distribution of Mammals' (1866), p. 267, the distribution of the Lemming as extending right along the east and western shores of Greenland to the head of Baffin's Bay, on the supposition that it is a regular member of the Greenland fauna. I am inclined to look upon it as representing the extreme *eastern* limit of the *Myodes torquatus*, as the *Myodes hudsonius* is a climatic species representing the extreme *western* range of the former species. It is almost unnecessary to note, after what I have said, that Fabricius makes no mention of it in his 'Fauna Grœnlandica;' and if it had been found, he, ever anxious as he was to add anything to the Greenland Mammals, would have been sure to have heard of it from the natives, credence in whose mythical zoology forms one of the few disfigurements of his work. Neither did Ingelfield, Sutherland, Kane, or Hayes see anything of it in Smith's Sound, or southward to the northern limits of the Danish possessions.

In 1861, the natives at Pond's Bay, on the western shore of Davis's Strait, brought me many skins of this species, which I ascertained to belong to the *hudsonius* form. For the sake of reference, the Arctic species may be classed as follows:—

MYODES TORQUATUS, Pall.

Var. *hudsonius*, Forst.

Var. *grœnlandicus*, Tr.

6. [MUS DECUMANUS, Pall. (1778).]

Mus norvegicus, Erxleben (1776).

Grœnl. Teriak.

The brown Rat was introduced as far back as the days of Fabricius by the Danish ships in the summer, and seemed likely to prove dangerous in houses; but they gradually and periodically died out, as they could not stand the cold of the winter. Some years ago they were again introduced, and still occasionally one is seen in the summer months in some of the warehouses from Upernavik to near Cape Farewell.]

7. [MUS MUSCULUS, Linn.]

Grœnl. Teriangoak ("the small Rat").

Its history as a colonist animal in Greenland is about the same as

the Rat's. At some of the more southern settlements they can occasionally survive the winter and beget abundantly. Both the Mouse and Rat were introduced as far north as Kane's and Hayes's ships wintered, but I cannot learn that they got naturalized.]

8. *LEPUS GLACIALIS*, Leach.

L. arcticus, *ibid.*

Grœnl. Ukalek.

The Hare is a common animal over the whole coast, from north to south, east and west. It is, however, seen more seldom in the north of the Danish trading-limits, and there are only a few hundreds shot annually. They are said to be rather rare on the east coast. I cannot see why its beautiful white skin is not more used. At one time the Danes used to send quantities home, but they could get no market for it. From the Hare the natives spin a kind of yarn which they occasionally knit into caps, for a summer head-dress, for the men and children. It is difficult (indeed, almost impossible) to give characters whereby this species can be separated from the *Lepus variabilis* of Europe when the former is in its summer dress; and the skull presents equal difficulties.

I have, however, preferred to look upon it as nominally distinct, though I really believe that it is only a climatic variety of *L. variabilis*, Pallas.

9. [*SUS SCROFA*, Linn.

Grœnl. Poliké.

It is kept at some of the southern settlements.]

10. *OVIPOS MOSCHATUS* (Gmel.), Blainv.

Grœnl. et Esk. Umimak.

In the 'Fauna Grœnlandica,' p. 28. no. 17, Fabricius has classed *Bos grunniens*, L., as one of the animals of Greenland, because he thought that he had found (on a piece of drift ice) some remains of it, consisting of the greater portion of the skull of an animal "very like an Ox." He was of opinion that this was a portion of the Yak. He did not, however, consider it to be a native of Greenland, but rather to have been drifted from northern Asia on the ice, the flesh having been eaten by Polar Bears. Any one can see, by examining the figure which Fabricius afterwards gave of this specimen (*Bid. Selsk. Skriv. N. Saml. iii. 82*), that it was the Musk-Ox; and, indeed, he afterwards acknowledged so himself (*Bid. Selsk. Skr. 3. N., vi.*). It is therefore, after this, somewhat surprising to find a zoologist so well acquainted with the Greenland fauna as the elder Reinhardt stating that the Musk-Ox, which, like Fabricius, he called *Bos grunniens*, rarely comes from Melville Island to Greenland*. Mr. Murray seems to doubt on which side of Greenland Fabricius met with his specimen; but there need be no doubt on that matter, as it

* *Isis*, 1848, p. 248; Schmarada's 'Geograph. Verbreitung (1853), p. 370; *vide* Murray's 'Geogr. Dist. of the Mammals,' p. 140.

must have been on the west side. The east was even more unknown in his day than now, and he was certainly never round Cape Farewell. The Musk-Ox has, therefore, no right to a place in the fauna of Danish Greenland, nor do I believe that at any time it was an inhabitant of that portion of the continent.

Recent discoveries have, however, shown it to be, with the strongest probability, an inhabitant of the shores of Greenland north of the glaciers of Melville Bay. Dr. Kane met with numerous traces of it in Smith's Sound; and his successor, Dr. Hayes, found at Chester valley in the same inlet, among Eskimo kjækkenmøeddings, the skull of a Musk-Ox. Eskimo tradition describes the animal as at one time common along the whole coast, and they affirm that it is yet occasionally to be met with. No longer ago than in the winter of 1859 a hunter of Wolstenholme Sound, near a place called Oomeak, came upon two animals, and killed one of them*.

I think, therefore, that we may with some authority assume that the Musk-Ox is not yet extinct in Greenland.

11. RANGIFER TARANDUS (Linn.), Baird.

Var. *grœnlandicus*, Kerr (Linn. 1792, p. 297).

Grœnl. Tukto (tootoo); ♂, Pangnek; ♀, Kollauak.

I will not here enter into any discussion of the vexed question of the identity of the European and American Reindeers, or whether the Greenland Reindeer is specifically distinct from the American species; suffice it to say that the heading of this note sufficiently expresses my views on the subject, after very excellent opportunities of comparison and study, and that I consider the Greenland Reindeer only a climatic variety of the European species. I have, moreover, seen specimens of Reindeer horns from Greenland which could not be distinguished from European, and *vice versâ*. On the whole, however, there is a slight variation, which may be expressed by the trivial name to which I have referred at the commencement of these remarks†.

It is found over the whole country, from north to south ‡, but not nearly so plentiful as it used to be. Indeed it is fast on the decrease, on account of the unmerciful way in which it is slaughtered by the natives for the skin alone, as is the buffalo in America. The skins are a great article of commerce; sometimes they sell in Copenhagen at from 3 to 7 rigsdaler (6*s.* 9*d.* to 15*s.* 9*d.*) each, according to the quality. (The natives get in Greenland only 72 skillings (1*s.* 6*d.*) for them). The yearly production used to be in the summer time from 10,000 to 20,000, but it is now on the decrease.

Dr. Hayes fed his party luxuriously on them all winter at Port Foulke in Smith's Sound, not many miles from where Kane's

* Hayes's Voyage towards the North Pole (1866), p. 390.

† *Vide* Murray, Edinb. New Philosophical Journal, Jan. and April, 1859; Newton in Proc. Zool. Soc. 1864; Murray, Geog. Distrib. of Mammals, p. 150 *et seq.*; Baird, North Am. Mammals; *id.* U. S. Pat. Office Rep. (Agric.) 1851 (1852), p. 105.

‡ Rarer on the east coast (apparently).

party starved a few years before. Behind Holsteensborg are valleys full of Reindeer; and I have heard tales of people climbing the hills in that vicinity, and looking down into glens where the Reindeer were so numerous that they might be supposed to be the herds of a wealthy Laplander. Ten thousand skins were shipped from that port some years ago. They are slaughtered indiscriminately by the natives—these improvident people, in nine cases out of ten, leaving the hides and flesh, and only taking the tongues. They are bad-enough shots; and the Danish traders supply them with powder at less than prime cost (viz. 36 skillings, or 9*d.*, per lb.), with a view to increase the produce of the hunt; but this ammunition is wasted in a most reckless manner.

On the way to and from these hunts up the fjords (“the interior country,” though really the natives know of no place off the coast more than the Europeans do), with that savage desire to *kill* every living thing, ducks are shot and left lying, or, if they feel hungry, they will tear off the titbits: a Ptarmigan will be shot sitting on its eggs, and the ball cut out of its body to be again used in this murderous sport. There is no necessity for it; for at this time they are abundantly supplied with food, even to excess. It is, however, the season of sport and fun, looked forward to by the natives much in the same light as we do to our grouse-shooting or deer-stalking, and is about as profitable to all parties concerned. In order to pursue this they leave the more lucrative Seal-fishery, and neglect to lay in a winter’s supply of food; so that when the “ban-yan” days come they bitterly regret their folly, and weary for the bleached carcasses up the frozen fjords. Notwithstanding this, regularly as the season comes round they are off again to the shooting from far and near, and repeat the same improvident course: nor, if they like it, has anybody a right to complain. In all verity, enjoyments few enough fall to the lot of these hyperborean hunters.

However, the effect of this indiscriminate slaughter is now being felt in the decrease of the Reindeer in many parts where they were once common. They are no longer found on Disco Island, as in the days of Cranz and Fabricius. Indeed there are now very few shot in mid-Greenland, and many of the natives are giving up the hunt for them altogether. During the summer of 1867 only five Reindeer were killed in the district of Ritenbenk (lat. 69° 45' N.). The yearly average had been about twenty or thirty; but the Governor informs me that in his opinion Reindeer-hunting-days are nearly over in that section of the country. In the districts of Jakobshavn, Clavshavn, and Christianshaab I did not learn that one had been killed. At Clavshavn a few natives went out hunting, but met with bad weather, and returned for good, having only seen two animals altogether, and shot nothing.

In the southern portion of the country more are seen, not so much on the coast as up the valleys by the fjords. It is in May or June that most of the natives leave their winter houses, and go Reindeer-hunting. When they do dry any meat, they cover it up in *caches*. The dogs are not taken along with them. In old times, even making

every allowance for exaggeration, the Reindeer seems to have been very numerous. In the Icelandic 'Sagas' they are spoken of as having been very numerous in the Æster Bygd.

Four hundred years ago the natives seem by these accounts to have hunted the Reindeer much in that section generally supposed to be the site of the Æster Bygd (viz. Julianeshaab district). At the present day they have left that district; and it is now nearly sixty years since any have been shot there. Latterly the hunting has been better in Greenland (south). From 1840 to 1845 many were got; and within the last few years they seem (if we might judge by the produce of the hunt) to be on the increase. This, however, is, doubtless, owing a good deal to the use of the rifle; but it is very questionable whether this will not again decrease their numbers, as it seems to have done elsewhere. Necessarily we have no better data to go upon than that so many skins have been traded; but if this is to be received as evidence, more have been traded of late years.

When the hunting was at its best it was at the positions where the country was broadest, or where the great *mer de glace* of the interior was most distant from the coast, viz. Holsteensborg, Sukkertoppen, Godthaab, and Fiskernaæsset. Now there are very few killed at the last-named place. Godthaab also yields few; but the Holsteensborg and Sukkertoppen natives have taken a good many of late. At Holsteensborg (formerly mentioned as a favourite locality) the hunting-ground is behind the large inlets, where the ice lies far back, and where land most free from ice has been found. The Reindeer, living in very large herds, require always to be on the look-out for an extensive feeding-range; and it has been observed that they are going south, in the direction of Julianeshaab; and individuals have been annually shot not far from Fredrikshaab. In order to hunt the Reindeer, the natives go every year, in the month of June, from the southern districts to the two northern districts in the Southern Inspectorate, and return in September. A good number are also shot in the winter time; and not unfrequently, in very snowy winters, they have been known to come down close to the settlements, and the natives have shot them standing in their doorways. The story of the Reindeer going into the *interior* in the winter is founded on erroneous notions of what the interior is. They no doubt go a little way into the valleys; but as for going into the interior, that is a physical impossibility; for the interior is merely one wide frozen waste, surrounded by a circlet of islands. It is to the valleys of these islands that the Reindeer undoubtedly retire; but nobody travels very far afield in Greenland during the winter season, so that we have no means of arriving at a very accurate confirmation of this supposition. Dr. Hayes's people finding them in such abundance at their winterquarters goes further to prove this. One of his men described to me the party as going over a little ridge, and finding the Deer as if in a preserve, like the cattle in the pastures of his native Jutland: "we just shot them as we wanted them" *.

* *Vide* also Hayes's 'Open Polar Sea,' *passim*.

Their food in Greenland consists chiefly of various species of *Empetrum*, *Vaccinium*, *Betula*, &c.; and I can hardly think that the traditional "reindeer-moss" (*Cladonia* of various species) forms any great portion of its subsistence, as that lichen is nowhere found in Greenland in such quantity as to afford food for any animal*.

The Greenlanders have no idea of taming the animal; indeed its use to them would be trifling, as it cannot travel well on ice, and the difficulties of transporting supplies of food for it on their long ice-journeys would be great. The Eskimo's sledge-travelling is almost wholly confined to the frozen surface of the sea in winter; and for this purpose dogs answer much better. The meat is very good; and the natives eat the half-digested vegetable contents of the stomach along with blubber as a choice delicacy. They prefer to eat the flesh in a putrid state. It is, with the exception of the breast, for the most part lean. Clothes and thread are made from the skin and sinews. The latter is much sought after in districts where there are no Reindeer. From the horn are made all sorts of native implements; but commercially it is of no value in Copenhagen. However, I think its importation ought to answer, if brought to England, though to Denmark it will not pay the freight.

A calculation has been made that from 1840-45 there were about 2500 persons living in the principal Reindeer district. Every family of five persons, it was calculated, would use two skins &c., which would make 5000 for themselves; and they sent home 11,500; the total hunt was therefore calculated to be about 16,000 annually. This sum has been taken for a minimum; for every hunter, besides using the skins for clothes, not only for himself and family, also used them for tents, partitions in houses, and for socks &c., so that the number killed was in all likelihood much greater. Of late years the skins traded by the natives have decreased one half. Between 1851 and 1855 there were annually shot 8500 Deer. It is difficult to say how much meat has been consumed in that period; but every Deer may be put down at 80 lbs. of meat alone. This makes the meat, between 1840 and 1845, amount to 1,280,000 lbs. annually, and between 1851 and 1855 to 680,000 lbs.

The Reindeer is often shot in situations where it is impossible for the hunter to carry the meat down, when it becomes a prey to wild beasts and birds. The quantity of meat thus lost is enormous, independently of much more wastefully destroyed, as described in the first portion of these notes. It is so great that, during the period first referred to, fully one half was thrown away, and during the last period a quarter. The tallow in a large Deer will weigh from 8 to 12 lbs. The tongues are first cut out, after the Reindeer is killed. About 3000 to 4000 lbs. of Reindeer-horn must be used by the natives in South Greenland. The trader at Holsteensborg has

* On the western shores of Davis's Strait I have known them to come down to feed upon the *fuci* exposed at low water, as do the cattle and red deer in some places in the north of Scotland.

(or at least had a few years ago) more than 60,000 lbs. of it lying on the ground in a heap*.

I have gone into the history of the Reindeer in Greenland at some length, because I found that though the Reindeer in Lapland is familiar to many, yet the animal in its wild state is much less known, and I have seen most erroneous statements regarding its distribution in Greenland.

12. [OVIS ARIES, Linn.

Grænl. Saua.

At present it is only known in the district of Julianeshaab, to the number of between twenty and thirty. It was already introduced in Fabricius's day. In the summer they feed in the valleys, and in the winter are kept under shelter. They cannot, therefore (nor, indeed, can any of the colonist fauna), be said to be acclimatized.]

13. [BOS TAURUS, Linn.

Grænl. Umimak.

At present there are thirty or forty grazing about in the southern valleys during the summer, and kept at stall in the winter. Some of the more enterprising natives also keep a few cows. I was told by the Danish residents that though there was quite enough grass occasionally found round the settlements in the summer, even further north, they could not be kept on account of the dogs. The old Icelandic Sagas describe the Norsemen as keeping herds of cattle in the valleys of Greenland up to the Middle Ages; and I have no doubt of the accuracy of the statement. The place where they prosper best now is just on the site of one of these ancient colonies. If they left any behind them when the colonies were exterminated by the Eskimo, who about this period make their appearance in South Greenland, they must have died out, or, more likely, were slaughtered by the natives (if a people who, to all appearance, were only wandering hordes who had now for the first time crossed Melville Bay from the north, can be so styled); for when Greenland was again visited by the Europeans no cattle were found. It is somewhat curious that the Greenlanders apply the Eskimo name of the *Musk-Ox* to the domestic Ox, showing a recollection of the existence of the former in the land they came from, though it is no longer a native of Greenland to the south of Cape York.]

14. [CAPRA HIRCUS, Linn.

Grænl. Sauarsuk.

As far back as the days of Fabricius, the Goat had been introduced into the southern settlements of Greenland, and was found profitable; they feed on the grass which springs about the old

* For many of the foregoing statements I am indebted to Dr. Rink, Royal Inspector of South Greenland, whose work (*Grönland Geographisk og Statistisk, &c.*) is the standard on all subjects connected with that country.

Eskimo camping-places in the summer, and are housed in the winter. I am told that they will eat dried Arctic Salmon, if nothing better is forthcoming. It is not kept north of Holsteensborg, as it is found impossible to keep it where there are troops of savage dogs; and it is accordingly only found about the settlements south of that, to the number of about 100.]

5. *On some of the doubtful or mythical Animals of Greenland.*

Otto Fabricius used to spend his summers roaming about with the Eskimo, until he had learned to manage a kayak and strike a Seal with a skill which few Europeans can ever acquire. On one of these excursions he found in "Sildefjord, north of the colony of Fredrikshaab," a piece of a skull, about which the natives told him something; and from what they related to him, and what he thought himself, he entered no less than two species in the Greenland fauna, "*Trichechus manatus*" (*Rhytina gigas*) and "*Phoca ursina*" (*Callorhinus ursinus*), being, apparently, not certain to which it belonged. The Greenlanders called this animal *Auvekæjak*, or *Auikæjak*, and said it was like a Walrus and broke things easily to pieces. He was sure that the piece of skull belonged to the first of these animals; and again he repeats the same under the head of *Phoca ursina*; so that it is now difficult to arrive at any conclusion regarding the species of animal to which it belonged. However, I think there can be but one opinion, that neither the Sea-Bear nor the *Rhytina* can be entered in the Greenland fauna on such fragmentary evidence. The confused stories of the Greenlanders can give the critic no great hold.

This piece of cranium is not now to be found in Fabricius's Museum. In a posthumous zoological manuscript, entitled "Zoologiske Samlinger," written in Copenhagen during the period between 1808 and 1814, and now preserved in the Royal Library, he has again spoken about the *Auvekæjak* (Bd. ii. p. 298, no. 286), and has thus written about the skull he found in Greenland:—

"The head which I found was full of holes, and looked like that of a Walrus (no. 82), without tusks."

There were many long small teeth in the head*; and if such was the case, we cannot be wrong in saying that the animal was not a Mammal. We have, however, no right, when we remember the clear comprehensive style in which Fabricius wrote regarding the Greenland fauna, however much we may be inclined, to say that the whole was erroneous.

It is unfortunate that when Fabricius referred his *Auvekæjak* to the Sea-cow of Steller, he was not acquainted with that animal, and did not know of the horn-plates; for, if he had, it is impossible that he could have found a resemblance to it in the *Auvekæjak*. His words regarding it are clear enough, so far as they go—"Rarissimum animal in mari Grœnlandico, cujus solum cranium ex parte conservatum. commune cum sequenti specie ab incolis dictum nomine *Auvekæ-*

* Reinhardt. *loc. cit.* p. 6.

jak, vidi, inque hoc dentes spurios tales confertim congestos quales Steller" (*vid. loc. cit.* Adel.* § 189). Again, immediately under the head of "*Phoca ursina*," he says:—"Grœnl. ΑΥΒΕΚÆΙΑΚ.—Illam esse animal quod sub nomine hoc memorant incolæ non est dubitandum. Dicunt illud in Australiori Grœnlandia, licet raro, dari quadrupes pilosum, ferociter omne occurrens dilacerare, et si visum consumere: ursi maritimi more terra marique degere, impetuosisime natate, venatores valide infestare. Dentes ut amuleta contra ulcera, nec non quodammodo ad instrumenta venatoria adhibentur." There is an evident uncertainty in Fabricius's mind; and he has listened too much to the idle fables of the natives (who have, as I shall presently show, many of that nature); whatever it is, there can, I think, be scarcely a doubt as to the exclusion of *Trichechus manatus* and *Phoca ursina* from the Greenland fauna; nor can their place as yet be supplied by any other species. Prof. Steenstrup thinks that it was a portion of the skull of the Sea-wolf (*Anarrhichas*). The situation of the teeth and the nature of this fish's cellular skull well agree with his description of the skull as "full of holes" (forhulret†). Hr. Bolbrœ, who understands the Eskimo language intimately, tells me that the word means a "little Walrus," and that in all probability it was only the skull of a young Walrus, an animal not at all familiar to Fabricius, as they are chiefly confined to one spot, and the natives fear to go near that locality. Fabricius may have only written the description from recollection; and memory, assisted by preconceived notions, may have led him into error in the description of the long teeth, which after all might, without great trouble, be made to refer to the dentition of the young Walrus as described by Macgillivray ‡ and Rùppell §.

This opinion is strengthened by a passage in Fabricius's account of the Walrus, when he again is in doubt whether a certain animal is the young of the Walrus or the Dugong, "De varietate dentibus exertis brevioribus loquuntur incolæ, quam minus recte (ut videtur) ad *Phocas* referunt, si non pullus rosmari, an animal Dugong" (Buff. 205, 245, tab. lvi). So that, after all, perhaps the *Auvekæjak* was only the young of the Walrus; and this opinion I am on the whole inclined to acquiesce in.

Fabricius enters, under the name of "*Mustela gulo*, L." (*Gulo borealis*, Retz.), an animal which the natives talked about under the name of *Kappik*. It was said to be found in south Greenland, among high mountains, particularly besides streams, and was especially fond of the hearts of Reindeer. He considered it to be the well-known Wolverine, the *Jerf* of Scandinavia (Norse *Arv*, *Erv*, and *Jærv*; Swedish *Jerf*, *Gerf*; Finnish *Kamppi* and *Kamppi-Karhu*).

* Adelung: 'Geschichte der Schiffahrten und Versuche zur Entdeckung des nordöstlichen Weges nach Japan und China' (Halle, 1768) is the book Fabricius refers to. There is a wrong reference in F. G. to Adelung, viz. 189 for 148.

† Reinhardt, *loc. cit.* p. 8.

‡ Naturalists' Library, (Mammalia) vol. vii. (vol. xiii. of series), p. 220. M'Gillivray's Edin. Journ. of Nat. Hist. and Physical Sciences, Aug. 1838, p. 153; Hamilton in Nat. Lib. vol. viii. p. 102.

§ Bulletin Scien. Nat. vol. xvii. p. 280.

If so, it must be exceedingly rare, for since his time no one has been able to obtain or hear of a specimen. We more than suspect, however, that here, as elsewhere, he was only reproducing in a zoological dress the stories of the natives. So little was then known of the zoology of the Arctic regions, that he might well be excused for entering such animals in his fauna, there existing no reason why they should not be found in Greenland. If Fabricius could have lived to this day, he would have been the first to erase these from his list. The reason why I think so is this:—Under the head of “*Ursus luscus*” he has inserted a very doubtful and problematical animal, talked of long before his day, and equally so now, under the name of “*Amarok*” (“*Ursus luscus*, Eg.* 33, Cr.† 99, ex descriptione pellis ejus. Cf. Continuation.‡ 287, ubi dicitur subfusca, forsitan etiam veterum Hyæna Torf.§ 82”). This animal seems the same as that which he indicated in his fauna under the name of “*Mustela gulo*.” He describes it as very fierce, corresponding in this respect with the character of the Wolverine. Depending upon the natives being in the habit of distinguishing animals by different names very clearly, he considered that *Amarok* and *Kappik* were different animals. Neither of them he appears to know anything about. I found the Greenlanders talking to this day about the *Amarok* all over Greenland; and wonderful stories they tell of its ferocity. It is the terror of the Greenlanders, as Fabricius truly enough remarks; everybody knew about it; but I could find nobody who had ever seen it||. Graah¶ found the natives of the east coast equally familiar with the name of the *Amarok*; the name *Kappik*, however, was unknown in north Greenland.

Finally I discovered a man in Claushavn who declared he had seen the *Amarok*; it hunted in packs, he said; and this man made no secret of his belief that it was only native dogs which had escaped and returned to their wild state. In proof of this, he told me that, as frequently happens during the annual Reindeer-hunting-season, one of his dogs escaped and could not be captured again. Three years after, one severe winter, when “looking” his fox-traps, he found the identical dog captured, much subdued by hunger, but still very fierce after living for so long a period out of the reach of the merciless lash. It served its master for many a day after in harness. This man described the “*Amarok*” as all grey. It has been supposed to be the Wolf (*Canis occidentalis albo-griseus*), and to have crossed over the ice in Smith’s Sound; but, from what I have said about the Eskimo Dog, it will be apparent that to distinguish between a wild Dog and a Wolf is a matter of some difficulty. I think, therefore, that you will agree with me that the Wolverine has

* Description of Greenland, Eng. transl.

† History of Greenland, Eng. transl.

‡ Continuation of the above.

§ Greenlandia Antiqua.

|| Mr. Tegner informs me that one of the natives declares that in July 1867 he saw the marks of the foot of an *Amarok* at the head of the Tessiursak, an inlet near Claushavn.

¶ *Lib. cit.*, p. 90.

no place in the Greenland fauna, and that the Kappik* and Amarak must be regarded as synonyms of *Canis familiaris*, var. *borealis*, tinctured with a deep hue of fable. Murray portrays the distribution of the glutton (*Gulo borealis*) on both the east and west coasts of Greenland up to nearly 67° N. lat.†; but if I am right in excluding this animal from the Greenland fauna, this distribution is erroneous.

Here I may remark, what must by this time be self-evident to you, that the Greenlanders cannot be relied upon (independently of the principle in the abstract) for the names of animals. They are not the excellent cetologists we have always been led to suppose, confounding as they do several animals under one name, as I shall have occasion to notice at a future time when discussing the errors which Fabricius was led into by trusting too much to their nomenclature, and which to this time have entangled the history of the northern Cetacea in an almost pathless maze. Fabricius has notified in his Fauna many species of supposed Seals &c. under various Eskimo names, but which he was unable to decipher‡. Hr. Fleischer, Colonibestyret of Jakobshavn, has aided me in resolving these:—

1. *Siguktok*, “having a long snout and a body similar to *Phoca grönlandica*, perhaps *P. ursina*.” This is apparently some Eskimo perversion, if they have been interpreted properly; for I am assured that it is only the name of the Eider Duck (*Somateria mollissima*).

2. *Imab-ukullia*, a Seal with a snow-white coat, “the eye presenting a red iris, probably *P. leporina*,” is a rare albino of the Netsik (*Pagomys fœtidus*). The meaning of the word is the Sea-hare.

3. *Atarpiak* or *atarpek*, “the smallest species of Seal, not exceeding the size of the hand, of a whitish colour, and a blackish spot of the form of a half-moon on each side of the body.” This description does not correspond to the meaning of the word, which is “the Brown Seal.” Hr. Fleischer thinks that it is only a myth, as is—

4. *Kongesteriak*, which has, “according to the description given by the natives, some resemblance to the Sea-ape described by Mr. Heller”§. This is one of the northern myths. The natives say it is a Bear which is so covered with an ice-coat that it never comes on land, but is always in the water, &c. These myths, both in the pseudo-Mammalia and in other groups, are endless; but I have given enough to show that no dependence can be placed on their idle superstitious tales.

* Jansen in his ‘Elementarbog i Eskimoernes Sprog til brug for Europæerne ved Colonierne i Grönland’ (Kjöbenhavn, 1862), p. 55, translates “Kappik” as “en Grævling.”

† *Op. cit.* Map xxiv.

‡ *Vide* also Giesecke in his “Greenland,” in Brewster’s Edinburgh Encyclopædia. This article, which is the only original one, as far as I know, ever written upon Greenland in the English language, is a most trustworthy account, for the time it was written. The author, however, copies Fabricius in all his errors as well as excellencies.

§ I suppose Giesecke means *Steller’s* account of the “Sea-ape,” *vide* Pennant, Quadr. ii. p. 301 (*Trichechus hydropithecus*. Shaw, Zool. i. p. 247; *Manatus simia*, Illig.; *M.? hydropithecus*, Fischer, &c.).

I may as well close these notes on supposititious or non-existent animals by some remarks on other species, which though not mammals, yet come fairly under the headings I have given to this section of my paper. The Great Auk (*Alca impennis*, Linn.), once so common in Greenland, in the days of Egede, Cranz, and Fabricius, as, indeed, it was in many other parts of the northern portion of Europe and America, there can be little doubt is now quite extinct in Greenland. I made every inquiry regarding it, but could learn little or nothing about it. The natives about Disco Bay do not now even recollect it by name, though when the old Eskimo name of it (*Isarokitsoc*) was mentioned they immediately repeated it, and said, "Ah! that means little wings!" Though the Royal Museum in Copenhagen has offered large rewards for a specimen, hitherto their efforts have been in vain. One of the stories I was told at Godhavn, on Disco Island, if true, would afford some hope of its yet being found:—Eight years ago (1859), on one of the little islets just outside of the harbour, in the winter time, a half-breed named Johannes Propert (a nephew, by the way, of the well-known interpreter Carl Petersen) shot a bird which he had never seen before, but which, from description, could be no other than the Great Auk. He and his companions ate it, and the dogs in his sledge got the refuse; so that only one feather could afterwards be found. I know the man well. He is rather an intelligent fellow, and was not likely to destroy a bird of such rarity that he had never seen it before, when he knew that it would command a price from the Governor. Moreover Johannes bears the reputation of telling wonderful tales now and then. He says that he saw two, but that one escaped among the rocks. Mr. Frederick Hansen, Colonibestyre (Governor) of Godhavn, has offered a reward for it, and is very sanguine that he will yet obtain a specimen of the *Geirfugl**.

Depending on the native stories of a jumping animal found in the southern part of Greenland, on grassy meadows, and called by them *Piglertok* ("the springer"), Fabricius thought that he recognized the Common Frog, and has accordingly entered the *Rana temporaria* as a member of the Greenland fauna. He, however, saw no specimens, nor is such an animal known in Greenland, where there are no species of Reptiles or Batrachians found. About the southern portion of Disco Bay, the natives use the name as a sort of *slang* title to the *Nisa* (*Phocæna communis*, Brookes), the *Marsvîn* of the Danes in Greenland †, from its tumbling or springing movements while disporting itself. Jansen ‡ gives the word in the south Greenland dialect as *pisigsartut* or *pigdlertut*, and translates it a Grasshopper (*græshopper*).

* Swedish *Garfogel*, Norse and Icelandic *Geirfugl* and *Goiful*. It is also called in Norse *Stor-Ommer*.

† Called in Sweden *Marsvin* and *Tumlare*, in Finnish *Merisika*, and in Norse *Ise* and *Nise*, from which, apparently, the Eskimo name *Nisa* is derived, as are not a few of the Greenland words, from their intercourse with the old Norsemen prior to the Middle Ages. I suspect *Piglertok*, now the vulgar term, was originally the native one.

‡ *Lib. cit.* p. 59.

I will not stop to inquire into their grosser myths, which, though relating to animals, are yet only remotely connected with zoological science, and wander away into the domains of mythology, interesting enough, no doubt, but with which we as zoologists have but little to do. For instance, as far back as the days of Fabricius, they used to talk about men living away in the glens off from the coast. "They tell tales" (fabulantur), he says, "of other people living away among the mountains, rarely seen by them, never by the Europeans, whom they call *Torngit* or *Tunnersoit*, and even say that they have the appearance, stature, and clothing of Europeans. If they speak truly, which I am not in a position to deny, perhaps they are the remnants of the former Icelandic colonists, who have fled in among the mountains"*. About Jakobshavn they still talk of these people, and I collected many such stories. Some of these superstitions describe the *Torngit* as little men; and I know a man who says he saw one of these little men "pop out of a hole and in again" most agilely, and he tells a long story about it. Others describe them as tall men; so that these are undoubtedly only traditions of the old Norsemen. During the Norse possession of the country, the population appears to have got much amalgamated (as indeed we know, because when Paul Egede came, there were many traces of the white stock; and to this day there come down from the east coast natives with fair hair and blue eyes†) with the Icelandic adventurers who came with red-haired Erik, and subsequently imbibed much of their superstition. Indeed most of the best Eskimo traditions (as related by Rink in his 'Eskimoiske Saga og Eventyrn) are of Scandinavian parentage. Accordingly we find the old Norse tale of that fearful *Kraken*‡ which drew stout ships down to the bottom of the sea, in a Greenlandic version, still terrifying the squat seal-hunters who gather round the blazing *Kotlup* during the long winter nights; but I need say nothing further about it. It is one of the old *trols* of Scandinavia, familiar enough to all of us.

Still less will I stop to inquire regarding that "sea monster" which good Paul Egede saw, and Pastor Bing sketched "off our colony in 64° north latitude"§.

I have said enough to show that, though there is yet much to be done to the legitimate zoology of Greenland proper, there is still more to be done in what may be called the illegitimate zoology—the history of zoological myths and errors.

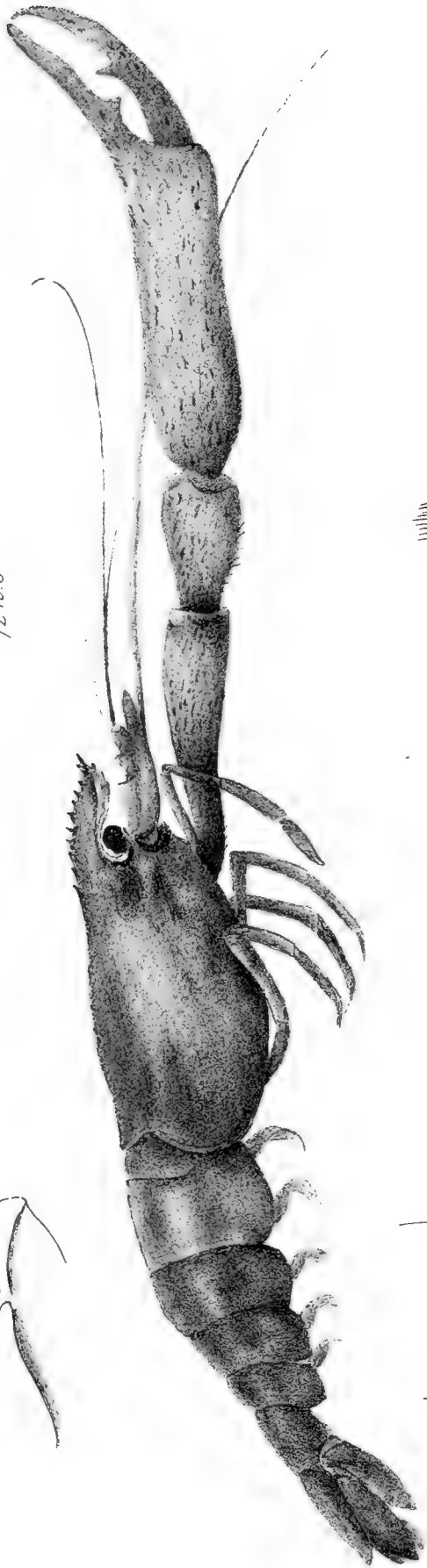
* Fauna Grœnl. p. 4.

† A Moravian Missionary at Pamiadluk, near Cape Farewell, told Captain Carl W. Neilsen (who told me) that, in 1850, a party of natives came to that settlement from the east coast, and declared that it was two years since they had left their homes. They were described as tall and fair-haired. Almost every year some come down and permanently settle in the Danish colonies.

‡ *Kraken*, *Kraxen*, *Krabben*, and *Horven*, vide Pontopiddan, Nat. Hist. of Norway, vol. ii. p. 211; Ancker-Trold, Olaus, Wormius, Torfæus, &c.

§ *Lib. cit.* p. 86.

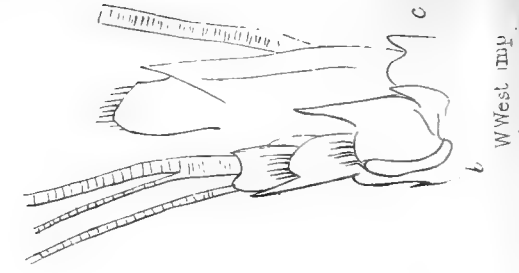




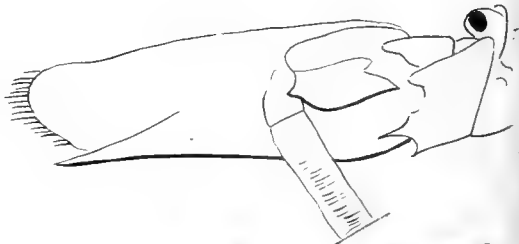
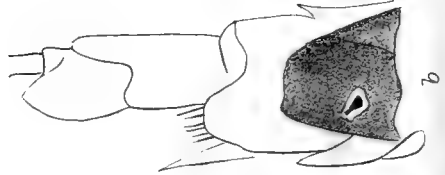
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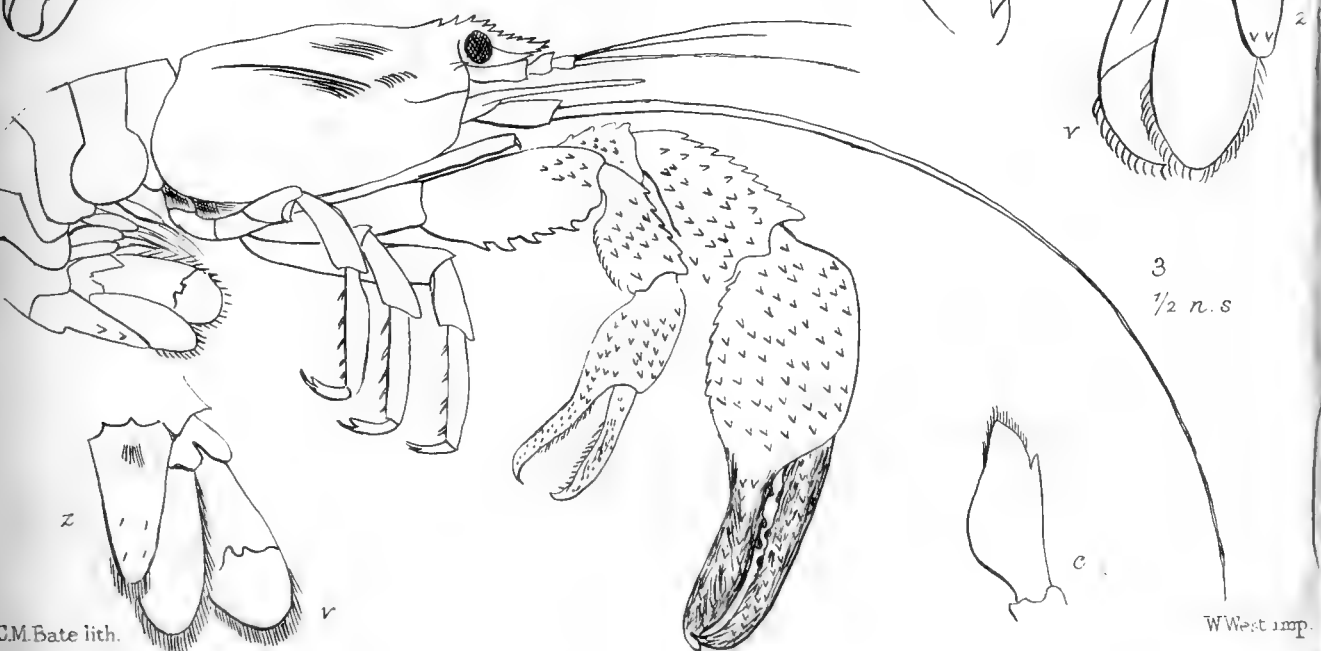
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4. On a new Genus, with four new Species, of Freshwater Prawns. By C. SPENCE BATE, F.R.S.

(Plates XXX. & XXXI.)

MACROBRACHIUM, gen. nov.

Carapace armed anteriorly with a vertically projecting rostrum.

Eyes with short peduncles, not concealed beneath the carapace.

Superior antennæ having the first joint of the peduncle caved upon the upper surface; second and third joints cylindrical. Flagella three-branched, the smallest branch united to the largest.

Inferior antennæ furnished with a large scale; flagellum long and slender.

Mandibles having a molar and an incisive process, and furnished with a triarticular appendage.

Gnathopoda pediform.

First pair of pereopoda slender, about as long as the carapace, didactyle; second pair immensely developed (in the male), longer than the entire length of the animal from the extremity of the rostrum to that of the telson.

Posterior three pairs simple, robust. Posterior pair of pleopoda longer than the telson. Telson triangular, terminating in a single point.

MACROBRACHIUM AMERICANUM, sp. nov. (Plate XXX.)

Carapace nearly half the length of the animal.

Rostrum short, armed above with eleven anteriorly projecting dental processes, of which the last four are posterior to the orbital margin of the carapace, and furnished with short, stiff hairs in the depressions between the teeth; below with three simple teeth. The rostrum has the anterior portion depressed, the apex being slightly elevated. Behind the margin, at the lower extremity of the orbit, is a single, sharply pointed tooth, behind and below which is a sharp spine or tooth that is surrounded at the base by a suture that passes from it on the anterior side to the anterior margin of the carapace.

Pleon deep, scarcely longer than the carapace.

Eyes globular. Superior antennæ having the peduncle scarcely longer than the rostrum; first joint half the length of the peduncle, inner surface flat, perpendicular, furnished with a single tooth near the centre of the lower edge, superior surface concave (for the lodgment of the eye); outer margin thinned out to a fine edge, furnished with a sharp, anteriorly directed tooth near the centre, and another at the distal extremity; the next two joints are short. The smallest flagellum united to the largest for about one-fourth of an inch from the base. Inferior antennæ having the peduncle about half the length of the superior. The large squamiform process nearly half as long again as the rostrum, furnished with an external subapical tooth. Flagellum about as long as the second pair

of pereopoda. Mandible having the incisive margin tridentate, the molar tubercle strong, prominent, and quadrate, and the triarticulate appendage not longer than the incisive process. Gnathopoda subequal, short, robust. First pair of pereopoda slender, having the carpus longer than the meros, and nearly four times as long as the propodos, smooth. Second pair of pereopoda half as long again as the entire animal, having the carpus shorter than the meros, and not half as long as the propodos; digital process turned inwards, armed within the centre with a large dental tubercle; dactylus meeting the digital process of the propodos at the extremity only, and armed near the centre with a large dental tubercle. The entire appendage covered with short spinous denticles, that are strongest on the inner surface and thickest on the digital process of the propodos, the dactylus, as well as the carpus, meros, and basal joints. Last three pairs of pereopoda robust, spinous along the surface of the carpus, propodos, and dactylus. Posterior pair of pleopoda having the outer ramus biarticulate, the margins round and smooth. Telson shorter than the posterior pair of pleopoda, furnished with a fasciculus of hairs near the base, and two sublateral dorsal spines beyond the centre.

This very interesting and, from its great size, valuable Prawn, was obtained by Mr. Osbert Salvin from the Lake of Amatitlan, whence a considerable number are procured and brought to the markets in Guatemala. Its length, from the tip of the rostrum to the extremity of the telson, is about 9 inches; and in diameter it is about 5 inches. The length of the great claws is a feature that must separate this from the genus *Palamon*, from which it is also distinguished by its less slender and graceful proportions. The colour of the specimen, as we have it dead, is of a brimstone-yellow, longitudinally striped with dark blue along the dorsal surface and on the sides of the pleon.

MACROBRACHIUM FORMOSENSE, sp. nov. (Plate XXXI. fig. 1.)

Carapace about one-third the length of the animal, having a rostrum nearly half the length of the carapace, armed above with eleven teeth, two of which are behind the orbital margin of the carapace, and furnished with short, stiff hairs between the teeth. Inferior margin smooth, fringed with short hairs. Behind the margin of the lower angle of the orbit is a sharp anteriorly pointed tooth, and obliquely behind and below is a second similar tooth. First pair of antennæ having the peduncle rather shorter than the rostrum, the first joint of which is about half the length of the peduncle, concave upon the upper surface, and furnished with a sharp distal tooth on the distal outer angle, and a row of hairs along the outer margin. The smallest branch of the flagella is united to the largest for about one-tenth of an inch. Second pair of antennæ having the squamiform appendage reaching beyond the rostrum, and armed subapically on the outer side with a short, sharp tooth. First pair of pereopoda slender, long, having the carpus longer than the meros, and three times as long as the propodos. Second

pair of pereopoda half as long again as the animal, having the carpus longer than the meros and as long as the propodos, excepting the digital process; digital process curved slightly inwards, fringed with a row of hairs, and furnished with two dental tubercles within the centre. Dactylus curved; the apex crossing the extremity of the digital process of the propodos, and impinging against it through the entire length, fringed with a row of hairs and with a single tubercle. The entire appendage covered with small, yellow, transparent, spinous denticles. Last three pairs of pereopoda moderately robust, and furnished with numerous small denticles along the inferior margin. Posterior pair of pleopoda roughened with small spines, as also the telson, which carries a small fasciculus of hairs near the base, and two small sublateral spines beyond the middle.

The length of this species is about 4 inches. It has recently been taken and brought home by Dr. Collingwood, who procured it from the River Tamsuy, in the Island of Formosa.

MACROBRACHIUM GANGETICUM, sp. nov. (The Chingra.)

This species appears closely to resemble the preceding. I only know it through a drawing given to me by the late Colonel Hamilton Smith, who obtained it from a friend at Patna, a distance of 250 miles from Calcutta, where it was used as food, and was known under the name of "Chingra," the Hindostanee, I believe of "shrimp." Its length is about 6 inches, and the colour a bluish grey.

MACROBRACHIUM LONGIDIGITUM, sp. nov. (Plate XXXI. fig. 2.)

Carapace, including rostrum, nearly half as long as the animal. Rostrum about half as long as the carapace; upper surface armed with eight teeth, two only of which are behind the orbital margin. The teeth are widely separated from each other, and a few hairs are situated immediately anterior to each denticle. The lower margin armed with five teeth and a copious fringe of hair.

First pair of antennæ having the peduncle one-third shorter than the rostrum, the first joint of which is about half the length of the peduncle, concave upon the upper surface, and armed with a sharp distal tooth on the outer angle, and without conspicuous cilia along the margin. The smallest branch of the flagella attached to the largest for about one-fourth of an inch from the base. Second pair of antennæ as long as the animal, the peduncle being about half the length of the peduncle of the upper pair. Squamiform appendage not reaching to the extremity of the rostrum, and armed subapically with a small, sharp tooth, that does not reach beyond the cilia that thickly fringe the distal and internal margin.

First pair of pereopoda long and slender, having the carpus longer than the meros, and three times as long as the propodos. Second pair of pereopoda not quite as long as the animal, having the carpus a little longer than the meros, and the propodos, inclusive of the digital process, as long again as the carpus, the dactylus being half the length of the propodos, being pointed and curved at the apex,

crossing when impinged against the curved margins of the digital process of the propodos, the entire appendage being thickly studded with small tubercles that appear generally to be ranged in longitudinal rows, of which those on the inner and lower sides are considerably the more prominent. Last three pairs of pereiopoda moderately robust, and furnished on the posterior margin of the propodos with a few equidistant solitary spines, and interspaced with hairs. Posterior pair of pleopoda having the denticle of the external plate not produced beyond the margin of the distal articulation. Telson smooth, slightly compressed, furnished with a depression and small fasciculus of hairs near the base, and two sublateral spines on each side beyond the middle.

The length of this species is about 5 inches. It has been in the collection of the Plymouth Athenæum for many years; but no habitat is recorded with it.

MACROBRACHIUM AFRICANUM. (Plate XXXI. fig. 3.)

Carapace half the length of the animal, rostrum depressed; apex slightly elevated, surmounted by nine small teeth, of which the anterior are the smaller, and only the posterior one behind the orbital arch; the interspaces furnished with short, stout cilia on the underside of the rostrum; near the apex are three small teeth; at the inferior angle of the orbit is a small, sharp tooth, between which and the infero-anterior angle of the carapace is a suture that passes to a considerable depth into the carapace, but its limit is not defined by a spine as is very generally the case in this genus. The superior antennæ have the peduncle nearly as long again as the rostrum, having the first joint as long as the other two, concave upon the upper surface, and produced into a strong spine upon the outer distal extremity. The smallest flagellum united with the largest to about one-eighth of an inch from the base. Inferior antennæ one-fourth longer than the animal; squamous process internally distended near the middle, receding towards the apex, which reaches nearly for one-half its length beyond the peduncle of the superior antennæ, and subapically armed with a tooth on the upper and outer side. First pair of pereiopoda are slender, and have the carpus longer than the meros, and four or five times as long as the propodos. Second pair of pereiopoda unequal, the right being considerably more long and robust than the left; but otherwise they resemble each other. The right leg as long as the animal, the left about one-third shorter; carpus about half the length of the propodos, minus the digital process, in the right, but nearly as long as the propodos in the left. Meros longer than the carpus, and both right and left thickly covered with sharp anteriorly directed spinous tubercles. Dactylus and digital process long and slender, armed at the extremity with a distinct spine, and along the inner margins with three corresponding tubercles. Posterior three pairs of pereiopoda robust, and furnished with numerous small spines on the dactylus and posterior margin of the propodos. Posterior pair of pleopoda having the articulation of the outer plate waved, and the denticulated process continuous

with the outer margin of the second articulate margin ciliated, extremity of both plates round. Telson smooth, laterally slightly compressed; near the base on the central dorsal surface is a depression occupied by a small tuft of hair, and beyond the middle, on each side, are two short spines and a fasciculus of short hair.

Hab. Tambo River.

The near resemblance that these species bear to those of the genus *Palæmon* may induce some carcinologists to reconsider the propriety of making these species a genus by themselves. I am not aware that any structural distinction separates them from the genus *Palæmon*. There is, I think, however, in the enormous length of the second pair of pereopoda, when compared with the same appendage in *Palæmon*, a strong *primâ facie* evidence that a separate generic distinction would form a very natural classification. I had, I must admit, some doubts upon the question, and hesitated in my opinion until I found that others, though closely allied in general form, yet specifically distinct in character, enabled me to see that the peculiarly distinguishing features that separated the species of this genus from *Palæmon* were sufficiently constant to warrant the adoption of the new genus. The convenience of this arrangement may also be seen in the peculiar and distinct habitat of *Macrobrachium*, the whole of the species yet known being lacustrine or fluviatile. I have only seen one or two specimens of each species, and these are all males. The development of the chelopods is so great in length that it must be difficult, if not impossible, for the animal to reach its own mouth with them; so that they can be of no use in feeding, for which purpose the first pair, being shorter, are more efficient. I believe it probable, but have not been informed, that in the females the chelopods are less monstrously developed.

It is something very remarkable that these Prawns, all of them so very large, living in freshwater lakes and rivers, in localities so very distant from each other as Central America and Central India, should bear so near a resemblance.

We are not aware that the same rivers or lakes have any other species of Prawn; and it would appear that the several species must have come from one common origin; for even the position and number of the spines on the telson, as well as the fasciculus of hair in the small depression at the base of the same, are common to all the species.

Whether or not there is anything remarkable in the form of their young or in the development of their larvæ I know not. The freshwater *Astaci* differ from their marine congeners in producing the young in a more advanced stage of development; but this appears not to be a constant law in freshwater Crustacea. In a small freshwater Prawn from the rivers of the island of Mauritius, that has been sent to me by Dr. Power, the young undergoes a change of form similar to that of the marine species.

I look upon the discovery of these edible Crustacea as being

among the most fortunate of recent carcinological observations. Their great size would well adapt either of the species for culinary purposes if any one could be induced to acclimatize the species to our own lakes and streams. This appears to be the more easy in regard to the species from America, since the Lake Amatitlan is at so lofty an elevation as to be of a very low temperature.

DESCRIPTION OF PLATES XXX. & XXXI.

PLATE XXX.

Macrobrachium americanum. c. Rostrum. b. Superior antennæ. c. Inferior antennæ. d. Mandible. h. First pair of pereopoda. v. Posterior pair of pleopoda. z. Telson.

PLATE XXXI.

- Fig. 1. *M. formosense*. c. Scale of inferior antennæ. v. Posterior pair of pleopoda. z. Telson.
 2. *M. longidigitum*. c. Scale of inferior antennæ. v. Posterior pair of pleopoda. z. Telson.
 3. *M. africanum*. c. Scale of inferior antennæ. v. Posterior pair of pleopoda. z. Telson.

5. On a supposed new species of *Galeocerdo* from Southern Seas. By J. D. MACDONALD, M.D., F.R.S., and Mr. CHARLES BARRON, Curator of the Haslar Museum.

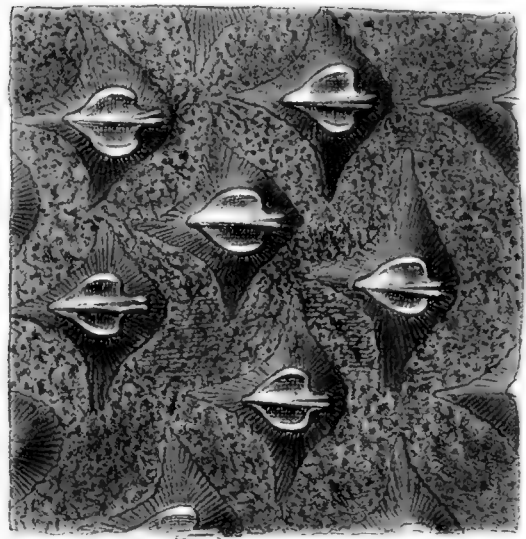
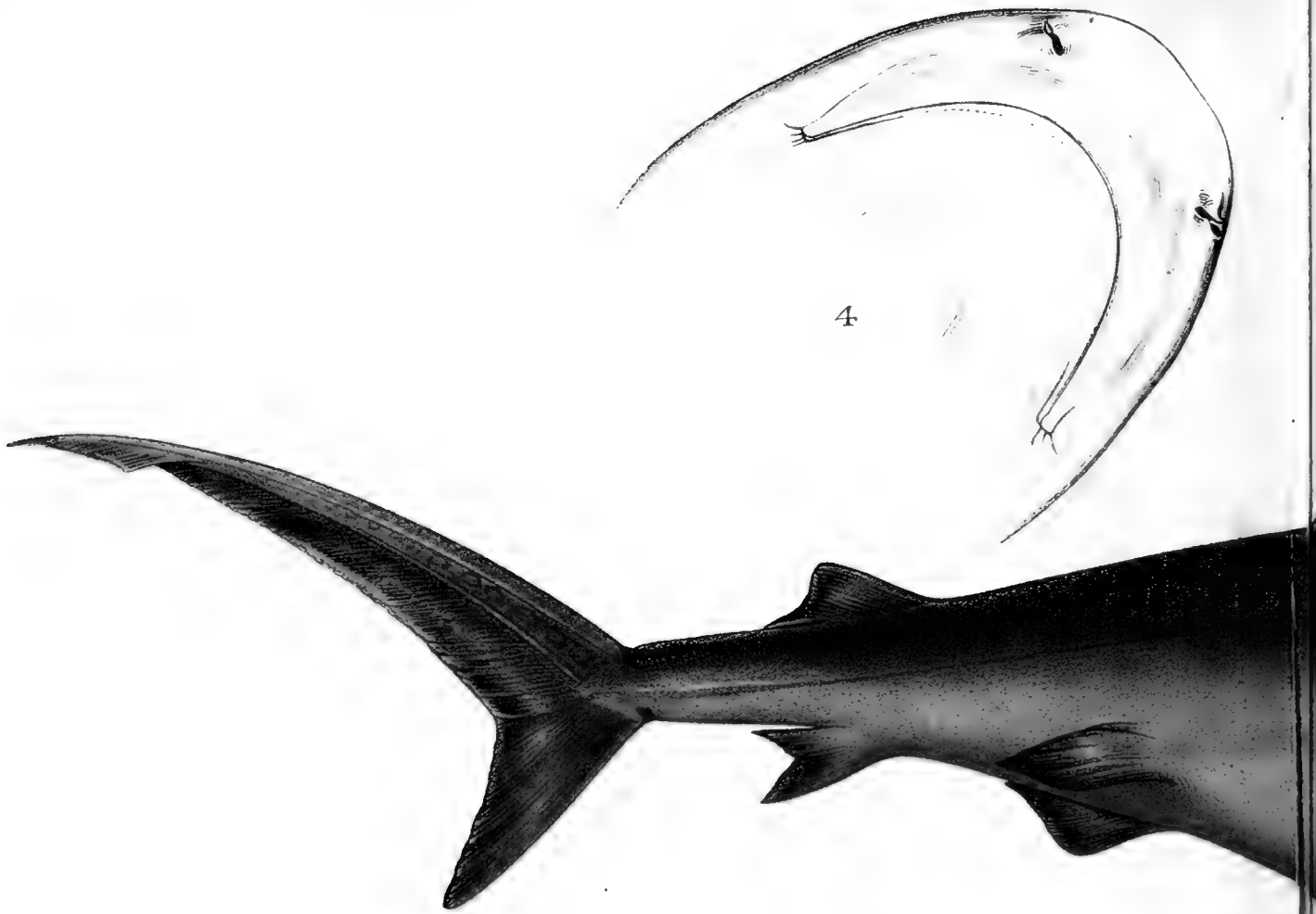
(Plate XXXII.)

The following observations on a species of *Galeocerdo*, from the Australian coasts, are based on two jaws and a portion of skin preserved by F. M. Rayner, Esq., Staff-Surgeon, R.N., together with notes and measurements made by him, and drawings made by Dr. J. D. Macdonald, R.N., from the recent animal.

On reviewing the literature of the genus *Galeocerdo* it would appear that, comparatively, few specimens have actually been obtained for scientific examination, as the great authorities on this group of fishes, Müller and Henle, only mention two examples of the southern Tope (*G. tigrinus*), and two of the northern (*G. arcticus*), with several jaws; and the British-Museum Catalogue of the *Chondropterygii* only includes one specimen of the former and three jaws of the latter species.

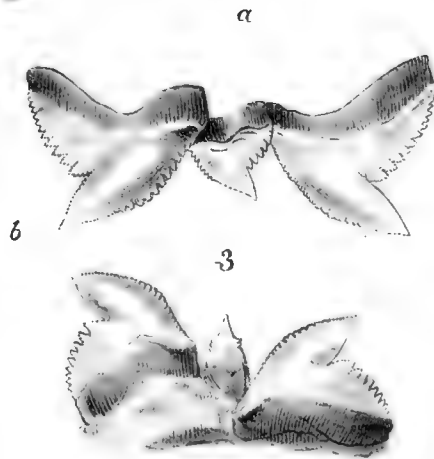
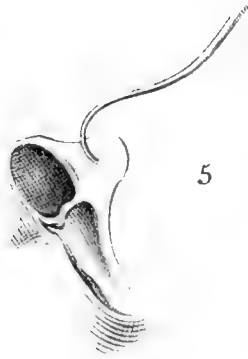
When we compare the external characters of the two known species, as given and depicted by Müller and Henle, with those of the present Shark, we find the proportions of the body and fins of *G. arcticus* (Müller and Henle, pl. 24) to agree best with it; but in the colour of the skin there is great difference, and the scales represented in the plate alluded to are approximated and slightly imbricated, besides being relatively broader and more distinctly three-keeled than those of our fish. Moreover, although the teeth figured





J.D. Macdonald. ad.nat. del
J Smit lith

GALEOCERDO RA



M&N Hanhart imp



by Müller and Henle (pl. 24), and by Prof. Owen (in his 'Odonotography,' pl. 28. fig. 9) of the northern Tope bear a general resemblance to those of Mr. Rayner's specimens, yet, on careful comparison, the latter are found to be more delicately crenulated towards their summits. In colour the southern Tope (*G. tigrinus*), figured by Müller and Henle in plate 23 of their work, has something in common with our Shark, particularly in the form and disposition of the markings; but in the general contour, and in the proportion of the fins, there is much disagreement. This is especially noticeable in the tail; for whereas in *G. tigrinus* the caudal fin, measured from the tail-pits to its extremity, is more than a third of the entire length of the fish, in Mr. Rayner's Shark this member is only a little more than a fourth of the extreme length, and agrees better with the tail of *G. arcticus* as well in proportion as in form.

The two Australian jaws collected by Mr. Rayner have been carefully compared with six entire jaws and a portion of a seventh, collected in southern seas by different naval officers, who presented them, at various times, to the Haslar Museum*; and they have been found to agree in every particular.

With such evidence of the apparent frequency of this Shark, and of its range in southern seas, one might be led to consider it identical with the known southern Tope; but there are also distinctive characters which we think sufficient to afford good presumptive evidence of the existence of a marked variety, if not a distinct species; and in honour of the gentleman whose labours have furnished much material and many interesting facts relating to this group of fishes, we wish to bestow on it the provisional name of *Galeocerdo rayneri*.

Mr. Rayner's notes, taken from the recent specimen, are here transcribed:—

“ *Dimensions of a female fish taken in March 1858.*

| | feet. | in. |
|--------------------------------|-------|-----|
| “ Length to tail-pit | 6 | 2 |
| Length of tail-fin | 2 | 3½ |
| Girth | 3 | 8½ |

“ Head short, flat and inflated at the angles of the jaws; snout short and rounded; nostril slit transversely, with a conical flap attached to the inner side of the anterior border, and the external

* 1. Large entire jaw from St. Thomas, Virgin Island, presented by Francis Cole, Esq., R.N.

2. Large entire jaw, locality unknown.

3. Large entire jaw, from the west coast of Australia.

4. Large entire jaw, from near Lord Howe's Island, presented by F. M. Rayner, Esq., R.N.

5. Large entire jaw, locality unknown.

6. Entire jaw of smaller size, locality unknown.

7. Portion of jaw of large size, from the Pacific, presented by — Wood, Esq., R.N.

opening exposed; the eye placed over the centre of the mouth, small, round, with a round pupil, bronzed silver iris and large granular nictitating membrane. The mouth large, crescentic, near the end of the snout, and with corner folds large above and small below. Body short, thick, keeled on each side from behind the first dorsal to beyond the tail-pits and along the dorsum between the two dorsal fins. The fourth and fifth gill-slits are over the pectoral fin, the last the smallest. The spiracles very small, linear and placed behind the eye, nearly vertical to the corner fold of the mouth. All the fins comparatively small; the first dorsal fin nearly midway between the pectoral and the ventral fins; the second dorsal placed over, but a little in advance of, the anal fin, which last has a deep notch on its posterior border. The upper lobe of the tail is long and curved, having a small lobule terminating in a fine point, with a notch below; lower lobe nearly half as long as the upper one. A large semilunar tail-pit above and below. The colour of the skin is of a slaty hue on the back, marked with transverse bands, interspersed with spots; the belly white."

The following descriptions we make from the series of seven jaws now in the Haslar Museum, and the two Australian jaws preserved by Mr. Rayner with the preparation of dry skin.

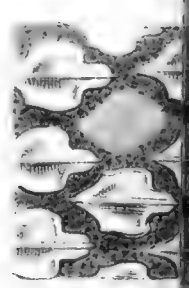
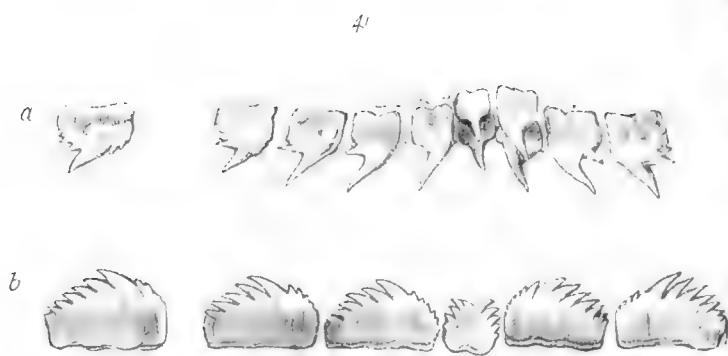
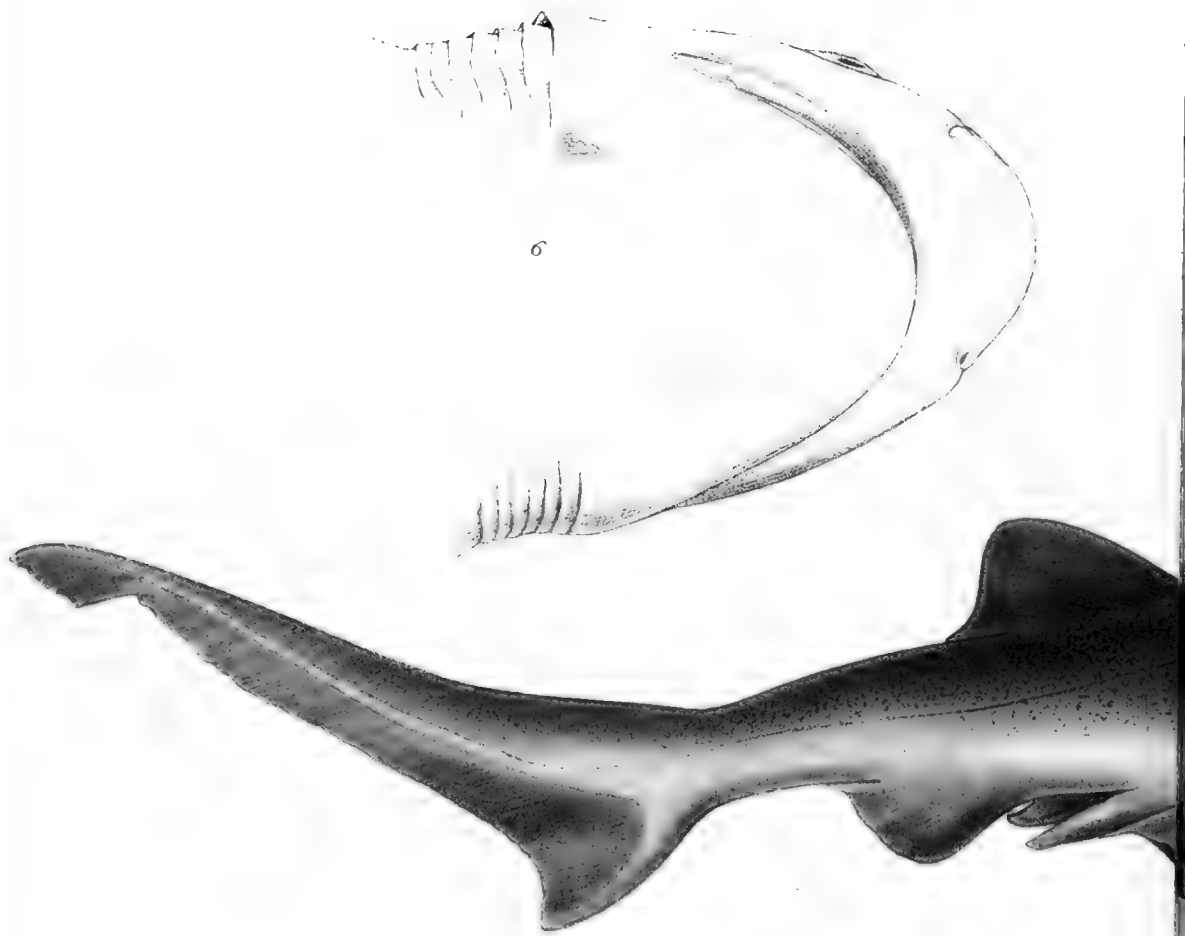
Teeth, upper jaw—one small central asymmetrical tooth, bending to the left and similar in form to the side teeth, which are considerably larger. In the lower jaw there is one small, central, nearly symmetrical tooth, broad at the base, finely serrate at the sides, giving off, at an acute angle, a denticle on each side, about half-way up, and a central fang which comprises the upper half of the tooth, and which, when seen with a lens, is found to be delicately crenulated. With this exception the teeth are alike in both jaws, and may be described as broad at the base, with a considerable convexity behind, flatter in front, asymmetrical, springing up from the anterior border with a backward curve to form a trenchant fang of a spear-head shape, the posterior border of which only encroaches upon half the width of the tooth; serrate on both sides, the serratures becoming finer towards the summit, while those occupying the hinder half of the tooth are larger and have fine secondary serrations on their edges. About eleven teeth on each side in both jaws, the last three, near the angles of the jaws, diminishing in size.

The colour of the dry skin is dingy grey with a certain amount of warmth, which is probably due to exsiccation, and the spots are of a still darker hue.

The scales are placed in quincuncial order with wide interspaces, the base of each scale broad, three-rayed and gibbous in front, thus representing the usually rhomboidal base of Shark's scales, the upper part shovel-shaped, somewhat reflexed at the edges, and with an elevated central ridge bifid posteriorly.

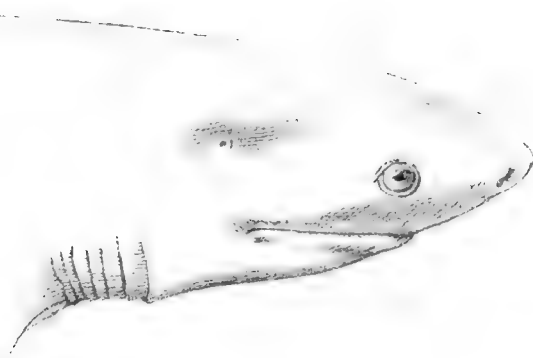
We have considered it useful to subjoin a summary of the chief results obtained by a comparison of the two Sharks, *G. tigrinus* and *G. rayneri*, as respectively figured and described by Müller & Henle and in the present paper.





From nature by F. Macaulay

5



1



a

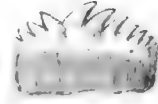
3



a



d





Comparison of the two Sharks, with their points of difference.

Galeocerdo tigrinus as given in
Müller and Henle.

1. Frontal elevation of doubtful character.
2. A hazel eye.
3. A warm brownish tint extending over the head and upper surface of body and tail, with oblique streaks extending to the gill-openings and under the throat.
4. Upper lobe of tail, from tail-pit* to extremity, over a third of the whole length of the fish.
5. Lower lobe of tail less than one-third the length of the upper†.

Galeocerdo rayneri as figured
and described in the present
paper.

1. No frontal elevation.
2. Iris bronzed silver.
3. Head, upper surface of back, tail, and fins bluish grey, without oblique marks extending to the gill-openings or under the throat. No warm brown tint observable anywhere.
4. Upper lobe of tail, from tail-pit to extremity, a little more than one-fourth of the whole length of the fish.
5. Lower lobe of tail nearly half the length of the upper.

DESCRIPTION OF PLATE XXXII.

- Fig. 1. Representation of the recent fish.
2. Portion of skin, magnified about 20 diameters.
3 *a.* Upper jaw. *b.* Lower-jaw teeth.
4. Inferior aspect of the head.
5. The nostril, with blunt triangular flap.

6. Notes on *Heptranchus indicus*, chiefly as regards Sexual Characters. By J. D. MACDONALD, M.D., F.R.S., and Mr. CHARLES BARRON, of the Haslar Museum; with Drawings from Nature by Dr. MACDONALD.

(Plate XXXIII.)

The subjects of the present paper, male and female of *Heptranchus indicus*, were taken by F. M. Rayner, Esq., Staff-Surgeon, R.N., in Bass's Straits, in January 1858; and in addition to the beautifully preserved jaws, portions of skin, &c., he made accurate notes of all the principal characters, with the dimensions and colouring as observed in the fresh state; and these remarks we transcribe *in extenso*:—

The head flat, with minute spiracles placed behind the eye, near the top of the head, and vertical to the corner fold of the mouth;

* No inferior tail-pit is given in this figure, nor in that of *G. arcticus*.

† Though two notches are given near the extremity of the upper tail-lobe, no distinct terminal lobe is represented.

the snout blunt and rounded; the nostril crescentic and very near the end of the snout; the eye small, without a nictitating membrane, having a round pupil and bronzed silver iris. The mouth convex, with a wide gape and long corner fold. The seven gill-slits all in front of the pectoral fin, of large size, decreasing posteriorly and extending low on the throat. The single dorsal fin situate intermediate between the anal and ventral fins; the pectoral fins large and broad; the upper lobe of the tail very long, and notched on the underside near its extremity, the lower lobe very short, with a small lobule. No tail-pits. The colour of the upper parts of the skin in the male fish brownish grey, with a few white spots interspersed among numerous smaller black ones, sprinkled over the back and sides; the belly clouded white. This description applies also to the female, except that on it no white spots were observed.

The examination of the preparations of dried skin from specimens of each sex shows that little need be added to Mr. Rayner's description, save that the skin of the male, when viewed with the light falling along it lengthwise, is plainly seen to be marked with numerous transverse zebra-like stripes, and it is also curious to observe that the sites of the white spots, on the skin of the male, are marked by a fewness of scales; and this character is in direct proportion to the intensity of the spots, so that it is not improbable they may be the result of disease.

Important and distinctive dental features are revealed by the examination of the jaws of the two sexes of this species, and which, so far as our investigations have gone, have been hitherto unnoticed, though, when the two are seen together, the differences are at once plain and striking. This can only be accounted for on the supposition that the two sexes have not been sufficiently compared together, which is likely from the apparent paucity of the specimens, as Müller and Henle only mention one in Leyden and one in Paris, and the British-Museum Catalogue only includes two stuffed specimens. The figure given in Müller and Henle's work, plate 32, is that of a female, and the teeth there delineated give an exceedingly faint notion of the characteristics of either sex; the teeth of *H. cinereus*, represented on plate 35, more nearly resemble those of the female of this species.

Teeth of male:—Upper jaw, three central rather crowded symmetrical teeth, somewhat quadrate at the base, with a strong and sharp fang arising straight from the centre of each, the outer ones having a small denticle on one or both sides, absent in the central tooth. The side teeth are similar in shape, but broader at the base, with the central fang directed towards the corner of the jaw, and a well-developed laterally directed denticle on each side; the teeth also, as they recede from the centre, have other little denticles appearing nearer the base, and these amount to three on each border of the last fanged tooth. Lower jaw—one central symmetrical tooth, flat and nearly quadrate at the base, and crowned with six graduated denticles, diverging laterally, three on each side, the side teeth larger, flat, subquadrate, and vertically grooved below, crowned with graduated denticles, asymme-

trical, four being usually turned towards the centre and six towards the angle of the jaw. The teeth near the corners of the mouth, in both jaws, are simply plates of small size and disposed in short series.

Teeth of female:—Upper jaw, a small central tooth with a more or less median fang, flanked by another asymmetrical tooth on either side, also with a single fang, but arising from the inner part of the free border and having an outward direction. The side teeth are similar in shape and (beside the principal fang, also directed obliquely outwards) present smaller denticles externally, increasing in number and distinctness as the teeth recede from the centre, but all pointing horizontally outwards. The first side tooth presents one denticle, the second and third two each, and the three last fanged teeth three denticles, with a serrature on the inner side of the base of the principal tooth. Lower jaw—one central symmetrical tooth, flat and quadrate at the base, with about six denticles diverging equally on each side. The side teeth subquadrate, flat, vertically grooved below, slightly serrated on the anterior margin, and surmounted with about six graduated denticles directed towards the angle of the jaw. The teeth at the outer extremity of both jaws are rudimentary plates, as in the former case.

DIAGNOSIS.

Male.

Denticles diverging from an axial line or principal fang in each tooth.

Female.

The principal fang and all the denticles diverging from the centre line of the whole jaw.

The dimensions of the male fish, as given by Mr. Rayner, were as follow:—

| | feet. in. |
|----------------------|-----------|
| Extreme length | 5 9 |
| Girth | 2 1 |

And of the female, which was a much younger fish:—

| | |
|-------------------------|------|
| Extreme length | 3 10 |
| Length of tail | 1 3 |
| ——— of lower lobe | 0 4 |
| Girth | 1 0 |

DESCRIPTION OF PLATE XXXIII.

Fig. 1. Representation of recent male fish.

2 *a.* Portion of skin with scales, magnified about 20 diameters. *b.* Scales seen in profile.

3 *a.* Upper-, and *b.* Lower-jaw teeth of male fish.

4 *a.* Upper-, and *b.* Lower-jaw teeth of female.

5. Head of female.

6. Inferior aspect of head, showing the extent of the gill-openings.

7. Nostril, with angular flap.

7. A Review of some of the Species of the Genera *Melo* and *Cymba* of Broderip. By THOMAS GRAHAM PONTON, F.Z.S.

Mr. Reeve, in his monograph of these genera (which, while acknowledging their undoubted generic value, he nevertheless unites under the old name of *Cymbium*), describes seventeen species, nine belonging to *Melo*, and eight to *Cymba*.

Having lately had the opportunity of examining a number of specimens of some of these, I propose to say a few words as to their specific value.

MELO GEORGINÆ, Gray.

This species was first described by Dr. Gray in the year 1833; but in his subsequently published monograph of the *Volutidæ* he considers that both it and *M. ducalis* (Lk.) are varieties of *M. diadema*, Lk. Reeve, in his monograph of *Cymbium*, says he considers this species to be undoubtedly distinct both from *M. diadema* and *M. ducalis*, with which latter species he, however, unites *M. umbilicata*, Broderip.

After a very careful examination of a considerable number of specimens of *M. ducalis*, *M. umbilicata*, *M. georginæ*, and *M. diadema*, I cannot help thinking that Reeve is right in uniting *M. umbilicata* with *M. ducalis*; but, as regards both that species and *M. georginæ*, that he is wrong in separating them from each other and from *M. diadema*.

I am quite unable to distinguish *M. georginæ* from *M. ducalis*; they appear to me to pass into each other and into *M. diadema* by a series of gradations.

First, with regard to *M. georginæ*, it seems to me that the slight differences in form and coloration which have been mainly relied on for distinguishing them, when a number of specimens of both are brought together, entirely lose their value. The deep-red hue and linear markings which have been supposed to characterize *M. georginæ* do not, I find, really do so. I have seen more than one specimen of *M. ducalis* which possessed the linear markings in combination with the brilliant red-brown reticulations on the bright flesh-coloured ground usually found in that form. The greater ventricosity of form also of *M. georginæ* I find to be very variable. Specimens of *M. ducalis* and *M. georginæ* of equal length frequently give equal measurements in breadth also.

Another reason for uniting species presenting such undoubted intermediate forms is the similarity of habitat. For, to cite the converse of a proposition recently laid down to define the limits of a species, "When two different forms are found in the same habitat, and are connected together by intermediate forms, such forms cannot be considered specifically distinct." But, supposing that *M. georginæ* passes into *M. ducalis*, does that species merge into *M. diadema*? Most undoubtedly I think it does, and that by indefinable gradations. One character not unfrequently relied on for

distinguishing them, viz. the greater immersion of the spire in *M. ducalis*, I find to be quite fallacious. So variable, in fact, is the more or less immersed state of the spire in what would be considered well-marked specimens of both forms, that I cannot regard it in any other light than a purely individual peculiarity.

The difference of locality may doubtless be urged, in the case of *M. diadema*, as a reason for keeping it distinct; but although a difference of locality, when joined with other marked peculiarities, is no doubt a strong additional proof of specific distinctness, I do not think that it of itself, in the absence of such other peculiarities, tends to prove the specific value of any particular form.

CYMBA PORCINA, Lamarck.

This species has long been a bone of contention amongst conchologists, many taking the view that it is merely a variety of *C. proboscidalis*, Lamarck, others as stoutly maintaining its specific distinctness. Reeve admits its specific difference, but with some hesitation.

Having examined between twenty and thirty examples of the two species, ranging in length from $1\frac{1}{2}$ inch to 8 or 9 inches, all from the same locality, I must say I have failed in making out a specific difference in the two forms.

The number of the columellar plaits, which is a character much relied on for distinguishing between the two forms, is not, I think, by any means an infallible guide. I have seen an undoubted specimen of the *proboscidalis* form with only two columellar plaits, and others in which the fourth plait was scarcely appreciable. All the specimens of *C. porcina* I have hitherto met with had three columellar plaits.

CYMBA NAVICULA, Gmelin.

I cannot distinguish specimens of this shell from some young forms of *C. neptuni*, which are always mottled with white, except by the number of the columellar plaits. The difference of number in these plaits, which, as mentioned above, is occasionally a variable character, appears in this instance, however, to be constant; it may therefore perhaps be better, taking this into account with other slight peculiarities, to keep them distinct.

CYMBA PATULA, Broderip.

Is this the young of *C. neptuni*, or a distinct species? asks Mr. Reeve. From the specimens I have examined I am inclined to think that it is certainly the latter. It appears to me to be more nearly allied to *C. olla*, young specimens of which it closely resembles, than to *C. neptuni*.

June 11, 1868.

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

Mr. P. L. Sclater exhibited a very fine and perfect skin of the Australian Cassowary (*Casuarium australis*), which had been transmitted to him by Mr. Charles J. Scott of Queensland, and was believed to be the first example of this species that had reached Europe.

Mr. Sclater alluded to several former occasions on which notices of this species had been brought before the Society*, and remarked that its rediscovery in Australia was mainly due to the exertions of the Messrs. Scott, who had so kindly interested themselves in the matter, as already recorded in the Society's 'Proceedings' (see P. Z. S. 1866, p. 557).

The present specimen of the Australian Cassowary had been shot in the beginning of November last by Mr. Henry Stone, overseer to Messrs. Scott Brothers and Co., at their station in the Vale of Herbert, in the same scrub from which the specimen described by Mr. Krefft in the Society's 'Proceedings' for 1867 (p. 482) had been procured. Along with the specimen, Mr. Scott had forwarded to Mr. Sclater a careful description of the head and naked parts of the neck, which Mr. Sclater intended to place, along with the specimen, at the disposal of Mr. Gould, in order that the bird might be properly illustrated in the Supplement to the Birds of Australia.

Mr. Sclater further remarked that some naturalists had been inclined to doubt whether the *Casuarium australis* would prove to be really distinct from the well-known *Casuarium galeatus* of Ceram, but that he believed that no one who had examined the present specimen could any longer doubt upon the matter. Mr. Sclater had not yet had an opportunity of making a careful comparison between the two birds; but the following appeared to be noticeable points of distinction between the two species:—

1. The different form of the vertical crest.

It would be observed that in the Australian bird the crest was of a different shape from that of *C. galeatus*, rising much more erect from the head and attaining a much greater development than even in the largest examples of the latter species, of which there was at the present moment a very fine specimen living in the Society's Gardens. In *C. australis* also the crest was extremely compressed towards the edges, terminating in two thin laminæ of horn united in a medial line.

2. The thicker and stouter tarsi, and the greater development and straightness of the elongated claw on the inner toe of *C. australis*.

3. In the fine cobalt-blue colour of the naked throat and front part of the neck, the corresponding parts in *C. galeatus* being of a dull purple.

The following were stated to be the dimensions of the present specimen of *C. australis*, which appeared to indicate that the species

* Cf. P. Z. S. 1866, p. 557; 1867, pp. 241, 473, 482.

attained a much greater size than *C. galeatus*. Total length, from the summit of the helmet to the end of the caudal feathers, about 72 in.; total height of the crest, from its base to the summit, 5·8; distance from the gape to the end of the bill, in a straight line, 6·1; length of tarsus 13·3; length of inner toe with the nail 6·3, nail of do. 3·5; length of middle toe with the nail 7·0, outer do. with the nail 4·5. The wing in *C. australis* was composed of four or five strong barbless quills, and terminated, as in other species of the genus, by a well-developed claw. The gular caruncle appeared rather to resemble that of *C. galeatus*, being divided nearly down to its base, and terminating in two flaps, which in the present specimens were of unequal length, one measuring 2·3, and the other 3·9, from the junction. These caruncles were sparingly covered with hairs, which Mr. Selater had not noticed in the case of the other Cassowaries.

Dr. A. Günther, F.R.S., made some observations on the various species of *Clupea* found on the British coasts, which were stated to be five in number, namely, the Herring (*Clupea harengus*), the Spratt (*C. sprattus*), the Alice-Shad (*C. alosa*), the Twaite-Shad (*C. finta*), and the Pilchard (*C. pilchardus*). Dr. Günther showed, by the exhibition of various specimens and diagrams, that the so-called *C. alba*, or Whitebait, which had been considered by several authors a distinct species, and by Prof. Valenciennes had been even elevated into the rank of a distinct genus (*Rogenia*), was nothing more than the young of the common Herring. Dr. Günther likewise referred *C. leachii* of Yarrell to a well-developed variety of the Herring, and considered the so-called *Alosa squamo-pinnata* of Couch (Brit. Fish. iv. p. 123, t. 206) a hybrid between the Pilchard and one of the two Shads.

Mr. Tegetmeier called the attention of the Society to the progress recently made in Salmon-breeding at the Stormontfield ponds, on the Tay. In November 1867, 350,000 eggs were spawned artificially and deposited in the ponds: of these 200,000 were hatched this spring. The smolts of last and the previous year, which left for the sea during May 1868, were very much larger than those of previous seasons—the fishes of one year old being as large as those of two years' age of previous seasons. This great increase of size was evidently owing to the change which had been effected in their dietary. Formerly the fish were fed during their smolt-condition on boiled ox-liver rubbed down to coarse powder. Recently the aquatic weeds in the ponds had become covered with *Limnæa peregrina*, on which the fish had fed greedily, and to which the great increase of size was undoubtedly to be attributed.

Mr. E. T. Higgins exhibited and made remarks on a skin of a variety of the Puma (*Felis concolor*) from the southern part of South America.

The following papers were read:—

1. On the Development and Succession of the Teeth in the Armadillos (*Dasypodidae*). By WILLIAM HENRY FLOWER, F.R.S. &c., Conservator of the Museum of the Royal College of Surgeons.

With one exception, all writers on the dentition of the Armadillos, whose works I have been able to consult, have either contented themselves with describing the teeth found in full-grown specimens, passing over in silence the question of their development and succession*, or have assigned these animals, with the rest of the Edentata, to the section of mammals termed “monophyodont,” or those that generate a single set of teeth†. The exception I allude to is Professor Gervais, who, in his ‘Histoire naturelle des Mammifères’ (1855, vol. ii. p. 252), makes the following observation, accompanied by a figure of the specimen described:—

“Leurs mâchoires, qui sont grêles et plus ou moins allongées, sont toujours garnies de dents, mais ces dents varient pour la forme et pour le nombre, suivant les différents genres. J’ai pu constater leur mode de remplacement, dont aucun auteur n’avait encore parlé, et qui diffère beaucoup de celui des autres Mammifères. Dans le Cachicame, le seul Tatou que j’aie encore observé sous ce rapport, les molaires de lait, qui sont au nombre de sept en haut et en bas, sont moins arrondies que celles de la seconde dentition, et leur racine se dédouble en un chevron, dont les deux branches peuvent se séparer l’une de l’autre par suite de l’usure de la partie coronale. Les dents de remplacement poussent immédiatement au-dessous de celles de lait, qu’elles chassent comme des coins, en se plaçant entre les deux branches de leur racine. C’est un mode de remplacement bien plus semblable à celui des Crocodiles qu’à celui des Mammifères hétérodontes.”

As this observation has an important bearing upon the general principles laid down in all attempts to reduce the laws of the succession of mammalian teeth to a symmetrical and harmonious system, and has hitherto received very little, if any, attention from subsequent writers, I thought it desirable to investigate the subject afresh, and, if possible, set at rest any doubts which might exist regarding it.

Fortunately, I have been able to examine the early dentition of a sufficient number of animals, of the same species as that referred to by Professor Gervais, the common Nine-banded Armadillo (*Tatusia peba*, Desm.), fully to confirm his observation, and to supply some further details towards the completion of our knowledge of the successive stages of the process of dental development in this animal.

* Rapp, in his well-known monograph on the Edentata (1843), says, “Ueber einen Zahnwechsel ist mir bei den Edentaten nichts bekannt” (p. 52).

† Owen, Cyclop. of Anat. and Phys. (art. Teeth) vol. iv. p. 901; Anat. of Vertebrates, vol. ii. p. 278 (1866).

I will describe the specimens examined in the order of their respective ages. The first three are preserved in spirit in the Museum of the Royal College of Surgeons; the fourth is a skeleton in the British Museum.

1. In a foetal specimen, of which the head was 1''·6, the body 3'', and the tail 2''·7 long, there was no appearance of teeth above the gums; on each side of the mandible and of the corresponding part of the maxilla were the germs of seven teeth, each consisting of a soft papilla, enclosed in a round follicle. On stripping up the mucous membrane covering the edge of the jaw, they all came away attached to it, leaving the dental groove, with seven distinct alveolar depressions, quite clean. They were all in nearly the same stage of development; but those in the middle were rather larger than those at either extremity of the series. The length of the row of teeth above and below was almost exactly the same, viz. 0''·32.

2. In the next specimen the head was 2½'', the body 6'', and the tail 6½'' long. In the upper jaw, on each side, the apices of five teeth were just appearing above the mucous membrane; beneath the membrane, behind these, were the calcified germs of two others, making seven in all. They were all mere caps of calcareous matter, widely open below, their height scarcely exceeding their width at the base; the apices were rounded, the first simple and compressed, the second slightly wider but also simple, all the others double the width of the first, and divided by a longitudinal groove into an inner and an outer cusp, of which the inner was rather the larger. The entire tooth-row was 0''·55 long.

The lower jaw had also seven teeth on each side in a corresponding state of development—the first very small and single-pointed, all the others with a bicuspid apex, the inner cusp being higher and more pointed than the outer. On the left side, 0''·1 in front of the first of these teeth, was a minute calcified tooth scarcely larger than a blunt pin's point. I could not find one corresponding to it on the other side, or in the upper jaw, or in any of the other specimens examined; so its presence may have been an individual peculiarity. The other teeth were all in close apposition to one another.

3. In the third animal the head was 3¼'', the body 8'', and the tail 10'' long. In the upper jaw there were seven teeth on each side, the points of all of which had cut the gum, but were quite unworn; and there was a minute uncalcified germ of the eighth in a distinct alveolar socket close behind the seventh. All, except the much compressed first had bilobed crowns (the divisions being not very distinct in the second). In the teeth about the middle of the series, which were the largest, the calcified portion was 0''·15 long, quite simple, open, but rather contracted at the base. The tooth-line was 0''·75 long. The lower jaw showed a precisely corresponding condition. Rather below the middle of the inner wall of the alveolar cavities, most conspicuous in the lower jaw, were distinct little pits filled with a soft substance. These, as shown by the examination of the next specimen, were the germs of the second or permanent teeth.

4. In a skull (No. 911 B, Brit. Mus.) rather smaller though more mature than the last, the seven milk-teeth described in the last specimen are in place and much worn at their summits; there is also a small cylindrical posterior or eighth tooth in each side of each jaw. Of the milk-teeth, the first is the smallest, being much compressed, the second is rather broader, the remainder considerably broader and nearly equal. The upper ones are pointed, being bevelled in front and behind. The lower ones are worn mostly on the outside, and have a much more acute apex than the upper ones. The fangs of all are closed at the base, and more or less hollowed by absorption on the inner side, this absorption proceeding sometimes so far as to give a two-rooted appearance to the tooth. At the bottom of each alveolus (as is easily seen when the milk-tooth is removed), and at its inner side (in both jaws), is a distinct recess, in which lies the calcified conical apex of the germ of the permanent tooth, the outer surface of which lies against the hollowed part of the root of the milk-tooth. These germs are all of nearly equal development. The length of the longest upper milk-tooth, from apex to base, is 0''·22, of the longest lower one 0''·25. The length of the tooth-line in each jaw is 0''·7. The milk-teeth are slightly smaller than those of the adult, but otherwise differ very little from them in appearance. They have, however, the important difference of the closure of the base of the fang, causing arrest of growth. The eighth tooth appears to have no predecessor, and consequently is the only true molar.

Professor Gervais's observation supplies the next stage; judging from the size of his figure, the animal must attain almost to the dimensions of the adult before the milk-teeth are finally shed. The appearance of double roots which he describes is due only to the absorption of the middle part of the fang, in consequence of the pressure of the growing permanent tooth, which, as in other Mammalia, is placed, in the early stages of growth, not immediately below, but to the inner side of the milk-tooth.

A striking exception has thus been shown to a widely accepted generalization. The question naturally arises, Is this really the only exception, and is the generalization itself a sound one? It is most desirable that the teeth of other species of Armadillo should be examined; but it is a singular circumstance that so insufficient are our public zoological collections, that I have not yet been able to find a single example of the right age to throw any light on this question. All available specimens are either too old or too young. With the exception of the one species above described, all statements in reference to the succession of the teeth of these animals appear to rest upon no sufficient basis of observation.

2. On certain New and Rare Species of Birds found at Rockingham Bay, Queensland. By E. P. RAMSAY, C.M.Z.S.

As some of my scientific friends are doubtless aware, I despatched Mr. E. Spalding, an experienced collector, to Rockingham Bay during October 1867, with instructions to procure as complete a collection as possible of all north-country species found in that and the surrounding districts, and particularly to obtain all the information he could respecting the Australian Cassowary (*Casuarus australis*).

The following, then, is a list of the most interesting species found in this locality, and descriptions of such of them as I deem to be *new*.

1. HALIASTUR LEUCOSTERNUS.

This species is common as far south as Port Denison; and a few stragglers have wandered down to the Richmond and Clarence River-heads, New South Wales.

2. ASTUR, sp.

Agrees with Mr. Gould's description of *A. cruentus*, but has no rufous collar. This specimen was accompanied by a young bird, just able to fly, and which coincides with *A. approximans* exactly. Total length 20 inches; wing from flexure 11, tail 9.

3. ASTUR APPROXIMANS.

The above mentioned young bird. There is no difference between the West-Australian and the New-South-Wales individuals of this bird.

4. ASTUR (♀), sp. nov.

Two specimens shot, both alike. Total length (of skin) 20 inches.

Whole of the upper surface dull slaty brown, lower part of hind neck brown. Wings above slaty brown; underneath white, except the tips of the quill-feathers, which are slaty grey; the basal portion of the inner webs of the secondaries and tertiaries barred with greyish brown to within one-third of the width of their inner margin; edges of the wings barred with brown at the base of the primaries. Sides of the head and neck slaty brown, the feathers on these parts being white barred and margined with slaty brown. Whole of the under surface white; the throat, neck, chest, breast, and flanks crossed with wavy bars of brown, broader and inclining to arrow-shaped markings on the breast and flanks. Upper tail-coverts and tail barred with blackish brown; underside of tail-feathers light slate-grey, the bars distinctly showing through on all but the two centre feathers; inner webs of all lighter, becoming white at the base. Bill jet-black, yellow at the base; cere, legs, and feet yellow, claws black; irides deep orange.

Total length 20 inches; wing from flexure 11·2, tail 8·4; bill, from angle of mouth 1·3, from the forehead along culmen to tip 1·6,

from cere along culmen to tip 1, height at base 0·9, width 1·2 (on lower edge of upper mandible); lower mandible from angle of mouth 1·25, width at base 0·5; height of upper mandible from tooth to cere 0·6, its width at tooth 0·4; length of the head and bill 2·8, width 1·6, tarsi 3·2; first toe 1·2, its claw 1·3; middle toe 2 in., its claw 1 lin.; third toe 1·3, its claw 0·8; hind toe 1 inch, its claw 1·4; ditto from base to tip in a straight line 1·1, along the curve 1·4, its circumference at base 0·6, height 0·25, width 0·2; all the claws are much arched, thick and strong; tarsi thick and very powerful.

Although this bird is in many respects like what one would expect to find the young of *Astur novæ-hollandiæ* (alias *A. rayii*), I believe it to be of a distinct species. It is true, and, I suppose, well known, that the individuals of this latter species differ greatly in size, and, as many will not admit, in the colouring of the females. As regards this last fact I have instances of grey-backed females pairing with wholly white males; and if the New-South-Wales birds are really distinct from the Tasmanian, it will be in the fact that the females of the New-South-Wales birds are frequently grey-backed, while the Tasmanian birds are never so. A very intelligent collector, from whom I have had some valuable specimens of eggs, Braisher by name, told me, a few days ago, that a pair of this species had taken up their abode near his farm, in the Illawarra district, and that he felt sure of getting a reward I had offered for their eggs. Upon my asking how he knew that they were a pair, he replied, that one of them had a "blue" (grey) back. Nothing that I could say would persuade him to the contrary; and he affirmed that he had shot scores of them. During the breeding-season, Rainbird, a collector at Port Denison, sent me down a pair, of which that marked the female has the back grey. On questioning Rainbird, he informed me these had mated, and, he felt sure, had a nest hard by.

Nevertheless I shall wait until I have obtained the young from the nest before I consider the points fully settled, both with respect to the *Astur rayii* and *A. novæ-hollandiæ* being one species, and whether the bird I have described above be their young or that of a new species. At present I consider it to be new on account of its strong markings, greater size, and much stronger build, besides having the upper surface brown instead of a shade of grey. It is, moreover, a heavier-built bird, inclining to *Astur* rather than to *Leucospiza*.

5. ELANUS AXILLARIS.

The young of this species have the upper surface dull brown, wings and tail blue grey, shoulders black, and the feathers of the breast centred with a black line, which ends in a yellowish spot at the tip.

6. PODARGUS, n. sp.

From Cleveland Bay.

7. *PODARGUS*, n. sp.

From Rockingham Bay, thirty-five miles inland.

Although at present I feel convinced that both these species are new, I do not feel equal to the task of describing them until I have compared them with those in the fine collection of the Australian Museum.

8. *PODARGUS PAPUENSIS*.

Only one specimen obtained.

9. *CAPRIMULGUS MACROURUS*.10. *ALCYONE PUSILLA*.

Length of bill from angle of mouth 1·3 inches, from the forehead 1; wing from flexure 2, tail 0·8, tarsi 0·25. Bill black; legs and feet greenish-grey. Total length 4·3.

11. *TANYSIPTERA SYLVIA*.

The furthest south that this bird has been found, I believe, is Port Denison. The females differ from the males in having the two centre tail-feathers shorter, and their outer webs margined (rather broadly at the base, and gradually becoming narrower) with blue to within an inch of their tips; shafts black above, white underneath; the feathers on the rump of many specimens are also margined with blue.

12. *ARTAMUS ALBIVENTRIS*.

Bill deep blue at base, separated from the black of its tip by a triangular whitish-blue oblique mark; some are without this mark—the base being waxy blue, and the tip black. Total length 6·6 to 6·9; wings 4·4 to 4·8; tail 2·7 to 3; bill, from angle of the mouth 0·8 to 0·9, from forehead 0·7 to 0·75.

13. *CRATICUS QUOYII*.

A rare and shy species, found among the mangroves.

14. *PIEZORHYNCHUS NITIDUS*.

Tolerably abundant in brushes near the bay.

15. *OPHRYZONE KAUPI*.

Arses kaupi, auct.

One pair of this very interesting and rare Flycatcher were all that were seen; they were obtained on the edge of a dense brush, some thirty-five miles inland.

In habits and actions this pretty species closely resembles the species of *Monarcha*; they are lively and active, like the *Rhipidura albiscapa*, but do not fan the tail like that species.

One peculiarity which seems to have escaped Mr. Gould's scrutiny is the enlargement of the eyelid into a narrow flat rim, crenulated on its outer margin. This rim, which is $\frac{1}{20}$ inch in width,

and encircles the whole of the eye, is of a bright indigo-blue in the living bird, and gives it a very curious and remarkable appearance; this fact, added to *the unproportionably long hind toe and nail*, may, in some degree, help to decide to which genus the bird really belongs, or form sufficient grounds for the foundation of a *new genus*. If such be deemed the case, I beg to propose the generic term *Ophryzone*, on account of these peculiarities.

In one of my specimens, said to be the male, the chin is white, while in the female it is black; the upper tail-coverts are black, and the under white, in both sexes. The female, perhaps a young bird, has the feathers of the white collar tipped with black, and is only faintly marked with white on the lower part of the back and rump. In this specimen the black of the ear-coverts is joined with the band on the breast at the shoulders.

16. MACHÆRIRHYNCHUS FLAVIVENTER.

Spalding was fortunate enough to obtain three specimens of this beautiful bird—a pair of adults and their young one. The female differs only in having the under surface paler, the back olive-brown, and the throat and under wing-coverts white. The young is similar in plumage to the adults; but in it the yellow markings are almost white.

Male and female. Total length 5 inches; bill from the angle of the mouth 0·8, from forehead 0·65, breadth 0·35, height 0·15; wing 2·3; tail 2·15; tarsi 0·5.

This species frequents the densest parts of the brushes. The specimens were obtained thirty-five miles inland, and were the only individuals seen, although the place was frequently revisited.

17. PÆCILDRYAS SUPERCILIOSA.

Found tolerably plentiful as far south as Cleveland Bay. I have also received specimens from Port Denison.

18. EOPSALTRIA AUSTRALIS.

The specimens of the yellow-breasted Robins obtained at Rockingham Bay differ slightly from the *E. australis* of New South Wales in the browner tint of the upper surface, in the deeper yellow of the breast, upper tail-coverts, and rump, and in having a longer and much stouter bill, and are probably of a distinct species.

| Specimen from Rockingham Bay. | Specimen from Dobroyde, New South Wales. |
|---|---|
| Bill, from angle of the mouth | 0·75 in. 0·65 in. |
| Bill, from forehead | 0·65 0·55 |
| Bill, width at base | 0·25 0·2 |
| Bill, height at base | 0·2 0·15 |
| Wing, from flexure | 3·3 3·05 |
| Tail | 2·6 2·4 |
| Tarsi | 0·8 0·75 |

One specimen from Rockingham Bay has the inner webs of the

outer two tail-feathers margined with white. This is said to be a female, and is slightly smaller in size. I scarcely consider these differences sufficient for the foundation of a new species, notwithstanding many have been founded upon less, but for the present will defer the matter until I have obtained other specimens from the same locality.

19. CISTICOLA RUFICEPS.

During the last two years I have been getting together a series of this species for comparison, from all parts of Australia. It ranges from Cape York to Adelaide, South Australia. The young males resemble the females in having the head and all the upper surface striated black and rufous buff. Adult males, with rufous head and rump, are frequently found with half-grown wings and tails: this is one theory. Another is, that Mr. Gould's *C. ruficeps* is the young of *C. exilis* or *C. isura*; and with this I am at present most inclined to agree. My specimens throw no light on the subject, save that I have no examples of the rufous-headed and rumped birds with *long, or fully grown tails*, while I have specimens of the same with short tails and a few striated feathers on the crown. I believe *C. ruficeps* of Mr. Gould to be *the young*, and perhaps the *young male alone* of the striated birds, which may be either *Cisticola exilis*, *C. isura*, or *C. lineocapilla*, Mr. Gould's descriptions (?) of each being referable to the striated females of *C. ruficeps*.

The size of *Cisticola ruficeps* varies according to the age of the bird, the young ones with short tails being only 2 inches, the striated adults 4·7 (including their long tail), rufous-headed males 4·5 inches; so that no specific value can be placed on measurements of the tails. The wings differ by $\frac{1}{10}$ inch, and the bills by $\frac{1}{20}$ inch.

The nest of *C. ruficeps* is a neat, round, cup-shaped structure, composed of grass, hair, interwoven with cobweb, and half suspended by the branches and stems of grass and weeds amongst which it is placed. The eggs are three in number, light blue blotched and dotted with dull reddish brown.

20. CHLAMYDODERA NUCHALIS.

21. MIMETA FLAVOCINCTA.

22. SPHECOTHERES FLAVIVENTRIS.

23. CALORNIS METALLICA.

24. GLICIPHILA SUBFASCIATA, sp. nov.

Female. Total length 4·8 inches; bill, from the angle of the mouth 0·6, from forehead 0·5, width at base 0·2, across nostrils 0·1; wing, from flexure 2·5; tail 2; tarsi 0·65.

The whole of the upper surface, sides of the head, and neck glossy brown, a short oblique stripe under the eye white, feathers on the crown of the head centred with dark brown. The whole of the under surface and the extreme tips of the ear-coverts silvery white. The chest faintly barred with lines of brown, which join the sides

of the neck above the shoulders; flanks and under coverts of wings tinged with brown, under surface of the wing dark brown, the inner margins of the feathers whitish brown; bill and legs reddish horn-brown.

An egg taken from the oviduct is white, thinly dotted with black, 0.75 in length by 0.5 inch in breadth.

25. *PTILOTIS VERSICOLOR*?

Young in half plumage; beautifully mottled, on both under and upper surface, with triangular markings of black and yellow.

26. *ORTHONYX SPALDINGI*, sp. nov.

Male. The whole of the head, cheeks, and ear-coverts, the sides of the head, sides and back of the neck, the sides of the chest, and the shoulders jet-black. Wings above brownish black, the feathers broadly margined with dark brown; primaries and outer webs of the secondaries brown, lighter on the outer webs of the primaries. Chin, throat, chest, and centre of breast, as far as the abdomen, white; sides of the breast, flanks, upper and under tail-coverts, rump, and back olive-brown; base of the feathers and abdomen dull slaty brown; the tail, lower part of hind neck, and between the shoulders blackish brown; bill black; eyelid flesh-white; irides blackish brown; legs and feet brownish black. The tail is long and pointed, two outer feathers one-fourth less than the centre ones, the shafts of which are black, and much curved downwards, but not so much worn into spines as in the remainder of the feathers.

Total length (of skin) 11 inches; wing, from flexure 5.2; tail 5 inches; tarsi 1.9; bill, from angle of mouth 1 in., from forehead 0.9, its width at base 0.4, height 0.4.

The female differs from the male in having the olive-brown tinge on the upper and under parts of a reddish-brown tint, and in having the centre of the chin, throat, and chest rich deep rust-red, from which a triangular patch of white descends, lessening in width, over the breast to the abdomen; the rest of the plumage as in the male; bill black, irides blackish brown, eyelid flesh-white.

Total length (of skin) 5.5 inches; tail 4.1; wing, from flexure 4.5; bill, from angle of mouth 0.9, from forehead 0.85, height 0.3, width 0.3; tarsi 1.8. Legs and feet blackish brown.

Remarks.—This fine species was obtained in a dense brush about thirty-five miles inland, and is a valuable addition to our avifauna, being the second species of this anomalous genus (*Orthonyx*). Its much greater size and jet-black plumage at once distinguish it from *Orthonyx spinicaudus* of the New-South-Wales brushes, to which, however, it closely assimilates in habits and actions, frequenting the thickest parts of the scrubs, and obtaining its food by scratching among the fallen leaves and *débris*.

I beg to propose the specific name of *spaldingi* for this new species, after its discoverer, who has worked hard in the ornithological line for many years, and added to my collection many valuable and rare birds.

27. *SITTELLA LEUCOPTERA*.

Of this species I received only two specimens, which I suppose must be young females. They have the whole of the head, neck, and throat black; chest and remainder of the upper surface silky white, with a black stripe down the centre of each feather.

28. *GEOPELIA PLACIDA*.

Whether this species be considered a variety of *G. tranquilla* does not much signify; suffice to say that there is not the slightest difference of plumage between these two birds. The following are the admeasurements of both:—

Geopelia tranquilla, from New South Wales.

| | |
|-------------------------------|-------------|
| Total length | 7·9 inches. |
| Tail | 3·85 |
| Wing | 4· |
| Tarsi | ·55 |
| Bill, from angle of the mouth | ·65 |
| Bill, from forehead | ·48 to ·5 |

Geopelia tranquilla, var.? "placida," from Rockingham Bay.

| | |
|-------------------------------|-------------|
| Total length | 7·6 inches. |
| Tail | 3·85 |
| Wing | 4· |
| Tarsi | ·53 |
| Bill, from angle of the mouth | ·6 |
| Bill, from forehead | ·46 to ·5 |

29. *MEGALOPREPIA MAGNIFICA, var. ASSIMILIS*.

A smaller race than the New-South-Wales birds, but identical in plumage.

30. *ARDEA SUMATRANA*.

A fine pair of adults, accompanied by their young one, were obtained, the latter in an extremely interesting stage of plumage. The whole of the upper surface dark bluish slate-colour, each feather, with the exception of the primaries, secondaries, tertiaries, and tail-feathers, broadly tipped with chestnut; the wing-coverts broadly margined and tipped with the same; feathers of the head and the whole of the neck dull dark slate-colour, centred and largely tipped with chestnut; chest, breast, flanks, and abdomen chestnut, the base of the feathers being dark slate-colour, under surface of wings (except the quill-feathers) and the under tail-coverts tipped with chestnut; upper tail-coverts dark slaty blue.

These specimens were shot thirty-three miles up the river.

31. *BUTORIDES FLAVICOLLIS*.

32. *BUTORIDES JAVANICA*.

33. *ARDETTA PUSILLA*.

34. *PARRA GALLINACEA*.35. *ERYTHRA QUADRISTRIGATA* ♀.

An egg taken from the oviduct of this specimen is of a dirty greenish white, the ground-colour almost obscured by dots, spots, and a few blotches of brownish red and yellowish brown, many of the larger markings appearing beneath the surface; length 1·08 by ·86.

36. *CHLAMYDOCHEN JUBATA*.

Very scarce at Rockingham Bay.

37. *NETTAPUS PULCHELLUS*.38. *DENDROCYGNA VAGANS*.39. *ANOUS STOLIDUS*.

Caught on the yard-arm of the ship, while off Port Curtiss.

40. *CASUARIUS AUSTRALIS*.

I regret extremely that, although Cassowaries were seen on several occasions, none were obtained. The black troopers accompanied Spalding on many occasions in search of them; but although the birds were seen they could not be got at otherwise than by lying in wait for them at dusk, which, on account of the hostility of the native blacks, could not be attempted without great risk of life.

3. Descriptions of Four New Species of Birds from Veragua.

By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.L.S. &c.

1. *PYRANGA TESTACEA*, sp. nov.

Pyranga hepatica, Salv. P. Z. S. 1867, p. 139.

Testaceo-rubra unicolor, subtus clarior: loris obscure cinereis, alis intus fusco-nigris, extus dorsi colore limbatis: rostro nigricanti-corneo, dente maxillari medio distincto; mandibula ad basin flavicante: pedibus obscure corylinis: long. tota 7·0, alæ 3·6, caudæ 3·1, rostri a rictu 0·9, tarsi 0·85.

♀. *Flavicanti-olivacea, subtus aureo-flava; pectore et lateribus olivaceo perfusis; subalaribus flavis.*

Hab. Veragua; Chitra et Calovevora (*Arcé*).

Obs. Proxima *P. hepaticæ*, sed crassitie multo minore, et colore saturatiore distinguenda.

In *Arcé*'s earlier collections from Veragua was a single skin of a male Tanager of this genus in transition plumage, which Salvin, misled by the prominent maxillary tooth, referred to *P. hepatica*. Several skins of both sexes of the same bird are in *Arcé*'s recent collections, and show that the species is essentially distinct from the northern bird. It differs in its much smaller size, in its very distinct maxillary tooth (which is as prominent as in *P. bidentata*), and

in the colouring of both sexes. Above, the male is of a rich brick-dust red, without any of the greyish tinge of *P. hepatica*; below of the same colour, but brighter than above. Corresponding differences are met with in the opposite sex—the female of *P. testacea* being of a uniform yellowish olive above, and of a much brighter yellow below, than that of *P. hepatica*.

2. CHLOROSPINGUS HYPOPHÆUS.

Supra flavicanti-olivaceus, loris cinereis: subtus pallide fulvescenti-fuscus; gutture flavo, medialiter fere albicante; hypochondriis et crisso olivaceo perfusus: rostro nigricanti-corneo; mandibula ad basin albicante: pedibus fusco-olivaceis: long. tota 5.5, alæ 2.7, caudæ 2.0, tarsi 0.7, rostri a rictu 0.65.

Hab. Veragua, Calovevora (Arcé).

Obs. Similis *C. flavigulari*; sed crassitie minore, corpore subtus fuscescente nec clare cinereo, et gutture medio albicante differt.

Sclater's specimen of *C. flavigularis* from Nanegal (P. Z. S. 1860, p. 86) is somewhat intermediate between this species and *C. flavigularis*. It has the dull-coloured under surface of the former bird; but its throat is wholly yellow, and its crissum yellowish green, as in the latter.

Several specimens of *C. hypophæus* are in Arcé's most recent collection. The sexes, as determined by him, are marked alike.

3. LEPTOTRICCUS SUPERCILIARIS, sp. nov.

Supra viridi-olivaceus; alis caudaque nigricantibus, flavicanti-olivaceo extus marginatis; pileo et collo postico nigricanti-cinereis, superciliis castaneis; linea frontali et regione parotica albis: subtus margaritaceo-albus, pectore, præcipue ad latera, cinereo perfuso, ventre et crisso flavicantibus; subalaribus albis: rostro nigro, pedibus fuscis: long. tota 4.0, alæ 2.0, caudæ 2.0, rostri a rictu 0.55, tarsi 0.65.

Hab. Veragua, Chitra (Arcé).

This remarkable species seems to agree best in generic characters with *Leptotriccus sylvicola* of Brazil, having the long slender tarsi, small delicate feet, pointed wings and long tail which distinguish that form, though the bill is somewhat larger and rather wider. It may be at once recognized by the small but distinctly marked superciliary stripe, which commences above the lore and passes to the back of the eye.

The second primary is equal to the fourth in length, and hardly exceeded by the third; the fifth is barely shorter than the fourth; the first is long, but rather shorter than the seventh.

Two specimens of this apparently undescribed species are in Arcé's collection.

4. EUPHERUSA EGREGIA, sp. nov.

Supra læte viridis, remigibus primariis fuscis purpurascente tinctis, secundariis ad basin castaneis, horum autem apicibus purpurascentibus: subtus nitenti-viridis, ventre albicante:

caudæ rectricibus duabus utrinque externis albis, extus nigro irregulariter marginatis et terminatis; sex mediis nigris, supra in pogonio exteriori aeneo tinctis: rostro nigro, pedibus flavis: long. tota 4.0, alæ 2.3, caudæ 1.4, rostri a rictu 0.85.

♀. *Corpore subtus albo, plumis quibusdam lateralibus nitente viridi marginatis; caudæ rectricibus duabus lateralibus omnino albis.*

Hab. Veragua; Castello et Calovevora (*Arcé*).

Obs. Affinis *E. eximia* et ejusdem formæ, sed rectricum laterali-um pogoniis externis albis distinguenda.

Arcé has sent two specimens of this apparently distinct species of *Eupherusa* in one of his recent collections from Western Veragua. The male is not quite adult, and would probably eventually lose all traces of the irregular dark margins of the outer tail-feathers, as in the female no traces of these spots appear. In *E. eximia* the whole outer web of the two external rectrices is black, which renders the two allies readily distinguishable.

The present bird is the only second species of true *Eupherusa* we have yet met with. Mr. Lawrence has assigned three other birds to this genus—namely *Eupherusa niveicauda* (Ann. L. N. Y. viii. p. 134), *E. cupreiceps* (ibid. p. 348), and *E. nigriventris* (Pr. Acad. Phil. 1867, p. 232). Of these, the first, which is the same as *Thaumantias chionura*, Gould (Cf. Salvin, P. Z. S. 1867, p. 156), and the second are very closely allied, but are perhaps better placed in the genus *Thaumantias*. Of the third we have not yet been fortunate enough to obtain specimens.

4. Sundry Notes on Indian Raptores.

By R. C. BEAVAN, Bengal Staff Corps, C.M.Z.S. &c.

(Plate XXXIV.)

Having in my papers in the 'Ibis,' 1865, p. 400, 1867, p. 430, and 1868, pp. 73 & 165, entitled "On various Indian Birds," omitted all mention of the Birds of Prey that I have at various times come across in India, I propose to supply, in a few short notes, the deficiency, and thus to form a complete record of my collections (with the exception of the large families of the game and wading tribes, of which I hope to be able to treat hereafter). As in former papers, the numbers and nomenclature used are taken from Jerdon's 'Birds of India,' our best authority on the subject.

1. VULTUR MONACHUS, Linn. The Great Brown Vulture.

This large bird appears regularly every cold weather at Umballah, which is the only station in the North-west Provinces of India in which I have ever noticed it. It is not common, but may frequently be seen high in the air soaring, and is easily distinguishable from the other species of its kind both by its much larger size and its peculiar black appearance. It is much more wary, too, when on



$\frac{1}{4}$

J. Smith del.

M.G. Reinhart imp.

NEOPUS MALAIENSIS



the ground, and not easy to approach within shot of any weapon except a rifle.

Col. Tytler, however, was lucky enough to secure a pair of this fine bird at Umballah, in the cold weather of 1865-66, and he sent an account of it to the 'Journal of the Asiatic Society of Bengal,' which was published in March 1866, p. 74. His dimensions are worth recording, as they differ slightly from those noted by Jerdon, and were taken from a freshly killed specimen, to my certain knowledge. Length 43 in., wing 33, head and bill $6\frac{3}{4}$, tarsus $5\frac{1}{4}$, mid toe and claw 6, extent 8 ft. 2 in. ; weight 17 lbs.

Blyth, in 'Ibis,' 1863, p. 24, gives its habitat as "the mountainous parts of Europe and Asia, but rare in the plains of India." As far as my personal experience goes, I have never once noticed it either at Simla or Darjeeling, the only two hill-stations with which I am at present acquainted.

2. *OTOGYPS CALVUS*, Scop. Black Vulture. Vulgo "King of the Vultures" of European residents in India.

On the 15th March, 1865, I found a nest of this species at Ramnuggur, a small village in the Maunbhoom district of Chota Nagpore. This village, which consists of only a few huts, is situated at the foot of a peculiar-looking and steep hill, called Parasa; and the top of this hill being a station of the Great Trigonometrical Survey of India, it will probably be found marked in a fair-sized map. Half-way up the hill I came across a curious-looking low tree with a thick spreading top, in the middle of which latter, carefully concealed among the vegetation, was a large nest of sticks loosely put together; in it I found a single egg. The old bird flew off the nest as I approached, and to my surprise I recognized it as the female of this species. There was but this single egg, which I was only just in time to secure, for the young bird had already begun to chip his way out. I got him out, however, after some difficulty, and found the dimensions of the egg to be in length $3\frac{3}{8}$ in., breadth $2\frac{3}{8}$; in colour it was dirty white.

The bird is tolerably common in Maunbhoom, and a carcass generally attracts two or three amongst hundreds of *Gyps bengalensis*.

3. *GYPVS FULVUS*, Gmel. Large Tawny Vulture.

This bird is abundant up country, about the stations of the North-west Provinces of India, and in the hot weather apparently visits the hills; for I saw a very fine one seated on the top of a high pine tree at Mahasoo, beyond Simla, on 29th September, 1866, in front of the dāk bungalow. At it I fired with a ball, but without the slightest effect.

In the plain-country about Umballah it is peculiarly abundant at certain seasons. One I shot in the cold weather of 1865-66 at Sirhind measured in the flesh as follows:—Expanse from wing to wing 8 ft. 2 in. ; length 3 ft. 7 in. ; wing 2 ft. 2 in. ; tail 1 ft. 2 in. ; tarsus 4 in. ; bill at front nearly 3 in., its height $1\frac{5}{8}$; mid toe and claw $5\frac{1}{2}$; weight $14\frac{1}{2}$ lbs. No feathered tarsus. Scuta on all the toes.

5. *GYPS BENGALENSIS*, Gmel.

Breeds in Maunbhoom in February, choosing for the purpose almost invariably a large semul or cotton-tree, which at that time of year loses its leaves and puts forth its fine scarlet flowers; hence the nest, which is generally placed at the junction of two large limbs, or at the diverging point of several branches from the trunk, is plainly visible, but not easy to get at; for the Vulture chooses the largest trees it can find, and most of them are smooth, large in girth, and devoid of branches near the ground.

The nest is circular, compactly built of fresh twigs with the leaves on. Eggs two, dirty white, frequently blotched with red, which, however, is either blood or dirt, for it is removeable by brushing with soap and water.

On my way down to the plains from Simla in October 1866, I came across several of this species, which I have found abundantly distributed in every part of the plains of India hitherto visited by me. On the occasion alluded to, numbers of cattle had been used for the purpose of carrying down baggage from Simla to the plains, and, as a matter of course, several had died on the way. One which I found on the roadside was surrounded by crowds of these Vultures. On going up to examine it I disturbed above forty of them, most of which flew up into the neighbouring trees. On going near the carcass I was surprised to hear a rumbling noise proceeding from its inside. There was a good-sized hole dug out by the bills of these birds in the neck of the carcass, and also another near its anus, while the stomach was swollen out and distended as if with air. On hitting this with my stick, it appeared to be filled out by something inside, and in a few minutes, to my great astonishment, I found that there were more Vultures all alive inside the carcass! Two, following each other in quick succession, shortly afterwards walked out through the hole in the neck of the bullock, and the first immediately flew off to a neighbouring tree, whilst the other was so gorged he could not do more than waddle off to a rock close by, on which he sat, whilst I left him and concluded my journey. Many a time have I seen Vultures at a carcass, but never before to penetrate inside that of a dead beast.

It is a curious fact, too, that whereas here, in the north-west of India, these birds penetrate into the hills, as in this case, up to the elevation of, and perhaps higher than Simla, or about 6000 feet, one seldom or ever at Darjeeling sees or hears of a Vulture, except perhaps at Punkabaric, which is entirely at the foot of the hills. The same remark applies equally to the next species.

6. *NEOPHRON PERCNOPTERUS*, Linn., of Jerdon. The White Vulture.

N. ginginianus, Lath. apud Blyth in 'Ibis' 1866, p. 233.

As mentioned by Jerdon, this is the most abundant scavenger in the upper provinces of India, but is entirely unknown in Lower Bengal. Its limit seems to extend as far only as Rancegunge, a sta-

tion on the line of the East-Indian Railway, distant from Calcutta only 120 miles. In the small intervening space of low, wet, and rice-covered ground it is never to be seen; but directly the dry, sandy, corn-producing country occurs, there it is to be found in abundance. It is occasionally seen in the uplands of Maunbhoom and Bancoorah, but may be described as rare in the latter district, except sometimes in the cold weather. It is especially abundant at Allahabad and at Umballah, where the late Dr. Scott made several observations on it during his long residence there. Some of his notes I subjoin. The sexes copulate on the ground, and, unlike most birds, take some time about this operation. They breed about Umballah in March; and although during the time I was at that station in the spring of 1866 I was unable to secure a nest, Dr. Scott told me that there are generally one or two in his garden, and promised me the eggs, which I subsequently got. Its range extends as far into the Himalayas as Simla, where, with the Bearded Vulture, *Milvus govinda*, and *Gyps bengalensis*, it performs its share of the scavenger work of the station, and is consequently of the greatest use. A Simla specimen had the irides a reddish-pink colour, and legs fleshy. Jerdon gives "dark brown" for the first, and dirty yellow for the colour of the legs.

7. *GYPÆTUS BARBATUS*, Linn. The Bearded Vulture.

Simla, July 20th, 1866. A fine specimen of a young male sent to me by Col. Tytler, which had been shot by his son in the station. Sex, by dissection, a male. The bird when brought was still alive, so that the colour of the fleshy parts here given may be depended on. Length 45 inches; wing $29\frac{1}{4}$; tail $20\frac{1}{8}$; tarsus $4\frac{3}{8}$; bill at gape $3\frac{3}{4}$, at front 3, height of bill at base $1\frac{3}{4}$ in.; extent across wings 8 ft. $4\frac{3}{4}$ in. Irides pale buff colour, sclerotic membrane orange-red; bill greenish horny; feet bluish plumbeous.

This bird is very abundant at Simla, and may generally be seen quartering slowly over a certain beat along the hill-sides. It does not appear at all wary, as I frequently saw it over Col. Tytler's house, which happened to be favourably placed under a well-known beat of the species along the sides of Mount Jacko. I have seen it after dead cattle, in company with other Vultures, a few miles from Kalka, close to the foot of the hills, elevation perhaps 500 ft. I never observed this bird in the Darjeeling hills; but it doubtless exists there.

11. *FALCO JUGGER*, Gray. The Luggar Falcon.

I only once procured a specimen of this species, at Ambekanuggur in the Maunbhoom district, in January 1865.

16. *HYPOTRIORCHIS CHIQUERA*, Daud. The Turunti or Red-headed Merlin.

Umballah, November 5, 1866. Shot the ♂ out of a pair which were alternately stooping on the racecourse at the small Lark Pipit. Length $12\frac{1}{4}$ inches; wing 8; tail $5\frac{1}{2}$; tarsus $1\frac{7}{16}$; spread of foot underneath $2\frac{1}{2}$; bill at front $\frac{5}{8}$, at gape $\frac{7}{8}$, height at base $\frac{1}{2}$: cere and

skin round the eye pale yellow. This is one of the boldest and most graceful of the small Indian Raptores, and not uncommon in some parts of the country.

17. *TINNUNCULUS ALAUDARIUS*, Brisson. The Kestrel.

At Baramussia in Maunbhoom, on 8th March, 1865, I shot a young bird in plumage changing to that of the adult. His dimensions were as follows:—Length $13\frac{1}{2}$ inches; wing $9\frac{1}{2}$, expanse 23; tail 6; tarsus $1\frac{1}{2}$: feet in colour a bright yellow, with black claws. Round eyes and the cere light yellow. Beak greenish blue, approaching greenish yellow near the top (where it meets the cere), lighter yellow underneath. And again at Simla, in August 1866, I procured both adult and young specimens, and observed several of the latter in Dr. Stoliczka's collection from the interior of the hills. (*Cf.* Ibis, 1867, p. 142.) I give the dimensions of another shot by me, in November 1866, near Umballah. Length $13\frac{3}{4}$ inches, wing 10, tail $6\frac{3}{4}$, tarsus $1\frac{5}{8}$, spread of foot $2\frac{1}{4}$, extent $28\frac{3}{4}$: bill and claws bluish black, cere yellowish white, legs light orange-yellow.

Of that peculiar pigmy genus *Hierax* I never yet met with a specimen alive; and it must be confined therefore to a very limited range in India; for I, who have been over a good portion of it, never heard it mentioned even by the natives in any part I have visited.

22. *ASTUR TRIVIRGATUS*, Temm. The Crested Goshawk.

One of the very few birds of prey procured by me in the Maunbhoom district in 1865 was identified by Mr. Gurney as a young bird of this species, and interested him as being in exactly the same stage of plumage as another received by him shortly afterwards from the island of Formosa. (*Gurney in epist.* 22nd Jan., 1866.)

The same gentleman in another letter tells me that “this species is thought by Professor Schlegel to comprise two races, the Malay race being, in his opinion, distinct from the Indian, and that additional adult Indian specimens would be interesting as tending to elucidate this point” (J. H. G.).

23. *MICRONISUS BADIUS*, Gmelin. The Shikra.

I have procured specimens of this bird on several occasions—in the Maunbhoom district in 1864, and since. I have seen it flown by a falconer at Quail, near Kalka, in 1866, although without much success, owing to the density of the vegetation: it was then thrown from the hand at the flying quarry; and this appears to be the usual native custom with such small hawks.

At Mahasoo near Simla, I shot a bird which Col. Tytler called a species of *Micronisus* that he knew, having previously obtained it near Umballah; but as I do not know exactly to which species to refer it, I subjoin the description from my note-book.

MICRONISUS, sp. ?

Mahasoo, near Simla, September 25th, 1866. Young bird of the year apparently. Sex ♂. Irides bright yellow, edged with black;

cere greenish yellow; base of both upper and lower mandible bluish slaty, tips of both dark horny; legs greenish yellow, with black claws. Length $10\frac{5}{8}$ inches, wing $6\frac{1}{8}$, tarsus 2, spread of foot underneath $2\frac{1}{8}$, tail $5\frac{1}{4}$, extent fully 18. This bird is at present in Col. Tytler's private collection.

24. ACCIPITER NISUS, Linn. The European Sparrow-Hawk.

A specimen, ♀ juv. (No. 547 of my catalogue), was procured by me at Ambekanugger, Maunbhoom district, in December 1864. I have not seen it again in the country, but observed some small Hawks frequenting the high *Casuarina* trees regularly every evening at Barrackpore in the same year, which looked like this species on the wing. As I could not shoot, it being a military station, I was unable to secure a specimen and satisfy myself regarding their identity.

25. ACCIPITER VIRGATUS, Temm. The Besra Sparrow-Hawk.

An adult ♂, according to Col. Tytler, was killed by me at Simla, on the 19th June, 1866. This was a very perfect specimen. Irides bright golden red, cere and gape light yellow with a tinge of green; legs bright yellow, with black claws, bill bluish leaden. Length $11\frac{5}{8}$ inches; wing $6\frac{5}{8}$; tail $5\frac{3}{8}$; tarsus nearly 2; bill at front, including cere, $\frac{1}{2}$, breadth at base $\frac{7}{16}$, bill at gape $\frac{1}{16}$; extent $18\frac{3}{4}$.

We now come to that fine family amongst the Birds of Prey, viz. the Eagles, which are well represented in India, but of which I have hitherto procured but few specimens, and those generally of the common sorts.

27. AQUILA IMPERIALIS. The Imperial Eagle.

I procured a fine specimen of this fine bird at Umballah, on the 30th November, 1866. It was seated on a low tree, not far from the slaughterhouses belonging to the Commissariat Department; and I see that the late Dr. Scott, who accompanied me on that occasion, has since procured examples which he transmitted to the Natural-History Society of Montrose. My specimen weighed $6\frac{1}{4}$ lbs. Length $30\frac{1}{2}$ inches; wing $22\frac{1}{2}$; tail $11\frac{1}{4}$; tarsus $3\frac{3}{4}$; spread of foot underneath 6, hind claw alone being $1\frac{1}{4}$; bill at front $1\frac{7}{8}$, and at gape $2\frac{5}{8}$; extent 6 feet. This bird was conspicuous by its light rufous-white head, and the large and pure-white feathers at the shoulder of the wing. The irides were brown mixed with pale yellow, the latter colour forming a light ring to the outer circumference of the eye. Cere and feet a very pale yellow; bill bluish or greenish horny.

I believe that this species subsists about Umballah chiefly on carrion.

29. AQUILA FULVESCENS. The Tawny Eagle.

This, sometimes taken for the Chuhamar, or rat-killer of the natives, is common in the neighbourhood of Umballah, where several examples were procured both by the late Dr. Scott and myself. They may frequently be seen in cantonments, but high in air, soaring about in circles with the common Kite (*Milvus govinda*,

Sykes) and Vultures. A female, killed on November 5th, had the stomach empty. I subjoin the dimensions of several:—

Umballah, November 5th, 1866.

| Length. | Wing. | Tail. | Tarsus. | Weight. | Extent. | Spread of foot. |
|-------------------------|--------|----------------------|---------------------|---------------------|---------|---------------------|
| ♀. 28 $\frac{1}{4}$ in. | 19 in. | 10 $\frac{1}{4}$ in. | 3 $\frac{3}{4}$ in. | 4 $\frac{1}{2}$ lb. | — | 5 $\frac{3}{4}$ in* |

November 13th.

| | | | | | | |
|------------------|------------------|-----------------|-----------------|---------------------|---|----|
| 25 $\frac{1}{2}$ | 18 $\frac{1}{2}$ | 9 $\frac{1}{4}$ | 3 $\frac{1}{4}$ | 3 $\frac{1}{4}$ lb. | — | —† |
|------------------|------------------|-----------------|-----------------|---------------------|---|----|

Camp Eesahurree, near Umballah, November 17th.

| | | | | | | |
|---------------------|------------------|-----------------|-----------------|---|--------|----|
| ♂. 25 $\frac{1}{4}$ | 18 $\frac{1}{2}$ | 8 $\frac{1}{4}$ | 3 $\frac{5}{8}$ | — | 63 in. | —‡ |
|---------------------|------------------|-----------------|-----------------|---|--------|----|

November 30th.

| | | | | | | |
|----|----|----|-----------------|---------------------|---|----|
| 31 | 20 | 11 | 3 $\frac{5}{8}$ | 4 $\frac{3}{4}$ lb. | — | 6§ |
|----|----|----|-----------------|---------------------|---|----|

By this list it will be seen that specimens freshly killed vary a good deal in their dimensions, especially as regards their weight.

31. AQUILA PENNATA, Gmel. The Dwarf Eagle.

I believe that this Eagle occurs at Umballah, and that I myself have seen it on more than one occasion in flight; but I did not secure any specimens, never having the opportunity; but of the next species (No. 32) I am glad to say I was able to procure both sexes myself at Simla in 1866.

32. NEOPUS MALAIENSIS, Reinh. The Black Eagle||. (Plate XXXIV.)

I first observed this rare and beautiful bird when in the Darjeeling Himalayas in 1861 and 1862, and tried, although in vain, to procure specimens then for Dr. Jerdon. I was surprised, when at Simla in 1866, to find it tolerably abundant at Fagoo, where it was also noticed by Col. Tytler (*cf.* Ibis, 1868, p. 195). It was near that place that I procured my first specimen, a female, on 4th August, 1866. My dog Fosco had just put up a pair of Kaleege Pheasants (*Gallophasis albocristatus*) which had taken to a tree, and I was trying to make out their whereabouts, when a Black Eagle suddenly sailed by; and by a long shot, with No. 8 shot, I managed, much to my delight, to wing him, and he fell down the Khud. It is truly a fine bird (*cf.* Ibis, 1867, p. 140), and the young peculiar in plumage (*loc. cit.*), if I am right in my determination of the species of this latter—a view in which, I believe, Col. Tytler concurs. Dimensions of both sexes as follows:—

| Length. | Wing. | Tail. | Tarsus. | Spread ft. under-neath. | Hind toe and claw. | Toe alone. | Bill ft. | Gape. | Ext. |
|-------------------------|----------------------|----------------------|---------------------|-------------------------|---------------------|---------------------|---------------------|-------|------|
| ♂. 27 $\frac{1}{2}$ in. | 21 $\frac{3}{4}$ in. | 12 $\frac{1}{4}$ in. | 3 $\frac{1}{8}$ in. | 5 in. | 2 $\frac{1}{8}$ in. | 1 $\frac{1}{4}$ in. | 1 $\frac{1}{4}$ in. | 2 in. | 5ft. |
| ♀. 28 $\frac{1}{2}$ –29 | 22 | 14 $\frac{1}{4}$ | 3 $\frac{1}{8}$ | 5 $\frac{1}{4}$ | — | — | 1 $\frac{1}{2}$ | — | — |

* Irides grey.

§ Bill at fr. 1 $\frac{1}{2}$ in.

† Irides grey brown.

|| *Cf.* Ibis, 1867, p. 140; 1868, p. 13.

‡ Irides brown.

In the latter the spread of the two interior toes underneath was = $5\frac{1}{4}$ inches. She was shot by a native Shikaree on September 10th.

The male had the remains of a large rat in its stomach; so that it does not prey on pheasants or their eggs exclusively, as hinted by Dr. Jerdon (Birds of Ind. vol. i. p. 66). The female's stomach was empty. Since I got the above pair I have seen another specimen perched upon the dead bough of a lofty fir, *Abies smithiana*, at Fagoo, near Simla, in August 1866.

The irides in both these birds were deep brown (*cf.* Jerd. B. of Ind. vol. i. p. 46); cere, gape, and legs bright yellow; bill dark leaden, nearly black, which latter is also the colour of the claws. Sex ascertained by dissection.

33. *NISAETUS BONELLI*, Temm. The Crestless Hawk Eagle.

This fine species must be included in the fauna of Simla, and, I believe, also of Umballah, procured in the former station by Col. Tytler, in September 1866, and in the latter, I believe, by the late Dr. Scott, who has sent specimens to Lord Walden.

40. *PANDION HALIAETUS*, Linn. The Osprey.

Once procured at Maldah, in Lower Bengal, in 1864.

41. *POLIOAETUS ICHTHYAETUS*, Horsf. The White-tailed Sea-Eagle.

I have seen a colony of this fine Eagle, very near where described by Dr. Jerdon, not far from Caragola Ghaut, on the Ganges.

43. *HALIAETUS LEUCOGASTER*, Gmel. The Grey-backed Sea-Eagle.

On the 19th September 1865, I observed a fine specimen of this species on the dead bough of a high tree overhanging the Gyne River, near Moulmein, and got within easy shot of it, but was not prepared with the gun. I also observed the species on other occasions when travelling in Burmah by boat, but never managed to secure a specimen.

44. *BUTEO VULGARIS*, Bechst. The Common Buzzard, = "*B. rufiventer* of Jerdon's Supplement, and equivalent to *B. desertorum* of Daudin, erroneously placed, in Jerdon's last book (Birds of India), under *B. vulgaris*, which I have not yet seen from India, but should be glad also to see if it occurs there" (Gurney in *epist.* Jan. 7, 1866).

45. *BUTEO CANESCENS*, Hodg. The Long-legged Buzzard. Chuhamar, *i. e.* the Rat-killer of the N. W. P.

I killed a fine specimen of the female of this species at Umballah, on November 5, 1866.

| | Length. | Wing. | Tail. | Tarsus. | Weight. |
|----|---------|--------|---------------------|---------------------------|--------------------|
| ♀. | 25 in. | 18 in. | $10\frac{1}{4}$ in. | nearly $3\frac{1}{2}$ in. | $2\frac{1}{4}$ lb. |

Irides light grey. The stomach only contained a young toad (*Bufo melanostictus*).

I find in my note-book mention made of another species of Buz-

zard (?) or Eagle, which was killed at Umballah on 30th November 1866, by a brother of the late Dr. Scott, with No. 10 shot, on a tamarisk-tree in a neighbouring garden to that occupied by the latter. Its dimensions were as follows:—

| Length. | Wing. | Tail. | Tarsus. | Spread of foot un- derneath. | Bill, front. | Gape. | Extent. |
|---------|----------------------|---------------------|---------------------|------------------------------------|---------------------|----------------------|---------|
| 20 in. | 14 $\frac{3}{4}$ in. | 8 $\frac{1}{2}$ in. | 2 $\frac{3}{8}$ in. | 4 in. | 1 $\frac{5}{8}$ in. | 1 $\frac{7}{16}$ in. | 49 in. |

This bird was peculiar in having pure-white spots at the shoulder of the wing (very visible when flying, according to Mr. Scott). The cere was bright golden yellow, irides brown; the bill greenish at base and dark horny at the tip; the legs dully coloured yellow, with strong black claws. Its general colour was dark brown, lighter, approaching white, on the tips of the feathers of the upper tertiaries and the ends of the upper tail-coverts, as well as on the tips of the upper secondaries; tarsus wholly feathered to the foot.

47. BUTEO PLUMIPES, Hodg. The Harrier Buzzard.

“This, Mr. Blyth now considers, and, I think, correctly, to be a dark variety, or quasi-melanism, of *Buteo japonicus*” (Gurney in *epist.* January 1866).

48. POLIORNIS TEESA, Frank. The White-eyed Buzzard.

This small Buzzard was tolerably abundant about Umballah, in the station of which I got my first specimen, on 23rd October, 1866, and afterwards procured several others, the dimensions of which, in the flesh, I subjoin:—

October 23rd, 1866.

| Length. | Wing. | Tail. | Tarsus. | Spread of foot un- derneath. | Bill ft. | Gape. | Extent. |
|----------------------|----------------------|---------------------|---------------------|------------------------------------|--------------|---------------------|---------|
| 16 $\frac{1}{2}$ in. | 11 $\frac{5}{8}$ in. | 7 $\frac{1}{8}$ in. | 2 $\frac{3}{8}$ in. | 2 $\frac{7}{8}$ in. | barely 1 in. | 1 $\frac{1}{4}$ in. | 35 in. |

November 14th, at Lallroo, 8 miles N.W. of Umballah.

| | | | | | | | | |
|----|------------------|------------------|-----------------|-----------------|-----------------|------------------|-----------------|------------------|
| ♂? | 15 $\frac{1}{2}$ | 11 $\frac{1}{2}$ | 6 $\frac{3}{4}$ | 2 $\frac{3}{8}$ | 2 $\frac{7}{8}$ | 1 $\frac{1}{16}$ | 1 $\frac{3}{8}$ | 36 $\frac{3}{4}$ |
| ♀? | 17 $\frac{1}{2}$ | 12 $\frac{1}{2}$ | 7 $\frac{3}{8}$ | 2 $\frac{1}{2}$ | 3 | 1 $\frac{1}{8}$ | 1 $\frac{1}{2}$ | 39 $\frac{3}{4}$ |

Of the presumed male the weight was $\frac{3}{4}$ lb.; of the presumed female 17 oz. The irides are pure pearl-white, legs and cere pale orange-yellow, claws and terminal three-fourths of the beak black.

54. CIRCUS ÆRUGINOSUS, Linn. The Marsh Harrier.

Of this I procured an example in the Maunbhoom district, on the 5th March, 1865. I find I have recorded of this bird that I shot it in the act of stealing the eggs of the common Speckled Dove (*Turtur suratensis*), from a nest in a sâl tree (*Shorea robusta*). The dimensions in the flesh were as follows:—

| Length. | Wing. | Tail. | Tarsus. |
|---------|-------|--------|---------------------|
| 20 in. | — | 10 in. | 3 $\frac{1}{4}$ in. |

the wing to the end of the longest primary being 16 $\frac{3}{4}$ inches. Feet and tarsus bright yellow, claws black; the irides also bright yellow.

55. *HALIASTUR INDUS*, Bodd. The Brahminy Kite of Europeans in India; *Dhobee ka cheel* or Washerman's Kite of the natives.

This, as mentioned by Jerdon, is particularly abundant in Lower Bengal, and extends to the Maunbhoom district, where I observed several about tanks near villages, especially at Ambekanuggur, in February 1865. It is rare up the country at Umballah, where I do not recollect ever noticing it, but where is abundantly found the next species.

56. *MILVUS GOVINDA*, Sykes. The Common Pariah Kite of India.

"*Milvus assimilis*, the young. I am satisfied that two species of Kites exist in India, the larger, the true *M. govinda*, appears to be identical with *M. melanotis* of China, Japan, Formosa, and the Loochoo Islands; the smaller I consider identical with *M. assimilis* of Australia and Celebes. The young of *M. govinda*, when first leaving the nest, has both the upper and under plumage interspersed with longitudinal marks, sometimes white, sometimes pale brownish yellow, and about an inch in length. I want to ascertain whether the young of *Milvus affinis* are similarly marked. The latter is very closely related to, though distinct from, the Black Kite of Europe (*M. ater*), which I have seen from Afghanistan and from Northern China, and which may possibly occur in India also" (Gurney in *epist.* January 1866).

I quite agree with Mr. Gurney that there are probably two species of the common Kite in India, as specimens vary so very much in size, although they do not differ much in plumage; and as to *M. ater* being found in India, all I can say is, that in the hilly and jungle portions of the Maunbhoom district, about the villages of Maknu and Chalta in the pergunnah of Ambekanuggur, I repeatedly observed, in 1865, a black Kite, which I was unable to procure; it certainly was more of a Kite than an Eagle, and was not the *Neopus malaiensis*, or Black Eagle, which I had previously observed at Darjeeling. *Milvus govinda* extends up to Simla, in the north-west Himalaya, and is not so common at Umballah as in Lower Bengal. It is essentially a migratory species, disappearing almost entirely from the neighbourhood of Calcutta during the rains.

59. *ELANUS MELANOPTERUS*, Daud. The Black-winged Kite.

A specimen shot in the Maunbhoom district is probably referable to this species. They were particularly abundant in the jungles to the south of Umballah in November 1866, and might frequently be seen hovering like a Kestrel. Dimensions of a freshly killed specimen at Babyn, near Umballah—

| Length. | Wing. | Tail. | Tarsus. | Spread ft. | Bill ft. | Gape. | Extent. |
|----------------------|----------------------|-------|---------------------|---------------------|-------------------|----------------------|----------------------|
| 12 $\frac{3}{4}$ in. | 10 $\frac{1}{2}$ in. | 5 in. | 1 $\frac{1}{4}$ in. | 2 $\frac{3}{4}$ in. | $\frac{5}{8}$ in. | 1 $\frac{3}{16}$ in. | 30 $\frac{1}{2}$ in. |

In one specimen the irides were reddish brown; another (probably an older bird) had them blood-red; the cere and feet light yellow, the latter with black claws; the bill black; the colour above is pale ashly, with blackish upper wing-coverts, and the feathers of the back

tipped slightly with fulvous and white; lower parts pure white, with a slight tinge of fulvous about the breast; eye-streak pure black.

61. *STRIX CANDIDA*, Tickell.

A desideratum in the Norwich Museum (Gurney *in epist.* January 1866).

I myself have observed this species only once. When hunting for leopards in the district of Rungpore, in 1859, several were put up out of grass at the bottom of a half-dried-up piece of water, in thick jungle.

66. *SYRNIUM NIVICOLUM*, Hodg.

"I greatly doubt whether this species is really distinct from *S. aluco* of Europe" (Gurney *in epist.*).

68. *OTUS BRACHYOTUS*, Gmel. The Short-eared Owl.

At Ambekanuggur, in Maunbhoom, in December 1864, a pair of large owls came regularly every evening, just after the stars began to make their appearance, and worked over the rice-kates in which our survey-camp was pitched, apparently for rats. They were so wary that, although I sat up several nights in succession, I never could manage to intercept them. At last, by the merest chance, I secured one, which turned out to be of this species. Their cry is very much like that of a frog when seized by a snake—so much so, that a friend of mine, hearing it close to his tent one night, rushed out in some alarm, with lighted candle and a thick stick, to prevent the supposed snake from entering his sleeping-apartment. The only thing besides that I can compare this cry to is the peculiar mew of a cat which one sometimes hears.

I procured another specimen at Umballah, on November 6th, 1866. Dimensions as follows:—Length $14\frac{1}{2}$, wing $11\frac{1}{2}$, tail 4, tarsus $1\frac{3}{4}$; spread of foot underneath about 3; bill at front 1 in., at gape $1\frac{3}{16}$, extent $37\frac{1}{2}$ inches. The species was not uncommon about the jungles there, being generally flushed out of long grass.

69. *URRUA BENGALENSIS*, Frank. The Rock Horned Owl.

This species was found in some abundance by me in the Maunbhoom district, and several specimens killed. At Beeru, a village on the road from Perulia to Raneegunge, and also on the Rognathpore Hill; and in all the bear-frequented, rocky and hilly spots in that district they are abundant. They live amongst the rocks, and frequently take to a dead tree bough, if close by, when they are turned up by the coolies one engages to beat out Master Bruin (*Ursus labiatus*) from his and their abode.

"The identity or otherwise of this species with *Bubo ascalaphus* of Northern Africa is still an unsettled point" (Gurney *in epist.*).

71. *HUHUA NIPALENSIS*, Hodg. The Forest Eagle-Owl.

I once procured a fine specimen of this species, at Darjeeling, in

1862, where it was brought me by my sapper orderly, "Bardy," a Nepalese sepoy, who while out after pheasants one day, said that this bird attacked him, and that he was obliged, in self-defence, to shoot it. This specimen is now mounted in the Museum of the Asiatic Society at Calcutta.

72. *KETUPA CEYLONENSIS*, Gmel. The Brown Fish-Owl.

In October 1864, I shot a pair at Maldah, in Lower Bengal. They were found frequenting a large mango tree, on the border of an old unfrequented tank, in heavy jungle. At Umballah, on November 16th, 1866, I got a fine specimen in the late Dr. Scott's compound or garden. It was seated in a tamarisk-tree and being bullied by Crows when killed. Length 21 inches; wing $14\frac{1}{4}$; tail 9; tarsus 3; spread of foot $4\frac{1}{4}$; bill at front $1\frac{1}{8}$, at gape 2 in.; extent 52 inches (4 ft. 4 in.). Irides orange, soles of feet yellowish white, claws and beak black; weight nearly $2\frac{1}{2}$ lbs. The colour of the claws, if this specimen is correctly named, would, without doubt, justify Hodgson's name of *nigripes*. Dr. Scott told me that some seven or eight of this species had frequented his garden at Umballah the previous year (1865).

73. *KETUPA FLAVIPES*, Hodg. The Tawny Fish-Owl

has been observed at Simla, according to Colonel Tytler; but I did not see it there myself.

74. *EPHIALTES PENNATUS*, Hodg. The Indian Scops Owl. "Khanooria pêcha" of the natives in Maunbhoom.

A bird referable, I think, to this species was brought to me alive by a native at Baramussea, in Maunbhoom, on 27th February, 1865; and I subsequently procured several more in the next month, when the bird was breeding in this district. It was either this species or the next.

75. *E. LEMPIJI*, Horsf.

I find from my notes that I shot an Owl of this genus in a mangoe tope at Ambekanuggur, but cannot, from a mere description, tell which of these nearly allied species my specimens, procured in the Maunbhoom district, really belonged to.

76. *ATHENE BRAMA*, Temm. The Spotted Owlet. *Gâch douria pêcha* of Maunbhoom; "Cherubim" of Europeans in India.

This is a very abundant species almost everywhere in India, at Barrackpore, Maunbhoom district, Umballah, &c., and, from its familiar and confiding habits (nearly always taking up its abode close to men and their houses) is frequently seen. It was very common at Ambekanuggur in Maunbhoom; and I never could, for certainty, ascertain whether it was this bird or *Caprimulgus monticolus*, Frank., which I have repeatedly observed hovering over the rice-kates like a Kestrel, of an evening.

77. *ATHENE RADIATA*, Tickell. The Jungle Owlet.

This species is as common as the preceding in the Maunbhoom district, where it breeds (*cf.* P. Z. S. 1864, p. 375), but is found further from the abodes of man. It is the bird whose peculiar call may be heard at all hours of the night, and often in the day. This call, when once heard, is not easily forgotten. It is heard on all sides, morning and evening. It may be syllabized thus, Kroo-kroo-kroo-krookook krookuk, krookuk krookuk. It is very loud at first, each succeeding note being in a lower key than the one before; hence the native name "Kroopècha." It lays two or three white eggs in the hollow of a tree, like the preceding, but slightly larger and more rounded.

79. *ATHENE CUCULOIDES*, Vigors. The Large-barred Owlet.

The "Himalayan Owlet" would perhaps be a better name for this species, of which I was lucky enough to procure one specimen at Simla in June 1866. Irides bright yellow, bill greenish horny, legs dirty yellow, claws horny; tarsus $1\frac{1}{4}$, wing $5\frac{1}{2}$ in.; bill at front, including cere, $\frac{5}{8}$; cere large and swollen, of a dirty green colour. Also procured by me at Darjeeling in 1862.

80. *GLAUCIDIUM BRODIÆI*. The Collard Pigmy Owlet.

Found at Simla, as I have seen a specimen in Col. Tytler's Collection, which was shot by him there.

81. *NINOX SCUTELLATUS*, Raffl. The Brown Hawk-Owl.

I have seen this species repeatedly in the Maunbhoom district, but never could secure a specimen. Found one at Pathurkutta, in February 1865, in dense tree-jungle, being persecuted by Carrion-Crows (*Corvus culminatus*), but could not get a shot at it. Found the nest of, probably, the same bird on the 6th March, 1865, near the same place, in the fork of a moderate-sized tree, but without eggs. I feel confident that I have frequently observed this species of Owl when beating in the Sâl forest of the terai near Julpigoorie, in 1859, for large game.

5. Notes upon the birth of a Ringed Seal in the Society's Gardens. By A. D. BARTLETT, Superintendent of the Society's Gardens.

On the 23rd of last month the Society obtained from a dealer in Liverpool four fine adult Seals (*Phoca fœtida*), said to have been taken in Heligoland. I noticed that one of them was of large size, and suspected that it was a female in young. I therefore had her placed by herself in an enclosure with a small shallow pond of water. Here she soon became perfectly tame, and fed freely from the hand of the keeper. We continued to notice the increase of bulk, and the movements of the young one were quite apparent.

On Monday the 8th of June she was very uneasy, and appeared to me to be in considerable pain; I therefore kept a constant watch, and the man who had charge of her remained with her all night. She continued in this state until about twelve o'clock on Tuesday, at which time she produced the young one. It was born near the edge of the water, and in a few minutes after its birth, by rolling and turning about, was completely divested of the outer covering of *fur* and *hair*, which formed a complete mat, upon which the young animal lay for the first hour or two after its birth. When born it was very active, and within three hours afterwards was swimming and diving about in the water like an adult animal. It uttered a low soft *ba*, or single call-note, and looked about for its mother, and crawled towards her when she came out of the water. She turned upon her side in order to let it suck, and I had every reason to believe that all was going on well. The young Seal slept well, sometimes on its belly, sometimes on its side. The mother, however, appeared unwell and in great pain, and on the following day (Wednesday) suddenly plunged into the water and sunk to the bottom. Believing she was dying, I had her assisted out of the pond. She was in strong convulsions, and continued to roll and struggle until the next morning (this day) when she died. She appears to have had no milk. Finding the female unable to suckle her young one, I had it removed to the house and have fed it by means of a bottle with warm milk and a small quantity of cod-liver oil added to the milk.

The statement having been made that the species of Seal could be distinguished by the mode of shedding its first coat (I believe it is said that the common Seal, *P. vitulina*, sheds its coat as soon as born, while the *P. fœtida* sheds its first coat before its birth), I beg to say that this supposed distinction is shown by the above remarks to be of no value whatever as a means of distinguishing the species. I have no doubt both species are alike in this particular; and I have no doubt, from what I have seen, that the outer fur is sometimes shed before birth and sometimes immediately after birth in both species alike.

This young Seal was 32 inches long, and weighed 20 lbs. at its birth.

The outer covering is now on the table. It appears to me that the young animal shedding its outer covering compensates for the absence of the licking generally bestowed upon young animals by their mother. The Seals never lick.

June 25, 1868.

Dr. E. Hamilton, V.P., in the Chair.

Mr. P. L. Sclater exhibited two heads of the Spanish Ibex (*Capra pyrenaica*, Schimper), which had been obtained by Major Howard Irby on the Sierra Hermosura near Marbella in Southern Spain,

and announced that that gentleman had procured at Gibraltar a young living specimen of this animal, which it was his intention to present to the Society's Menagerie.

Mr. Sclater read the following notices of the more important additions to the Society's Menagerie during the month of May:—

1. A pair of the Wild Ass of the Syrian deserts (*Equus hemippus* of the late Isidore Geoffroy St.-Hilaire), of much interest as rendering the Society's series of the living species of this group complete. This pair of animals had been obtained by exchange from the Jardin d'Acclimatation, Paris, on the 2nd of May.

2. A young male of the Regent Bird (*Sericulus chrysocephalus*), purchased on May 14th, being the first specimen of this remarkable bird that had reached the Society's Gardens alive. The Society's correspondent, Dr. F. Mueller of Melbourne, had previously forwarded a living example of this bird, which had, unfortunately, died in the vessel after it had reached the docks.

3. An African Fruit-Bat (*Cynonycteris collaris*) which had been captured at sea off the St. John's river, Natal, Mareh 1st, 1868, and purchased the 27th of May. This animal had been placed in the Monkey-house along with the Indian Fruit-Bat (*Pteropus medius*), which had been living in the Society's Menagerie ever since October 1863.

A communication was read from Prof. R. Owen, F.R.S., containing a description of the sternum in *Dinornis elephantopus* and *D. rheides*, with notes on that bone in *D. crassus* and *D. casuarinus*, and forming the thirteenth part of his series of memoirs on the extinct birds of the genus *Dinornis*.

This paper will be published in the Society's 'Transactions.'

The following papers were read:—

1. Description of a New Species of the Genus *Ceyx*.

By JOHN GOULD, F.R.S. &c.

CEYX PHILIPPINENSIS, sp. nov.

This little Kingfisher might at first sight be considered the same as *Ceyx cyanopectus*, Eyton, but on comparing it with that species it will be found to differ in having a shorter bill, in the richer tone of the whole of its colouring, in having the patch of feathers on the sides of the neck larger and of a purer white, and in the absence of the dark indigo band; the flanks, too, are rufous, and not blue as in *C. cyanopectus*. Its form and colouring are those of a true *Ceyx*; but it has the patches of feathers on the upper part of each side of the breast very much developed, as in *Aleyone*, and more so than in any other species of the genus *Ceyx*. Upper mandible brownish black; lower mandible fleshy-brown; feet orange.

Total length $5\frac{1}{4}$ inches, bill $1\frac{5}{8}$, wing $2\frac{1}{2}$, tail $\frac{5}{8}$, tarsi $\frac{7}{16}$.

Hab. Vicinity of Manila, Philippine Islands.

2. Notes on the History and Geographical Relations of the Pinnipedia frequenting the Spitzbergen and Greenland Seas. By ROBERT BROWN, F.R.G.S. &c.

[Communicated by Dr. Murie.]

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1. *Introduction.*

In the introduction to a former paper* I had occasion to refer to the hazy uncertainty which surrounds the history of many of the Arctic Mammalia; preeminently is this true of the Cetacea, but scarcely less so of the order Pinnipedia. Though the specific determination of the species in this group is more easily managed, and has, to a great extent, been accomplished, yet the end to which these determinations are made, viz. the history of the birth, the life, and the geographical distribution and migrations of the animals themselves, are yet almost unknown, or dependent on the authority of the old Greenland naturalists, many of whose observations, made in a day when the specific characters were less known, or but a limited portion of the Arctic Ocean explored, have been proved to be far beside the truth. Again, these observations were made on the coast of Greenland where none of our sealers go; while in the Spitzbergen and Jan Mayen seas (the "Old Greenland" or "Greenland sea" of the whalers) the vast portion of the sealing of commerce is carried on for a few weeks each spring, but regarding the history of the Seals which form the prey of these hunters, the extent, commercial importance of the trade, and the migrations of these animals from one portion of the Arctic Sea to another we absolutely know nothing. Scientific purists forsooth (the Dr. Dryasdusts of zoology) may look upon the description of the process of a bone, or the elucidation of a dental tubercle, as the aim and end of all biological study; but I again repeat that all this, though of the utmost value, is merely an atom in the description of the animal, and mainly important so far as it tends to render the specific determination of the animals whose life we are studying easier to the field naturalist. I cannot help looking upon natural history as the history of nature; and to have a history of animated beings we must know something further about them than that the palate bone is notched, that the cervical vertebræ are anchylosed, or that the grinders have a posterior lobe.

It is with this view that these fragmentary notes have been put together. The various writers on this group, as far as relates to Arctic zoology, I have already criticised in my former paper, to which I beg leave to refer. In the spring of 1861, with a view to acquire a knowledge of the northern Seals of commerce, I accompanied a sealer

* "On the Mammalian Fauna of Greenland" (P. Z. S. 1868, p. 330).

into the seas between Spitzbergen and Jan Mayen; that year, however, proved a partial failure, and we returned to England by the end of April, leaving immediately for Baffin's, on which voyage I also accompanied her. Dr. John Wallace, now of the Hudson's Bay Company's Service, during the previous year also made a similar voyage, but was fortunate enough to enjoy better opportunities of observing the habits of Seals than I did; for at the period when I left for Davis's Strait, he remained behind, and passed the whole summer in the sea between Spitzbergen, Jan Mayen, and the east coast of Greenland. On my arrival in England he put into my hands an excellent series of notes on these species of animals, part of which I communicated to the Royal Physical Society of Edinburgh in 1862, and of which an abstract was published in their 'Proceedings' for that year. At that time, having some intention of preparing a more extensive work, I reserved my own observations and a great portion of Dr. Wallace's until such time as this might be matured; besides, there were innumerable points in the history of the Seals which I was desirous of investigating before putting any of our observations before the world. However, shortly after this I left on a very long scientific journey, far from the scene of our former studies, and for more than four years the whole subject was laid aside. In the summer of 1867 I again found myself a sojourner as far north as 70° N. lat., in Danish Greenland. During this time I made a very extensive collection of the skeletons, skulls, &c. of these and other animals, besides adding to and correcting some of my former observations. That osteological collection is not yet examined; but this is the less important, because, so far as I was able to judge during the hasty examination it was possible to give them during the process of preservation, there are no new species among them. Moreover the craniological characteristics of the northern Pinnipedia, thanks to the labours of Nilsson, George and Frederick Cuvier, Blainville, Gray, Gaimard, Lilljeborg, and others, are now very satisfactorily determined; and what points are still *sub judice* can easily be settled by an appeal to the collections already in our Museum, and to the one formed by me when it is made accessible to science.

These notes are still very imperfect; but as my stay in England is uncertain, I think it only right, if they are of any value at all, that they should be published, reserving to myself the hope that at some future day I may be enabled to present a more complete monograph of the Pinnipedia. In the following notes are combined most of my own observations with selections from those of Dr. Wallace (distinguished by his name within parentheses when I have been unable to confirm the observation); and to keep up the continuity of remark I have been compelled to occasionally repeat the substance of a portion of the abstract formerly referred to*. As this, however, has been misunderstood, I think that this partial review will not be objected to, especially as it merely consists of a few paragraphs. The remarks on the species are prefaced by some general observations on

* Proceedings of the Royal Physical Society of Edinburgh, 1862, p. 312.

the group. For the reasons already stated, I have purposely omitted giving any craniological or other osteological distinctions, except in a few isolated cases, limiting what descriptive remarks I may have to make to some disputed points regarding the very fallacious distinctive marks derived from the skin. As in the previous paper, I have not attempted anything like a complete history of their habits, geographical distribution, &c., chiefly limiting my remarks to what has fallen within my own observation or knowledge. I have occasionally mentioned facts already known, but still requiring further confirmation; but in general, when I can add nothing to the remarks of other naturalists, a reference is made to their writings, such references being intended to convey the imputation that our observations are similar in their nature. The list of popular names attached to each species is the result of not a little work and extensive acquaintance among the seal-hunters and fishermen of the northern coasts. The scientific synonyms are only given when no doubt existed of their applicability, and are not intended to be a complete list.

2. *Physiological Remarks on the Habits of Seals.*

The Seal is, to a considerable extent, fitted for terrestrial progression, which it performs chiefly by the muscles of the trunk, aided by those of the extremities. The result is a rolling, waddling, or shuffling kind of motion—the animal leaning over on one anterior extremity, and then rolling back on the other to make a similar use of it, using them thus alternately and the muscles of the spine continuously, chiefly those of the lumbar region and *erectores spinæ*. In carnivorous animals the intestinal canal is shorter than in graminivorous species: yet there are exceptions; for the Sloth has a very short intestine, and the Seal a very long one. I have measured the length of the intestine of *Pagophilus grænlædicus*, and found it to vary between 50 and 56 feet in length.

It is said that the livers of the Seals at Nova Zembla (Hemskirk) and in the southern seas possess poisonous properties: this is not the case with the livers of any of the Greenland seals; for they are often eaten, and I never knew of any bad effect ensuing. The lymphatic glands are well developed, the glands being of great size, though not numerous, it being common to find only one in each axilla and groin. In the young Seals the lymphatics of the neck are subject to disease, which appears to be analogous to, if not indeed true scrofula: the glands swell and suppurate and pour out a purulent discharge; and the animals subject to this do not increase in size.

Many theories have been adduced to account for the Seal's capability of remaining with impunity so long below water. That of Buffon and the physiologists of his time was long celebrated: from their finding the *foramen ovale* open in a few instances, they twisted an exception into a rule, and accounted for it by this fœtal peculiarity. Dr. Wallace considers that this theory is erroneous, and from numerous observations he is satisfied that the open foramen must be very rare; for in only one of the Seals which he examined did he

find the foramen ovale unenclosed to within a line of the aorta. That of Blumenbach and Houston has been also brought forward, viz. that venous sinuses are to be found in the liver and surrounding parts, and that the large veins have been observed to be enlarged and tortuous; these have been supposed to act as reservoirs for the returning venous blood while the animal is diving under the water. But this theory carries inconsistency in itself. The venous system on the whole, and not in any particular part, unless in the vena cava, from the pressure excited on its walls, is greatly enlarged; but this arises from the great quantity of blood these animals possess. But, even supposing these venous sinuses and that the animal will remain below the surface for twenty or twenty-five minutes (though I must assert that I never saw them remain longer below the surface than fifteen minutes, and from five to eight is the common time), are these sinuses large enough to contain the full quantity of blood that may return in that period from the capillary system? The reply is certainly in the negative. Does the heart's action diminish in rapidity or come to a full stop? in that case there would be no need of these sinuses. What, then, are the uses of them?

After a very careful examination, Dr. Wallace informs me that he never could find them, in all the Seals which he examined. He certainly remarked the dilated condition of the veins, but referred this to a physiological cause, viz. the pressure of the superincumbent column of blood. He believes that their power of remaining so long below the surface of the water is to be referred to a cause physiological, and not structural. Their expertness in swimming is not possessed from birth, but only developed from an innate instinct. He has often watched young Seals taking the water at first in smooth pools among the ice, and then swimming slowly and quietly about in the still floe-water—then gradually taking the water, staying below the water at first but a short time, gradually lengthening their stay until they had acquired the faculty of remaining the usual time beneath the surface. Dr. Wallace, then, thinks that this faculty is owing to a cause more physiological than anatomical, and that the explanation he has given, coupled with the enormous quantity of blood which the Seal contains, will account for their power of remaining beneath the water. As I have not examined the anatomy of the Pinnipedia with this object in view, I cannot presume to give an opinion on the matter; in the Narwhal and other Cetacea which I examined, the extensive venous plexus about the vertebral column seemed to explain the possession of this power of temporary subaquatic existence. The flesh of the Seal is quite black, from the enormous quantity of venous blood it is impregnated with; but if exposed to the air or steeped in water, it acquires the usual arterial rosy hue. The flesh of young seals which have not yet taken the water is, on the contrary, quite red.

3. Habits and Instincts of Seals in general.

They spend a considerable part of their time in feeding, but they

pass by far the greater part in basking in the sunshine and sleeping on the ice*. It has been remarked that the Seal sleeps and wakes alternately about every 180 seconds. Seals are, however, often killed in considerable numbers when asleep on the ice; and this happens most commonly on a day of warm sunshine. We had a Seal on board about a month old, which I watched attentively for some time, and it certainly seemed to wake and sleep alternately with the interval mentioned (*Wallace*): when disturbed it made attempts to defend itself; and if left alone for a few seconds, it drew its flippers close to its sides, and gradually its head began to look drowsy, then closed its eyes, and from the long deep breathing it was evidently asleep, for a minute or two (for the time varied); and then, without being disturbed in any way, it would suddenly open its large black glassy eyes, stretch out its head, and look about, and, as if satisfied that all was right, would again relapse to sleep, and so on. When asleep, they always leave several sentinels on the watch, which, strange to say, are, for the most part, female Seals. These sentinels, however, conduct themselves in the same manner as I have described the individual Seal we had on shipboard. I have been assured by old seal-hunters that Seals can sleep on their back while floating in the sea; and this statement corroborates that of *Fabricius* and other naturalists. In 1861, in *Davis's Straits*, the steamer on which I was ran against a Seal sleeping in this manner. The *blow-holes*, or escape-holes, of the Seals are evidently formed by them when the ice is making, the animal always rising to breath again at the same place, thus preventing the coagulation of the ice, or breaking it as soon as formed. It has been supposed that the Seal could make such an opening by force or by *keeping its warm nose* (though, unfortunately for the theory, that organ is always cold!) *for a time at one place for the purpose of melting the ice*; but these conjectures are not founded on truth, the following reasons being my grounds for that statement:—It could not break the ice by force, and, moreover, it could not even dare to run its nose against such an obstacle; for the nose of the Seal is a tender point; this was known even to the ancients, and is referred to by *Oppian* in a well-known passage†. This is taken advantage of by the sealers, who secure as many as possible when they are hastening to the water from the ice, by striking them on the nose, and then killing them at their leisure when the others have escaped. Even suppose the muzzle capable of melting the ice (which it certainly is not), where could the animal rise to breath during the process? The preceding explanation of the formation of the breathing- or *blow-holes* was derived from independent observation of the habits of the Seal, but is identical with that given me by the natives of the Arctic regions. It is at such holes that the *Èskimo* and the Bear watch patiently for their prey.

* "Sternunt se somno diversæ in littore Phocæ" (*Virgil, Georgics, lib. 4.*)

† "Non hami penetrant phocas, sævique tridentes
In caput incutiunt, et circum tempora pulsant.
Nam subita pereunt capitis per vulnera morte."

The *voice* of the Seal is a peculiar cry, somewhat midway between that of a young child and the bleating of a lamb or kid.

They are very fond of music, which was well known to the ancients; and this fondness is often taken advantage of by the hunters at the present day*. I have often seen them raising their heads inquiringly out of the water listening to the sea-songs of the sailors as they wrought at the pumps or tracked the ship to the ice-floe; therefore it seems as if the fabled spell of Orpheus, which was powerless on the Dolphin, takes effect upon the Seals. In moving from one place to another they swim rapidly, sometimes on their backs and often on their sides, occasionally whirling about as if to amuse themselves, and sometimes leaping out of the water altogether.

Their parental love is so great that they will sometimes remain and share the fate of their hapless young. Their instinctive knowledge of danger is very keen; they have been known to seize their young with their flippers and carry them into the water with them when they saw the hunter approaching! I did not see this myself, and only ask you to receive the statement for what it is worth.

Seals are very tenacious of life, and difficult to kill, unless by a bullet through the brain or heart. They are so quickly *flensed* †, that after having been deprived of their skin they have been seen to strike out in the water; so that the sympathies of the rough hunters have been so excited that they will pierce the heart several times with their knives before throwing away the carcass. These movements, however, are apparently reflex or diastaltic, as I have often seen a Seal lying skinned on the deck for an hour, exposed to a temperature of 12° below zero (Fahr.), and yet the muscles of the loins and back retain their contractility to such an extent as to be able to rotate the pelvis on the spine, on those on each side being alternately irritated.

With the exception of the Bladdernose, the other Seals in the Greenland seas appear to have little or no combativeness in their nature, but are a harmless, persecuted, sportive race of graceful athletes making merry the solitary waters of polar lands.

On the other hand, the male Bladdernose is, in truth, the lion of the sea, dividing the empire of the polar waters with his huge ally the Walrus. Instead of flying at the approach of the hunter, he will quite calmly await the approach of danger, preparing for defence by betaking himself to the centre of the piece of ice he is on, and blowing up the air-bladder on his forehead, while he rears his head and snuffs the air like an enraged bull, and often gives battle successfully,

* It is often alluded to by the ancient poets (thus, "gaudebant carinine phocæ," Apol. Rhod. lib. 1; Val. Flacc. lib. 5. lin. 440, &c.); and all ancient historians especially note that it is "perstudiosum musicæ." The well-known passage in Sir W. Scott's poem also refers to this,—

"Rude Heiskars seals through surges dark
Will long pursue the minstrel's bark."

† A convenient whaler's word (of Dutch origin) to express the operation of taking off the blubber (and skin).

making the clubs fly from the hands of his assailants, with his flippers, his head being protected as with a helmet by the air-bladder. He will then in turn act on the offensive, and put his opponents to flight, pursuing them with a shuffling serpent-like motion over the ice, the result often proving somewhat dangerous to the panic-stricken hunter if the boat has left that piece of ice, as the Seal will use his tusks rather ferociously when thus enraged. However, he is not inclined to give battle unless provoked, and looks a dull stupid-looking sort of epicurean as he lolls on the surface of the ice and gazes about with his large black eyes, having an apparently meaningless stare. The "Ground-Seal" and "the Floe-Rat" (*Pagomys hispidus*) in the far north are quite harmless and inoffensive; they apparently delight to swim about in the calm smooth floe-waters, or bask asleep in the sunshine on the surface of the ice. Their greatest enemy is the Polar Bear, who is continually on the alert to take them by surprise, forming, as they do, his chief prey.

Nearly all of the Seals live on the same description of food, varying this at different times of the year and according to the relative abundance or otherwise of that article in different portions of the Arctic seas. The great staple of food, however, consists of various species of Crustacea which swarm in the northern seas. During the sealing-season in the Spitzbergen sea I have invariably taken out of their stomachs various species of *Gammarus* (*G. sabini*, Leach, *G. loricatus*, Sab., *G. pinguis*, Kr., *G. dentatus*, Kr., *G. mutatus*, Lilljeb., &c.), collectively known to the whalers under the name of "Mountebank Shrimps," deriving the name from their peculiar agility in the water. This "seals' food" is found more plentiful in some latitudes than in others, but in all parts of the Greenland sea from Iceland to Spitzbergen; I have seen the sea at some places literally swarming with them. Again, in the summer in Davis's Strait I have found in their stomach remains of whatever species of small fish happened to be just then abundant on the coast, such as the *Mallotus arcticus*, *Salmo* (various species), &c. I have even known them to draw down small birds swimming on the surface; but their chief food is Crustacea and fish.

4. Notes on the Species of *Pinnipedia*.

(1) CALLOCEPHALUS VITULINUS (Linn.), F. Cuv.

Phoca vitulina, Linn.

Phoca communis, Linn. (Mus. Ad. Frid. i. 5).

Phoca canina, Pall. (ad partem).

Phoca variegata, Nilss.

Phoca linnæi, Less.

Phoca littorea, Thienem.

Popular names.—*Sea-dog*, *Sea-calf*, *Sea-cat* (English sailors and fishermen generally); *Selkie*, *Selach*, and *Tangfish* (north of Scotland); *Rawn* (western islands of Scotland); *Språklig Skäl* (Swedish); in other parts of Scandinavia, and according to age &c., it is variously

designated *Wilkare Skül*, *Kubbsæl*, *Fjordnacke*, *den spättede Sül* (the Spotted Seal), *Algar*, *Laggar*, *Kutar*, and *Skültokar*; *Kobbe*, *Stenkobbe* (Norse); *Hylje* (Finnish); *Nuorjo* (Lapp.); *Seehund* (German); *Veau marin* and *Phoque* (French); *Kassigiak* (Greenland); *Spragled Sælhund* (Danes in Greenland).

The Eskimo in Ponds Bay, on being shown a good figure of this Seal, called it *Tupalo*; but whether this is their name for the animal and is to be received for a proof that the *C. vitulinus* is found there, I cannot take upon myself to decide. The Greenlanders also call it, according to age, *Kassigiarak* and *Kassiginak*; but when it attains the age of three years, it is called *Kassiarsoak* ("the big Kassigiak"). Prof. Newton ("Notes on the Zoology of Spitsbergen," Proc. Zool. Soc. 1865, and Ann. Nat. Hist. vol. xvi. 3rd series, p. 423) says that *Pagomys fœtidus* is called *Steen Kobbe* (Stone-Seal) by the Spitzbergen hunters. I suspect that he has erred through his informants mistaking this for *Callocephalus vitulinus*. No doubt Dr. Malmgren seems to think that the latter species is not got in Spitzbergen—an opinion I have ventured to contest in a former paper.

It is also sometimes called "the Freshwater Seal," on account of its following the Salmon high up rivers*.

Remarks &c.—Any laboured account of a Seal so long and so familiarly known would obviously be out of place in these short notes; I question, however, if all the accounts we possess regarding the Seal under the designation of "*Phoca vitulina*" really refer to this species, and not to *Pagomys fœtidus* and others †. It will, I think, be found that in the western and northern islands of Scotland several species, not hitherto supposed to be regular members of the British fauna, exist, known under the popular names of *Selkie*, *Selach*, *Sea-cat*, &c. I do not think I can say anything in regard to its habits further than what is already contained in various works on Mammalia &c., viz.:—Bingley, British Quadrupeds, p. 57; Bell, History of British Quadrupeds, p. 282; Hamilton, Amphibious Carnivora (Nat. Lib.), p. 127; James Wilson in Mag. Zool. and Bot. vol. i. p. 239; Edmonston, View of Zetland, vol. ii. p. 293; Martin, Western Islands, p. 62; M'Gillivray, British Quadrupeds (Nat. Lib.), vol. xiii. p. 199; Nilsson, Skandinaviske Fauna, i. p. 276; Fabricius, Naturhistoriske Selskabets Skrifter, I. Band ii. p. 98; Ædmann, Vet. Akad. Handl. 1784, p. 84; Rosted, Norske Vidensk. Nye Skrifter, ii. p. 185 (good description); Cneiff, "Berättelse om Skällfånet i Æsterbotten," in Vet. Akad. Handl. 1759, p. 179. r. 8 (on the hunt); Holmers, Anteckningar om sätet att

* I have known a Seal (probably *Halicyon richardsi*, Gray) to be killed at the Falls of the Columbia River in Oregon, upwards of 200 miles from the Pacific. It was doubtless in pursuit of Salmon. Dog River, a tributary of the Columbia, takes its name from a dog-like animal, probably a Seal, being seen in the lake whence the stream rises.

† In the Appendix to Parry's 'Voyage' is a notice of a Seal said to be "*Phoca vitulina*." It is the young (in second coat) of *Pagophilus grønlandicus*, which has often been mistaken for this Seal. It can be known by its having the second toe of the fore flippers the longest; while, independently of other characters, *C. vitulina* has the first toe the longest.

skjuta och fånga Skälar &c. (Stockholm, 1828)* (hunt &c.); Ball, Transactions of the Royal Irish Academy, xviii., and Sketches of British Seals; Gaimard, Voyage en Islande &c.

Procreation and Young.—On the coast of Greenland it is said to produce its young in the month of June; but the time seems to vary according to season and place. On our coast its young is dark-coloured; but on the Arctic coasts it is born white, with curly hair, like the young of *Pagomys fœtidus*.

Geographical Distribution.—This is a Seal peculiar to the coasts of the regions which it affects, but has also a wide range, being found over nearly all the northern coasts of Europe and the colder portions of America. It is even said to be found in the Caspian Sea and Lake Baikal. It does not seem, from its littoral habits, to be found in the Spitzbergen sea, or form a portion of the commerce of the sealer; it is, however, found on the coasts of Spitzbergen, tolerably abundant on the eastern shores of Greenland, and in Davis's Strait. It is to be found all the year round all along the coast of Greenland up inlets †, but not to any such extent as *Pagomys fœtidus* and *Pagophilus grœnlandicus*. In Scandinavia it is sometimes called the Fjardskäl on account of its frequenting inlets or fjords.

Economic value and hunting.—We have no data to decide as to what extent it is killed in Danish Greenland, its record being united with that of *Pagomys fœtidus*. The skins are highly valued as articles of dress, more especially as material for the women's breeches; and no more acceptable present can be given to a Greenland damsel than a skin of the *Kassigiak*. While a European Pyramis presents jewels and *bijouterie* to his fair Thisbe, the not less gallant Pingatok in Greenland presents to his squat *innamorata* the fruits of his hunt up the ice-choked fjord, in the form of a Seal of this species! In the Danish settlements they are valued at from three to four rigsdaler. The principal reason which induced the late Admiral Grâh's boatwomen to accompany him on his memorable voyage along the east coast of Greenland was the hope of obtaining some *Kassigiak* skins from that region, the natives of which value them at even less than the more serviceable hides of the other species, which are sold by the west-coast natives for a mere trifle. According to Hr. Cneiff (*l. c.*) a *C. vitulinus* will yield about $6\frac{2}{3}$ Swedish lispunds of blubber, and, according to Holmers, even 8 lispunds. Professor Nilsson says that a Seal of this species killed on the coast between Malmö and Skanör in Sweden yielded over 90 Swedish "potts" of oil, each "pott" being worth 36 skillings, = 67 rigsdaler 24 skillings Rigmont (Swedish) for the oil of one *C. vitulinus*. In August, when the Seals are poorer, another yielded 75 potts, equal in value to 56 rigsdaler 12 skillings (Swedish). In some of the northern and western islands of Scotland, and at the estuary of the Tay, &c., they are still occasionally hunted for their skins and oil. The skin makes excellent leather, and waiscoats made of it are much valued by fishermen.

* *Fide Nilss.*

† The "Colonie" of Christianshaab in Disco Bay is called *Kassigianwitchz*, or the place of the *Kassigiak*.

No separate returns of the catch of this have been kept; but it is estimated that of *Pagomys fœtidus* and *Callocephalus vitulinus*, the yearly capture in Danish Greenland must amount to 70,000* or more. The flesh is looked upon in Greenland as the most palatable of all "seal-beef."

(2) *PAGOMYS FÆTIDUS* (Müll.), Gray.

Phoca fœtida, Müll.

Phoca hispida, O. Fab. Nat. Selskab. Skrifter, vol. i. 2. p. 74.

Phoca bothnica, Gm.

Phoca fasciata, Shaw.

Phoca annellata, Nilss.

Phoca discolor, Gray.

Phoca frederici, Less.

Popular names.—*Ringlad Skül* (Nilsson); *Morunge* (Edmann, Vet. Akad. Handl. 1784, p. 84); *Hringanor* (Mohr, Isl. Naturhistoriske, p. 5); *Kuma* (Tungusen near Baikal); ?*Nerpa* (Russ.); (*Neitsiak* (young) and *Neitsik* (old, pronounced *Nesik*, Greenlanders and Danes in Greenland); *Floe-rat* or *Flaar-rat*† (of Northern English and Scotch sealers). It has been so often confounded with other Seals that, even on the coasts where it is not uncommon, it has not received many popular names; however, in different parts of the Scandinavian seaboard it is variously called *Inskürsskül* or *Skürfving*, and *Svart nollad-sül*, or simply the *Nollade*. This is, in all probability, the Seal known in the Hebrides as the *bodach* or old man.

It is doubtful if this is the *Phoca equestris* of Pallas; but I cannot think that there is any serious room for doubt that it is identical with Dekay's *Phoca concolor*. I do not think that any one now entertains any doubt about its being identical with the *Phoca fœtida* of Fabricius (Fauna Grœnl. p. 13. no. 8) or the *Phoca hispida* described by the same author in the 'Naturhistoriske Selskabets Skrifter,' l. c., though Nilsson seemed in 1847 to have been doubtful (Skand. Fauna, i. p. 283).

Descriptive remarks &c.—This is the smallest of the Greenland Seals; it is chiefly looked upon and taken as a curiosity by the whalers, who consider it of very little commercial importance, and call it the "Floe-rat," as it is always either found on floes or quietly swimming about in the smooth floe-waters.

Young.—The young is white, of the yellowish tint of the Polar Bear. The hair is curly.

Habit &c.—They delight to live in retired bays in the neighbourhood of the ice of the coasts, and seldom frequent the open sea. In the Greenland and Spitzbergen seas they chiefly live upon the floes in retired situations at a considerable distance from the margin of the ice. Dr. Wallace observed them for a considerable time in

* Rink, l. c.

† I have heard the English sailors call them *Dorrities*; but this term is also used for the Bluebacks (*P. grœnlandicus*).

the months of June and July, between N. lat. 76° and 77° , in possession of a large floe, part of which was formed of bay ice, where they had their "blow-holes" (the *atluk* of the Danes); his ship lay ice-bound for nearly three weeks, at about three miles from this large floe, and hence he had considerable opportunity of observing them. They passed the greater portion of their time apparently asleep beside their holes; and he never saw them all at one time off the ice, unless alarmed by parties from the ship or by the Polar Bear. When the ice slackened away and the sheets of open water formed around the ships, the Seals used to swim near them; and occasionally at these times a few were killed. In the water they are very cautious, swimming near the hunter, gazing on him as if with feelings of curiosity and wonder; but on the ice beside their blow-hole it is almost impossible for the hunter to approach them, so much are they on the alert and so easily alarmed. In Davis's Strait it especially feeds about the base of icebergs and up the ice-fjords. The great ice-fjord at Jakobshavn is a favourite haunt of theirs; the reason for this predilection is apparently that their food is found in such localities in greater abundance. The bergs, even when aground, have a slight motion, stirring up from the bottom the Crustacea and other animals on which the Seals feed*; the native, knowing this, frequently endangers his life by venturing too near the icebergs, which not unfrequently topple over upon the eager Seal-hunter.

The old males have a most disgusting smell, which has suggested the name *fœtida*†.

Geographical Distribution &c.—In the Spitzbergen sea they appear to be confined to high latitudes, and especially to the parallels of 76° and 77° N.; and it is in these latitudes that the whalers chiefly find them. In Davis's Strait it is to be found all the year round, but particularly up the ice-fjords. Its capture constitutes the most important feature of the Seal-hunt in North Greenland; but many are also killed in South Greenland, the Neitsik figuring largely in the trade-returns of that Inspectorate. In Jakobshavn bay, I am told, they are quite numerous about the middle of August.

Economic value.—They are extensively captured for food and clothing. Notwithstanding the nauseous smell of the old ones, the flesh of all of them (but especially the younger individuals) is sufficiently palatable to an *educated* taste. During the latter end of summer and autumn it forms the principal article of food in the Danish settlements, and on it the writer of these notes and his companions dined many a time and oft; we even learned to like it and to become quite epicurean connoisseurs in all the qualities, titbits, and dishes of the well-beloved Neitsik! The skin forms the chief

* Hr. Distrikts-læge Pfaff, who has resided at Jakobshavn for many years as district Medical Officer of North Greenland, suggests this to me; and the idea recommends itself as being that of a very intelligent naturalist.

† Homer refers to this in another species (probably *Monachus albiventer*):

“Web-footed Seals forsake the stormy swell,
And sleep in herds exhaling nauseous smell.”

material of clothing in North Greenland. All of the *οἱ πολλοί* dress in Neitsik breeches and jumpers; and we sojourners from a far country soon encased ourselves in the somewhat *hispid* but most comfortable Neitsik unmentionables. It is only high dignitaries, such as "Herr Inspektor," that can afford such extravagance as a Kassigiak (*Callocephalus vitulinus*) wardrobe! the Arctic *belles* monopolize them all.

(3) *PAGOPHILUS GRÆNLANDICUS* (Müll.), Gray.

Phoca grænlandica, Müll.

P. oceanica, Lepech.

Callocephalus oceanicus, Less.

Phoca semilunaris, Bodd.

P. dorsata, Pallas.

P. mülleri, Less.

Callocephalus grænlandicus, F. Cuv.

Young. *Phoca lagura*, Cuv.

Callocephalus lagurus, F. Cuv.

Phoca albicauda, Desm.

P. desmarestii, Less.

P. pilayi, Less.

Popular names.—*Saddleback* (English northern sealers); *White-coats* and *Bed Lampiers* (Newfoundland sealers) (young); *Harp Seal* (English authors); *Svartsida* (Norse); *Dølja*, *Dævok*, *Aine* (Lapp); *Svartsiden* (Danish, hence Egede, Græn. p. 62); *Blaudruselur* (Icelandic); *Karoleek* and *Neitke* (Eskimo at Pond's Bay, Davis's Strait); *Atak* (Greenlanders). The same people, according to the age of the Seal, call it *Atarak*, *Aglektok* or *Uklektok*, and *Atarsoak* (hence Crantz, Grönl. i. p. 163), meaning respectively the little Seal (white), the blueside, and the large Seal, while *Atak* means merely *the* Seal (blackside) without reference to age. A variety having the belly dark also is called by the Danes in Greenland *Svart-svart-siden*. The *Uklektok* of the natives is also called by the whites *Blaa-siden* (the blueside). I shall afterwards refer to some of its other names.

There seems little doubt that the *Phoca oceanica*, Lepech.*, is identical with this species; indeed Lepechin's description is one of the best we have of the *Pagophilus grænlandicus*. Lepechin seems to have confounded with this the young of another species, and to have erred by trusting wholly to the deceptive characters of colouring, instead of relying for its distinctive character on the more stable distinction of teeth and skull. What he says about the changes of coat in *P. oceanica* exactly agrees with what I have said regarding the present species.

Remarks.—It seems to be almost unknown to most writers on this group that the male and female of the Saddleback are of dif-

* In Sir Joseph Banks's copy of Fabricius's 'Fauna,' in the British Museum, "*Phoca oceanica*" is written (apparently in Sir Joseph's handwriting) opposite the description of *Phoca grænlandica*.

ferent colours; this, however, has long been known to the Seal-hunters. *Male*.—The length of the male Saddleback rarely reaches 6 feet, and the most common length is 5 feet; while the female in general rarely attains that length. The colour of the male is of a tawny grey, of a lighter or darker shade in different individuals, on a slightly straw-coloured or tawny-yellowish ground, having sometimes a tendency to a reddish-brown tint, which latter colour is often seen in both males and females, but especially in the latter, in oval spots on the dorsal aspect. The pectoral and abdominal regions have a dingy or tarnished silvery hue, and are not white as generally described. But the chief characteristic, at least that which has attracted the most notice, so much as to have been the reason for giving it several names, from the peculiar appearance it was thought to present (*e. g.* “harp” Seal, “saddleback,” &c.), is the dark marking or band on its dorsal and lateral aspects. This “saddle-shaped” band commences at the root of the neck posteriorly, and curves downwards and backwards at each side superior to the anterior flippers*, reaches downwards to the abdominal region, whence it curves backwards anteriorly to the posterior flippers, where it gradually disappears, reaching further in some individuals than in others. In some this band is broader than in others and more clearly impressed, while in many the markings only present an approximation, in the form of an aggregation of spots more or less isolated. The grey colour verges into a dark hue, almost a black tint, on the muzzle and flippers; but I have never seen it white on the forehead as mentioned by Fabricius. The muzzle is more prominent than in any other northern Seal.

Female.—The female is very different in appearance from the male: she is not nearly so large, rarely reaching 5 feet in length; and when fully mature her colour is a dull white or yellowish straw-colour, of a tawny hue on the back, but similar to the male on the pectoral and abdominal regions, only perhaps somewhat lighter. In some females I have seen the colour totally different; it presented a bluish or dark grey appearance on the back, with peculiar oval markings of a dark colour apparently impressed on a yellowish or reddish-brown ground. These spots are more or less numerous in different individuals. Some Seal-hunters are inclined to think this is a different species of Seal from the Saddleback, because the appearance of the skin is often so very different and so extremely beautiful when taken out of the water; yet as the females are always found among the immense flocks of the Saddleback, and as hardly two of the latter females are alike, but varying in all stages to the mature female, and on account of there being no males to mate with them, I am inclined to believe with Dr. Wallace that these are only *younger female Saddlebacks*. The muzzle and flippers of the female present the same dark-chestnut appearance as in the male.

Procreation and changes of coats in the young.—I have already

* I use this very convenient sealers' vernacular term to express the “paws,” “hands,” &c. of systematic authors.

spoken of the young as being different from the male; and in my remarks upon their geographical distribution and migrations reference will be made generally to their period and place of procreation, more theoretically, however, than from actual knowledge or observation. I now supply this from a study of this subject in the Spitzbergen sea. The period at which the Saddlebacks take to the ice to bring forth their young may be stated generally at between the middle of March and the middle of April, according to the state of the season &c., the most common time being about the end of March. At this time they may be seen literally covering the frozen waste as far as the eye can reach with the aid of a telescope, from the "crow's nest" at the main-royal mast-head, and have, on such occasions, been calculated to number upwards of half a million of males and females. After the females have procured suitable ice on which they may bring forth their young, the males leave them and pursue their course to the margin of the ice; there the Seal-hunters lose them, and are at a loss as to what course they take, the common opinion being that they leave for feeding-banks; but where, is unknown. They most probably direct their course along the "cant" of the ice, or among the ice where it has a loose scattered character; for in the month of May sealers fall in with the old Seals (male and female) in about from N. lat. 73° to 75°, and in the following month still further north, by which period the young ones have also joined them. The females commonly produce one at a birth, frequently two; and there is good reason for supposing that there are occasionally three, as most sealers can tell that they have often seen three young ones on a piece of ice floating about which were apparently attended by only one female. Yet it is only proper to remark that, of the several ships I have heard of finding the seals when taking the ice, none of the hunters have been able to tell me that they took more than two from the uterus of the mother*. In contradiction to the opinion of some experienced sealers, I think that it is more than probable that they produce but once a year.

(a) The colour after birth is a pure woolly white, which gradually assumes a beautiful yellowish tint when contrasted with the stainless purity of the Arctic snow; they are then called by the sealers "white-coats" or "whitey-coats"†; and they retain this colour until they are able to take the water (when about fourteen or twenty days old). They sleep most of this time on the surface of the snow-covered pack-ice and grow remarkably fast. At this stage they can hardly be distinguished among the icy hummocks and the snow—their colour thus acting as a protection to them; for in this state they

* Perhaps, after all, Pliny has struck the truth in regard to the order, when he says, "*Parit nunquam geminis plures*" (Hist. Nat. lib. 9. § 13).

† These are rarely seen in Danish Greenland, and then are called "Isblink" by the Danes from their colour; at least, so Fabricius says. He, moreover, informs us that the third year they are called *Aglektok* (as mentioned above), the fourth *Millaktok*, and after a winter *Kinaglit*, when they are beginning to assume the harp-shaped markings of the male (Nat. Selsk. Skrift. i. p. 92). I never heard these names in North Greenland.

are perfectly helpless, and the sealer kills them with a blow of the sharp-pointed club or a kick over the nose with his heavy boot. The mother will hold by her young until the last moment, and will even defend it to her own destruction. I have known them seize the hunter when flaying the young one, and inflict severe wounds upon him. In 1862, during a severe gale of wind many of the young seals were blown off the ice and drowned. Sometimes the sealing-ships have accidentally fallen among them during the long dark nights of the end of March or beginning of April, and were aware of their good luck only from hearing the cries of the young Seals. The white-coat changes very quickly. In 1862 the late Capt. George Deuchars, to whom science is indebted for so many specimens, brought me two alive from near Jan Mayen; they were white when brought on board, but they changed this coat to a dark one completely on the passage, of a week or ten days. They ate fresh beef, and recognized different persons quite readily. The young "whitecoat" represented on the plate of *Phoca barbata* by Dr. Hamilton ("Amphibious Carnivora," Naturalist's Library, vol. viii. pl. 5), from a specimen in the Edinburgh Museum, is not the young of that species, but of *Pagophilus greenlandicus*. The young white-coat, however, is much plumper than the specimen figured; indeed, in proportion to its size, it has much more blubber between the skin and the flesh than the adult animal.

(β) They take the water under the guidance of the old females. At the same time the colour of the skin begins to change to that of a dark speckled and then spotted hue; these are denominated "Hares" by the sealers*.

(γ) This colour gradually changes to a dark bluish colour on the back, while on the breast and belly it is of a dark silvery hue. Young Seals retain this appearance throughout the summer and are termed "Bluebacks" by the sealers of Spitzbergen, "Aglektok" by the Greenlanders, Blaa-siden by the Danes†.

(δ) The next stage is called Millaktok by the Greenlanders. The Seal is then approaching to its mature coat, getting more spotted, &c., and the saddle-shaped band begins to form.

(ε) The last stage (in the male to which these changes refer) is the assumption of the halfmoon-shaped mark on either side, or the "saddle" as it is called by the northern sealers.

I consider that about three years are sufficient to complete these changes. This is also the opinion held in Newfoundland, though the Greenland people consider that five years are necessary. I wish, however, to say that these changes do not proceed so regularly as is usually described, some of them not lasting a year, others longer, while, again, several of the changes are gone through in one year; in fact the coats are always gradually changing, though some of

* In this state it is not unlike *Halichærus grypus*, but can be distinguished by the characters given by Nilsson, Skand. Fauna, i. p. 301.

† The dental formula of a Seal in this stage killed by me in Davis's Strait, September 1861, was:—Incisors $\frac{6}{4}$; canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}$.

the more prominent ones may be retained a longer, and others a shorter time. It would require a very careful and extended study of this animal to decide on this point, which, owing to their migrations, it is impossible to give. After all, these changes and their rapidity vary according to the season and the individual, and really will not admit of other than a general description.

Habits.—It has few other characteristic habits beyond what is mentioned regarding the order generally, or in other sections of this paper on its migrations &c. It is looked upon by the Greenlanders as rather a careless, stupid Seal, easily caught by a very ordinary *kayaker*. Its food consists of any small fish (*Mallotus arcticus*, Fab., &c.), Crustacea, and even Mollusca. In this its habits agree with those of other species.

Geographical range and migrations.—The Saddleback has a wide range, being found at certain seasons of the year in almost all parts of the Arctic Ocean, from the American coasts to Nova Zembla, and perhaps even further; it appears that the *Phoca oceanica* (Lepechin, Acta Petropolitana, 1777, t. i. pp. 1, 259, t. 6, 7) is identical with it. Stragglers even find their way into temperate regions; and this is so frequently the case that this Seal may now be classed in the fauna of nearly all of the northern shores of Europe and America. The period of the year influences its position in the Spitzbergen sea (the Greenland sea of the Dutch, the "Old Greenland" of the English whalers). Early in March it is found by the sealing-ships in immense numbers in the proximity of the dreary island of Jan Mayen*, off the east coast of Greenland, not far from the 72nd parallel of north latitude; but, of course, the longitude varies with the extent which the ice stretches out to the eastward, though the common meridian is between 6° and 8° west of Greenwich. They are never found far inwards on the fixed ice, but on the margin of the icebelt which extends along the whole of the eastern shores of Greenland, stretching as far as the longitude of Iceland, and sometimes even for a hundred miles to the eastward of that island and of Jan Mayen island into the ocean. The general direction of its sea-margin is towards the north-east, stretching most commonly as far as Spitzbergen, to N. lat. 80°, but occasionally only to about 75° N. lat., where it joins at an angle another belt of ice which lies in a southern and eastern direction along the coast of Spitzbergen to Cherrie Island. This easterly belt of ice is what the whalers call a "south-east pack;" and at the angle where the two belts join, a passage can generally be accomplished through to the Spitzbergen waters. The nature of the ice, which can easily be perceived by the experienced sealer, determines whether the Seals will be found far from the margin of the ice. Thus, if there is much new light ice, it is probable that the Seals will have taken the ice at a considerable distance from the seaboard margin of the pack, as it is well known that instinctively

* Hence the Norse sealers often call it the *Jan Mayen Kobbe* (the Jan Mayen Seal), but more often the *Springer*, from its gambolling motions in the water (Newton, *l. c.*).

they select ice of a strong consistence for the safety of their young when in that helpless condition in which they are unable to take to the water. Again, they often take the ice where it stretches out to sea in the form of a long, broad promontory, with apparently this end in view, that their young may easily get to sea when able to do so; this is the great clue which guides the sealer in the choice of the ice where he may find his prey. This was very well exhibited in 1859. Dr. Wallace tells me that there was very little ice that year, and the island of Jan Mayen was altogether free from it; indeed the nearest ice lay away nearly 70 miles or more to the north-west of it. The 'Victor,' the 'Intrepid,' and a fleet of other ships met with indications of Seals in 72° N. lat., about eighty miles in a north-westerly direction from Jan Mayen, in the early part of the month of April; they had sailed in an easterly direction through a very loose pack of very heavy ice. The prospects were so good that Capt. Martin, sen., of the 'Intrepid,' perhaps the most successful sealer who ever sailed in the Greenland sea, and Capt. Anderson, of the 'Victor' (my old fellow voyageur both in the North Atlantic and North Pacific Oceans), were congratulating each other on the almost certain prospect of filling their ships (for, indeed, the old Seals had taken the ice and some had already brought forth their young), when suddenly there was a change of wind to the eastward, and before many hours it blew a hard gale from that direction. The results were that the ice was driven together into a firm pack and frozen into solid floes, and the 'Victor' and many of the best ships of the fleet got ice-bound. The Seals shifted their position towards the edge of the ice to be nearer the sea, and for seven weeks the 'Victor' was beset among ice and drifted southwards as far as N. lat. $67^{\circ} 15'$, having described a course of nearly 400 miles. Though I have stated the parallel of 72° N. lat. as being the peculiar whereabouts of the Seals in March, yet they have often been found at a considerable distance from it as well from Jan Mayen. Thus in 1859 they were found in considerable numbers not far from Iceland, the most northerly point of which is in N. lat. $66^{\circ} 44'$; this leads me to remark that the Seals are often divided into several bodies or flocks, and may be at a considerable distance from each other, although it is most common to find these smaller flocks on the skirts or at no great distance from the main body. After the young have begun to take the water in the Spitzbergen sea, they gradually direct their course to the outside streams, where they are often taken in considerable numbers on warm sunny days. When able to provide for themselves, the females gradually leave them and join the males in the north, where they are hunted by the sealers in the months of May and June; and it is especially during the latter month that the females are seen to have joined the males; for at the "old-sealing" (as this is called) in May, it has often been remarked that few or no males are seen in company with the females. Later in the year, in July, there are seen, between the parallels of 76° and 77° N., these flocks of Seals, termed by Scoresby "Seals' weddings;"

and I have found that they were composed of the old males and females and the *bluebacks*, which must have followed the old ones in the north and formed a junction with them some time in June. There is another opinion, that the old females remain and bring their young with them north; but all our facts are against such a theory (*Wallace*).

These migrations may vary with the temperature of the season, and are influenced by it; it is possible that in the Spitzbergen sea as the winter approaches they keep in advance of it and retreat southward to the limit of perpetual ice, off the coast of Greenland, somewhere near Iceland, where they spend the winter. We are, however, at a loss regarding the winter habits of these Seals in that region; here no one winters, and there are no inhabitants to note their migrations and ways of life. Different is it, however, on the Greenland shores of Davis's Strait, where in the Danish settlements the Seals form, both with the Whites and Eskimo, the staple article of food and commerce, and accordingly their habits and arrival are well known and eagerly watched. The *Atarsoak*, as it is commonly called by the Eskimo, the "Svartsidede Sælhund" (Black-sided Sealhound) of the Danes, is the most common Seal in all South Greenland. It is equally by this Seal that the Eskimo lives, and the "Kongl. Grönlandske Handel" make their commerce. In South Greenland when the Seal generally is talked of, or a good or bad year spoken about, everybody thinks of this Seal; on the other hand, in North Greenland *Pagomys foetidus* and *Callocephalus vitulinus** are the most common. These last two species are the only Seals which can be properly said to have their home in Greenland, affecting ice-fjords and rarely going far from the coast. This is not the case with *P. groenlandicus*; at certain times of the year they completely leave the coast; therefore the Seal-hunting in South Greenland is more dependent upon contingencies than in North Greenland. This Seal arrives regularly in September in companies travelling from the south to north, keeping among the islands; occasionally at this time individuals detach themselves from the drove and go up the inlets. The Seal at this period is fatter, and continues so until the winter time. In October and November is the great catching, lessening in December. Very few are seen in January, and in February almost none; but regularly towards the end of May they return to the south of Greenland, and in June further north. The Seal is at this time in very poor condition, and remains for the most part in the fjords. For the second time they disappear in July, again to return regularly in September†. It is therefore seen that this Seal regularly comes and goes twice a year.

* I was always under the impression that this Seal was rather rare; but as the return of its capture is not given separately from the former, it is impossible to say accurately.

† This varies a little with latitude &c.; e. g. this Seal leaves the vicinity of Jakobshavn ice-fjord about the middle of July or beginning of August, and comes back in October very fat. In August and September there are none on that part of the coast.

Every one knows when it commences its migration from the south to the north, but nobody knows where the Seal goes to when it disappears off the coast. Between the time they leave the coast in the spring and return in the summer they beget their young; and this seems to be accomplished on the pack-ice a great distance from land*, viz. in the Spitzbergen sea. It is at this period that the Seal-ships come after them, as referred to already. Of course a few stragglers occasionally do not leave the coast, and produce their young close to the land; but such exceptions do not at all affect the rule laid down. It is a very familiar fact that round the Spitzbergen seas in April the sealers get the best catch. At this season they accumulate in immense numbers on the pack and can be killed *en masse*; but Dr. Rink cannot believe that in this time the Seals could migrate from the west coast of Greenland to Spitzbergen, the distance being too great. In support of this argument, it is pointed out that in the winter the Seal goes in the opposite direction to that of Spitzbergen, and cannot be seen in the northern parts of Davis's Strait or Baffin's Bay; it is possible therefore, he thinks, that the Seals of Baffin's Bay go in the spring down the west side of Davis's Strait to Newfoundland and Labrador, and supply the bulk of those killed there at that season, that in the winter they cross Davis's Strait and beget their young in that region, and after this cross again to the southern portion of Greenland. One would think that if the Seals came from Spitzbergen there would at this season be great numbers met on the passage round Cape Farewell. At other seasons of the year it is certainly the abundance or otherwise of their food which determines which way the Seal will take. In June the Seals go to feed on fish up the fjords; but what way they go in July, and where they may be in August, is still a matter of doubt. It is often argued in Greenland that in the "old times" Seals were more numerous than now, and that the great slaughter by the European sealers in Spitzbergen and Newfoundland has decreased their numbers on the shores of Greenland. The worthy Inspector of south Greenland therefore rejoices that the recent failures of the Seal-hunting in the former localities will have a tendency to again increase their numbers in Davis's Strait and Baffin's Bay, and thereby bring an increase of prosperity to his hyperborean subjects.

Economic value and hunting.—To the Greenlander this Seal is of vast importance for its oil, flesh, and hide. One full-grown animal will weigh on an average about 230 lbs., of which the skin and blubber weigh 100 lbs., and the meat 93 lbs., the remainder being the head, blood, and entrails. The edible parts may therefore be said to reach the amount of 100 lbs.; but this weight also includes the bones. The blubber of one at the latter part of the year would probably fill about one-third of a cask, but would not yield over a fourth part of that quantity when the animals return in the spring after procreating. The yearly catch in the Danish settlements is estimated at 36,000†.

* Rink, *lib. cit.*, et O. Fabricius in Nat. Selsk. Skrift. l. c.

† *Fide* Rink, l. c.

(4) *PHOCA BARBATA*, O. Fab.*Callocephalus barbatus*, F. Cuv.*Phoca leporina*, Lepech. ?*Callocephalus leporinus*, F. Cuv.

Popular names.—*Hafert skül* (Swedish)*; *Ajne* (Lapp); *Ursuk* (so written by Fab., but in north Greenland always pronounced *oo-sook*)† (Greenland). It is also called *Takamugak*; but I never heard the term applied; so that it must be rarely used.

What the "great Seals" of Pennant and other authors are has yet to be investigated; they were originally all set down to be this species, but are now generally supposed to belong to the Grey Seal (*Halichoerus grypus*). The skeleton in the Edinburgh museum at once decides that the *Haaffish* of Shetland and Orkney, which Dr. Fleming referred to *P. barbata*, belongs to the former species. The male is there called the "Bullfish." The *Tapvaist* of the western islands of Scotland appears also to belong to that species, *H. grypus* being a common Seal among the Hebrides.

Descriptive remarks &c.—Next to the Walrus this is the largest species of the order found in the northern seas. Perhaps, however, *H. grypus* may occasionally be found to equal it in size.

Geographical distribution &c.—This species has been so often confounded with the Grey Seal (*H. grypus*) and the Saddleback (*P. grænlandicus*) in different stages and coats, that it is really very difficult to arrive at anything like a true knowledge of its distribution. In a note at the end of the notice of this species I shall have something to say regarding the probability of its identity with the Ground-Seal of the English Seal-hunters of the Spitzbergen sea. On the coast of Danish Greenland it is principally caught in the district of Julianshaab a little time before the Klapmyds. It is not, however, confined to South Greenland, but is found at the very head of Baffin's Bay, and up the sounds of Lancaster, Eclipse, &c. branching off from the latter sea. The Seals seen by the earlier navigators being nearly always referred in their accounts to either *Phoca vitulina* or *P. grænlandicus* renders it at present almost impossible to trace its western range; it is, however, much rarer in the north than in the south of Davis's Strait. Accordingly the natives of the former region are obliged to buy the skin from the natives of the more southern settlements, as it is of the utmost value to them. This Seal comes with the pack-ice round Cape Farewell, and is only found on the coast in the spring. Unlike the other Seals, it has no *atluk*, but depends on broken places in the ice; it is generally found among loose broken ice and breaking-up floes.

Economic value &c.—This animal is of great importance to the Eskimo; they cut the skin into long strips for harpoon-lines—a *sine*

* Newton (*l. c.*) says that this is the Seal known to the Norse hunters about Spitzbergen as the *Stor-kobbe* (Great Seal), and less seldom *Blaa-kobbe* (the Blue Seal).

† *Oosook* also means blubber. The name may possibly refer to the size or fatness of the animal, and mean "the *big, fat Seal*."

quæ non of every *kayak*. Out of every hide can be got four or five lines; and these are cut in a circular form off the animal before it is skinned; after this the lines are dried. These *allunaks* are very strong, and are applied to all sorts of purposes in Greenland travelling. The blubber is more delicate in taste than any other, and is accordingly more prized as a culinary dainty, when such can be afforded. There are only from 400 to 600 caught annually (*Rink, l. c.*).

Talking with Spitzbergen sealers, I used to hear much about the "Ground-Seal," which formed a part of their prey. I was, however, unfortunate enough not to meet with a specimen, the spring of my visit to those seas being what is called "a bad sealing-year;" and subsequently during my various voyagings in Davis's Straits and Baffin's Bay I failed to find one which could be pronounced to be the "Ground-Seal" of the Seal-hunters. I find, again, among Dr. Wallace's notes, very particular mention made of this species; and he seems to consider it distinct from all other species found in the Northern seas, and distinguishes it by the MS. name of *Phoca grælandica major*. It does not appear that he was acquainted with *P. barbata*; or, at least, it is not mentioned among his otherwise exact memoranda. What I learned regarding it agrees very closely with what he has said about it; I therefore will quote from his manuscript *verbatim*:—

"*Phoca grælandica major*. It is the 'Ground-Seal' of the sealers. Like the last-mentioned species [*Pagomys fætidus*] few of them are taken by the sealers; and they are mostly seen by the Spitzbergen whalers in high latitudes, especially from the parallel of 76° N. lat. as far as Spitzbergen itself. The length of the male is about eight feet, and the female upwards of six feet. The colour and peculiar markings of the male very much resemble those of the male Saddleback; but in appearance it is more robust and of greater girth for its length, while upon the whole the shade of its colour is darker and yellowish, or coppery colour, more distinct. The full-grown female also, to a certain extent, corresponds to the female Saddleback, but with her colour of a deeper tawny yellow. Two females which I saw killed had still the dark-chestnut hue on the back which characterizes the younger Seals, but in addition had the peculiar round and oval spots of a still deeper shade impressed on a yellowish ground; it seems probable that they were in a transition stage in regard to colour, and that the tawny yellow would gradually gain predominance as they advanced in age towards maturity. Lepechin describes a Seal which frequents the White and Spitzbergen seas which bears a great resemblance to the female of this species; in fact his description of the *Phoca leporina*, or 'Hare of the Sea' of the Russians, almost identifies it with the Ground-Seal (female). The habits of the *P. grælandica major* and the localities it frequents very clearly differ from those of *P. grælandica*, Müll., which, as above mentioned, with the exception of size, it so much resembles. Its most common retreat is on the floe and fixed ice. I have seen herds, numbering upwards of two or three hundred, lying at their ease close besides their 'blow-holes,' down which they would immediately

dive when the hunter attempted to approach them. Occasionally they come to the borders of the ice, as in 1859 a few were secured in N. lat. 79° on a heavy stream of ice, and in about lat. 75° and 76° I have seen considerable numbers in the bottom of deep 'bights' of the ice lying on the 'sailing ice;' and, indeed, in open years, when ships can penetrate through towards Shannon Isle and the 'west land' (the east coast of Greenland), these localities are found to be peculiarly frequented by the 'Bladdernose' and 'Ground-Seals.'"

I should scarcely have hesitated to identify this Seal with *Pagophilus grœnlandicus*, had not Dr. Wallace so expressly stated that it is not that species; and the whalers, who are very familiar with the "Saddleback," have not only distinguished it from that species, but applied a very familiar distinctive name to it. It is just possible that it is the *Phoca leporina* of Lepechin, which is usually classed as a synonym of *Phoca barbata*, O. Fab. (though it ought to be remarked that in such a case Lepechin's name ought to take priority of Otho Fabricius's, the one having been applied in the year 1778, while the other was not published until 1780), or that *Phoca leporina* is a good species—a conjecture which without skulls it is impossible to be certain of. Wallace does not mention the saddle-shaped mark on the back of the male (nor do my notes mention it as being found) of the Ground-Seal; so that the principal stumblingblock is removed to its being classed with *Phoca barbata*. Lepechin, no doubt (*Acta Acad. Scient. Imp. Petropol.* 1778, vol. iv. p. 264, tabb. viii., ix.), says that there are no spots on his Seal; but Wallace remarks that these may go off as the animal increases in age. At all events it is a subject of regret that a skull, which would have at once settled the point, was not brought. Leaving England very shortly after receiving these notes, and arriving home myself, I was unable to obtain a specimen. Again this spring, on taking up the subject of the Greenland Seals anew, I was so puzzled with this "Ground-Seal" that I had determined to make a short trip to the Spitzbergen sea again with a view to obtaining specimens, but, owing to an unforeseen accident, could not accomplish my purpose. I have, however, been promised that next year specimens shall be brought me. My experience, however, of these promises does not lead me to build any great expectations thereon; however, until that time at least, the specific determination of the "Ground-Seal" must, I fear, remain in abeyance.

(5) *HALICHÆRUS GRYPUS*, O. Fab.

Phoca grypus (den Krumsnudedede sæl), O. Fab.

Halichærus griseus, Nilss.

Halichærus grypus, Nilss.

Phoca gryphus, Licht.

Phoca halichærus, Thienem.

Phoca thienemanni, Less. (young).

Phoca scopulicola, Thienem. (young, *vide* Gray).

Popular names.—*Grey Seal* (English naturalists); *Graskül* (or *Grey Seal* of the Scandinavian naturalists); *Ståtskål* (*Edm. l. c.*);

Graskül (Swedish); *Sjöskül*, *Utskärsskül*, and *Krumnos* (various Scandinavian local names); *Tapvaist?* (western islands of Scotland); *Haaffish* (northern islands of Scotland).

General remarks.—The Grey Seal has no doubt been frequently confounded with other species, particularly *Phoca barbata* and the female of *Pagophilus grænlændicus*.

It does not seem to frequent the high seas, though possibly this species may be confounded with the "Ground-Seal" and some forms of the "Saddleback." It is said to produce on the coast of Sweden in February, and to have one pup at a birth, of a white colour, which attains the dark-grey colour of the adult species in about fourteen days. In 1861, a little south of Disco Island, we killed a Seal the skull of which proved it to be of this species; and again this summer I saw a number of skins in Egedesminde and other settlements about Disco Bay which appeared to be of this species. Though the natives do not seem to have any name for it, the Danish traders with whom I talked were of opinion that the *Graskül*, with which they were acquainted as an inhabitant of the Cattedgat, occasionally visited South and the more southerly northern portions of Greenland with the herds of *Atak* (*P. grænlændicus*).

The skull to which I refer, though carefully examined at the time, was afterwards accidentally destroyed by a young Polar Bear, which formed one of our ship's company on that northern voyage; therefore, though perfectly convinced of its being entitled to be classed as a member of the Greenland fauna, I am not in a position to assert this with more confidence than as being a very strong probability. It should be carefully looked for among the herds of *P. grænlændicus* when they arrive on the coast. Its hunting forms nowhere an important branch of industry; it is, however, killed on the Scandinavian coasts, at various places, where it is most abundant. A large Grey Seal about eight feet in length will yield (the Swedes say) about 12 hspunds of blubber, equal in value to 36 rigsdaler banco (Swedish); and the hide, which is as large as an ox-hide, will bring the value of such a Seal up to the sum of 60 rigsdaler banco (Swedish)*. I have seen and examined this Seal in various collections, and have seen it alive on the coasts of the Cattedgat, &c., and among the northern islands of Scotland, but can add nothing of additional value to the excellent account of Nilsson in his 'Skandinaviske Fauna' (Forsta Delen, Däggdjuren, 1847), pp. 298–310.

(6) *TRICHECHUS ROSMAREUS*, Linn.

Trichechus rosmarus, Linn.

Rosmarus arcticus, Pall.

Trichechus obesus et *T. divergens*, Ill. (*vide* Gray).

Odobænus rosmarus (L.), Sundeval, Uebers. der Verhandl. der Akad. der Wiss. 1859, p. 441.

* In the *kjökkenmødding* of Denmark, in company with remains of the *Castor fiber* and *Bos primigenius* are found those of *Halichærus grypus*, showing it to have been at one time sufficiently abundant to form part of the food of the primitive inhabitants of Scandinavia.

Popular names.—*Sea-horse* (English sailors); *Walrus* and *Morse* (Russ., English naturalists and authors); *Hvalross* (Swedish and Danish); *Havhest* (Sea-horse) and *Rosmar* (Norse); *Morsk* (Lapp); *Awük* (Greenlanders and Eskimo generally): this word is pronounced *āōōk* and (like many savage names of animals) is derived from the peculiar sound it utters, a guttural *āōōk!* *āōōk!*

General descriptive remarks.—The general form of the Walrus is familiar enough. However, specimens in museums and the miserably woebegone cubs which have been already twice brought to this country but poorly represent the Walrus in its native haunts. The skin of the forehead (in stuffed specimens) is generally dried to the skull; while in the live animal it is full, and the cheeks tumid. The skin of old animals is generally wrinkled and gnarled. I have seen an old Walrus quite spotted with leprous-looking marks consisting of irregular tubercular-looking white cartilaginous hairless blotches; they appeared to be the cicatrices of wounds inflicted at different times by ice, the claws of the Polar Bear, or met with in the wear and tear of the rough-and-tumble life a Sea-horse must lead in N. lat. 74°. The very circumstantial account of the number of mystachial bristles given in some accounts is most erroneous; they vary in the number of rows and in the number in each row in almost every specimen. They are elevated on a minute tubercle, and the spaces between these bristles are covered with downy whitish hair. I have seen several young Walruses in all stages, from birth until approaching the adult stage, and never yet saw them of a black colour, and should have been inclined to look upon as unfounded the statement that they are so, had it not been for the high authority of its author*. All I saw were of the ordinary brown colour, though, like most animals, they get lighter as they grow old. Neither are the muffle, palm, and soles “hairy when young;” in one which I examined before it was able to take the water I saw no difference between it and its mother in this respect. The Walrus appears to cast its nails; for in several which I examined about the same time (viz. in August) most of the nails which had been developed were gone, and young ones beginning to appear. The dentition has been examined by M^cGillivray†, Rapp‡, Owen§, Peters||, &c.; so that I need only touch upon that. In an aged male which I examined at Scott’s Inlet, Davis’s Strait, August 3, 1861, the small fifth molar on the right side of the upper jaw still remained, but loose; on the other side the corresponding alveolus was not yet absorbed.

Shaw (Gen. Zool. i. p. 234) has figured two species of this animal, and inferred their existence principally from the differences in the representations given by Johnston and Cook. Curiously enough, Pontopiddan tells us that the Norwegian fishermen in his day had

* Gray, Cat. Seals and Whales in Brit. Mus. 2nd ed. p. 36.

† *Loc. cit. antea.*

‡ Bull. Sc. Nat. xvii. p. 280.

§ Proc. Zool. Soc. 1853, p. 103.

|| Monatsber. der Akad. der Wiss. zu Berlin, Dec. 1864, p. 685; transl. Annals Nat. Hist. xv. (3rd series) p. 355.

an idea that there were two species. The whalers declare that the female Walrus is without tusks; I have certainly seen females without them, but, again, others with both well developed. In this respect it may be similar to the female Narwhal, which has occasionally no "horn" developed; I do not think, however, that there is more than one species of Walrus in the Arctic regions or elsewhere.

Habits and food.—On the floes, lying over soundings and shoals, the Walruses often accumulate in immense numbers, and lie huddled upon the ice. More frequently, in Davis's Strait and Baffin's Bay, they are found floating about on pieces of drift ice, in small family parties of six or seven; and I have even seen only one lying asleep on the ice. Whether in large or small parties, one is always on the watch, as was long ago observed by the sagacious Cook: the watch, on the approach of danger, will rouse those next to them; and the alarm being spread, presently the whole herd will be on the *qui vive*. When attacked, unlike the other Seals (unless it be the *Cystophora*), it will not retreat, but boldly meet its enemies. I was one of a party in a boat which harpooned a solitary Walrus asleep on a piece of ice. It immediately dived, but presently arose, and, notwithstanding all our exertions with lance, axe, and rifle, stove in the bows of the boat; indeed we were only too glad to cut the line adrift and save ourselves on the floe which the Walrus had left, until assistance could reach us. Luckily for us the enraged Morse was magnanimous enough not to attack its chop-fallen enemies, but made off grunting indignantly, with a gun-harpoon and new whale-line dangling from its bleeding flanks. Its *atluk* or breathing-hole is cleanly finished, like that of the Seals, but in much thicker ice, and the radiating lines of fracture much more marked*. The food of the Walrus has long been a matter of dispute, some writers, such as Schreber, Fischer, and others, going so far as to deny its being carnivorous at all, because Fischer saw in the stomach of one "long branches of seaweed, *Fucus digitatus*;" and Mr. Bell seems even to doubt whether the small number of grinding-teeth, and more especially their extreme shortness and rounded form, are not rather calculated to bruise the half-pulpy mass of marine vegetables than to hold and pierce the fish's scaly cuirass. I have generally found in its stomach various species of shelled Mollusca, chiefly *Mya truncata*, a bivalve very common in the Arctic regions on banks and shoals, and a quantity of green slimy matter which I took to be decomposed Algæ which had accidentally found their way into its stomach through being attached to the shells of the Mollusca of which the food of the Walrus chiefly consists. I cannot say that I ever saw any vegetable matter in its stomach which could be decided to have been taken in as food, or which could be distinguished as such. As for its not being carnivorous, if further proof were necessary I have only to add that whenever it was killed near where a Whale's carcass had been let

* There are many interesting details of the habits of the Walrus in Kane's 'Arctic Explorations' and 'First Grinnel Expedition,' in Hayes's 'Boat Journey' and 'Open Polar Sea,' and in Belcher's 'Last of the Arctic Voyages.'

adrift its stomach was invariably found *crammed* full of the *krang* or flesh of that Cetacean. As for its not being able to hold the slippery cuirass of a fish, I fear the distinguished author of 'The British Mammalia' is in error. The Narwhal, which is even less fitted in its want of dentition for an ichthyophagous existence, lives almost entirely upon platicthyoid fishes and Cephalopoda. Finally the *experimentum crucis* has been performed, in the fact that fish have been taken out of its stomach; and a most trustworthy man, the captain of a Norwegian sealer, has assured me (without possessing any theory on the subject) that he has seen one rise out of the water with a fish in its mouth*. In its stomach I have often seen small stones or gravel; and round its *atluk* considerable quantities are always seen: this is a habit which it possesses in common with *Phoca barbata* and even *Beluga catodon*. These stones may be taken in accidentally, but still they may serve some purpose in its digestive economy.

Next to man, its chief enemy is the Polar Bear. The Eskimo used to tell many tales of their battles; and though I have never been fortunate enough to see any of these scenes, yet I have heard the whalers give most circumstantial accounts of the Walrus drowning the Bear, &c. These accounts may be taken merely for what they are worth; but still this shows that they are not wholly confined to Eskimo fable, and ought therefore not to be hastily thrown aside. There is no doubt, however, that the Bear and the Walrus are (like all the Pinnipedia) but indifferent friends. Another pest I believe I discovered upon this animal for the first time, in 1861, in the shape of two undescribed species of *Hæmatopinus*, one invariably infesting the base of the mystachial bristles, and the other its body. I also found the Seals of Davis's Strait much troubled with another species (*Hæmatopinus phocæ*, Lucas) †. I have seen the Walrus *awuking* loudly on the ice, tumbling about, and rushing back from the water to the ice, and from the ice to the water, and then swimming off to another piece, and repeating the same operation as if in pain. A few hours afterwards I saw a flock of *Saxicola ænanthe* (it was on a land-floe, close to the Fru Islands) alight on the spot. On going over, I found the ice speckled with one of these species of *Hæmatopinus*, on which the birds had been feeding; and the unfortunate Walrus seems to have been in the throes of clearing itself of these troublesome friends, after the approved fashion. Subsequently I have seen these and other small birds alight on the back of the Walrus to peck at these insects, just as crows may be seen sitting on the backs of cattle in our fields. Its tusks it apparently uses to dig up the molluscous food on which it chiefly subsists; and I have seen it also use them to drag up its huge body on to the ice. In moving on shore it aids its clumsy progression by their means.

* The young specimen which died this spring in the Society's Gardens was in a very poor condition, and afforded but an indifferent notion of the lion-like *Awuk* which destroyed our boat in Scott's Inlet.

† Proc. Roy. Phys. Soc. Edin. 1863.

The Walrus, being an animal of considerable cerebral development, is capable of being readily domesticated. For many years past the Norwegians have frequently brought specimens to different Scandinavian ports; and two have reached England, and survived a short time. More than a century ago one of these animals reached England. De Laet*, quoting from Edward Worst, who saw one of them alive in England which was three months old and had been brought from Nova Zembla, says:—"Every day it was put into water for a short time, but it always seemed happy to return to dry ground. It was about the size of a calf, and could open and shut its nostrils at pleasure. It grunted like a wild Boar, and sometimes cried with a strong deep voice. It was fed with oats and millet, which it rather sucked in than masticated. It was not without difficulty that it approached its master; but it attempted to follow him, especially when it had the prospect of receiving nourishment at his hand." Its naturalization in our Zoological Gardens having therefore become a subject of considerable interest, I cannot better conclude these notes on the habits of the Walrus than by describing a young one I saw on board a ship in Davis's Strait, in 1861, and which, had it survived, was intended for the Zoological Society.

It was caught near the Duck-Islands off the coast of North Greenland, and at the same time its mother was killed; it was then sucking, and too young to take the water, so that it fell an easy prey to its captors. It could only have been pupped a very few hours. It was then 3 feet in length, but already the canine tusks were beginning to cut the gums. When I first saw it, it was grunting about the deck, sucking a piece of its mother's blubber, or sucking the skin which lay on deck, at the place where the teats were. It was subsequently fed on oatmeal and water and pea-soup, and seemed to thrive upon this *outré* nourishment. No fish could be got for it; and the only animal food which it obtained was a little freshened beef or pork, or Bear's flesh, which it readily ate. It had its likes and dislikes, and its favourites on board, whom it instantly recognized. It became exceedingly irritated if a newspaper was shaken in its face, when it would run open-mouthed all over the deck after the perpetrator of this literary outrage. When a "fall"† was called it would immediately run at a clumsy rate (about one and a half or two miles an hour), first into the surgeon's cabin, then into the captain's (being on a level with the quarterdeck), apparently to see if they were up, and then out again, grunting all about the deck in a most excited manner "*awuk! awuk!*" When the men were "sallying"‡, it would imitate the operation, though clumsily, rarely managing to get more than its own length before it required to turn again. It lay

* Description des Indes Occidentales, *apud* Buffon.

† When a boat gets "fast" to a Whale, all the rest of the crew run shouting about the decks, as they get the other boats out, "a fall! a fall!" It is apparently derived from the Dutch word "Val," a Whale.

‡ When a ship gets impeded by loose ice gathering around it, the crew rush in a body from side to side so as to loosen it, by swaying the vessel from beam to beam. This is called "sallying the ship."

during the day basking in the sun, lazily tossing its flippers in the air, and appeared perfectly at home and not at all inclined to change its condition. One day the captain tried it in the water for the first time; but it was quite awkward and got under the floe, whence it was unable to extricate itself, until, guided by its piteous "*awuking*," its master went out on the ice and called it by name, when it immediately came out from under the ice and was, to its great joy, safely assisted on board again, apparently heartily sick of its mother element. After surviving for more than three months, it died, just before the vessel left for England. As I was not near at the time, I was unable to make a dissection in order to learn the cause of death.

Regarding the debated subject of the attitude of the Walrus* I am not in a position to say more than my own notes taken at the time will allow of; I saw none last summer, and I am afraid to trust to a treacherous memory on such a matter. The entries in my diary, however, are explicit enough on the point so far as relates to this young individual; and I presume that its habits are to be taken as a criterion of those of the old one. When asleep in the upturned cask which served it for a kennel, it lay with both fore and hind flippers extended. When *walking* it moved like any other quadruped, but with its *hind flippers heel first*, the *fore flippers* moving in the ordinary way, *toes first*. I am aware that this is in contradiction to the observations of an eminent zoologist; I, however, merely copy what was expressly noted down at the time. It ought also to be mentioned that, in the excellent figures of the Walrus taken by the artist of the Swedish Expedition to Spitzbergen†, under the direction of such well-informed naturalists as Torell, Malmgren, Smitt, Goes, Blomstrand, &c., the fore flippers are represented as rather doubled back, and the hind flippers extended.

Geographical distribution.—The Walrus is an animal essentially of the coast, and not of the high seas. Whenever it is found at any distance from land it is almost always on shoals, where it can obtain the Mollusca which form the bulk of its food. The Seal-hunters never see it, nor is it found among the flocks of Seals on the Spitzbergen and Jan Mayen pack-ice. It is found all along the circumpolar shores of Asia, America, and Europe, sometimes extending into the subpolar, and even stragglers find their way into the temperate regions of America, Asia, and Europe. It is not unlikely that it may even be found in the Antarctic regions. On the north-west coast of America I have known it to come as far south as 50° N. lat. The Indians along the shores of Alaska (lately Russian America) carve the teeth into many fanciful ornaments‡; but we should be liable to

* Gray, Proc. Zool. Soc. 1853, p. 112.

† *Lib. cit.*, facing p. 169 (chromolithograph), and head p. 308, both drawn by Herr von Yhlen.

‡ My friend Mr. A. G. Dallas, late Governor-General of the Hudson's Bay Company's Territories, has a bust of himself beautifully carved out of a Walrus-tooth, by a Tsimpshian Indian at Fort Simpson, B.C.

fall into an error from seeing these teeth among the natives so far south, if we did not know that they are bartered from the more northern tribes. On the American Atlantic seaboard they come as far south as the Gulf of St. Lawrence, and stragglers even further. In Lord Shuldham's day they assembled on the Magdalene Islands in that gulf, to the number of 7000 or 8000; and sometimes as many as 1600 were killed (or rather slaughtered) at one onset by the hunters who pursued them*. It has been killed several times on the British coast; and I suspect that it is not an unfrequent visitor to our less-frequented shores. Perhaps not a few of the "Sea-horses" and "Sea-cows" which every now and again terrify the fishermen on the shores of the wild western Scottish lochs, and get embalmed among their folklore, may be the Walrus. In addition to those already recorded I know of one which was seen in Orkney, in 1857, and another the Shetland fishermen told me had been seen in the Nor' Isles about the same time. There is, however, some ground for believing that at one time it was, if not a regular member of our fauna, at least a very frequent visitor. Hector Boece (or Boethius, as his name has been Latinized), in his quaint 'Cronikles of Scotland,' mentions it towards the end of the fifteenth century as one of the regular inhabitants of our shores; and old Roman historians describe the horse-gear and arms of the ancient Britons as ornamented with bright polished ivory. It is difficult to suppose that this could have been anything else but the carved tusks of the Walrus. It is not, however, without the bounds of possibility that this might have been some of the African Elephants' ivory which the Phœnician traders bartered for tin with the natives of the Cassiterides. Except for its occasional movements from one portion of its feeding-ground to the other, the Walrus cannot be classed among the migratory animals. In Greenland it is found all the year round, but not south of Rifkol, in lat. 65°. In an inlet called Irsortok it collects in considerable numbers, to the terror of the natives who have to pass that way; and not unfrequently kayakers who have gone "express," have to return again, being afraid of the threatening aspect of "Awuk." A voyager has well remarked that "Awuk" is the lion of the Danish Eskimo; they always speak of him with the most profound respect! It has been found as far north as the Eskimo live, or explorers have gone. On the western shores of Davis's Strait, it is not uncommon about Pond's, Scott's, and Home Bays, and is killed in considerable numbers by the natives. It is not now found in such numbers as it once was; and no reasonable man who sees the slaughter to which it is subject in Spitzbergen and elsewhere can doubt that its days are numbered. It has already become extinct in several places where it was once common. Its utter extinction is a foregone conclusion. Von Baer has studied its distribution in the Arctic sea; and, so far as they go, his memoir and map may be relied on; both, however, require considerable modifications†.

* *Apud* Pennant, 'Arctic Zoology,' p. 149.

† *Mémoires de l'Académie de St. Pétersbourg*, t. iv. p. 97, t. 4 (1836).

Economic value and hunting.—The ivory tusks of the Walrus always command a good price in the market; and the hides are held in high value as an article of commerce; they are used as material for defending the yards and rigging of ships from chafing. It is also occasionally used for strong bands in various machinery, carriage-making, &c. The flesh tastes something like coarse beef. The whalers rarely or ever use it, having a strong prejudice against it in common with that of Seals and Whales. The Walrus-hunters in Spitzbergen almost exist upon it; and the Eskimo high up in Smith's Sound look upon it as their staple article of food. The American explorers who wintered there soon acquired a liking for it. Accordingly the "Morsk" has been hunted in northern regions from a very early period. The Icelandic Sagas (such as the *Speculum regale* &c.) speak of it as *Rostungur*; and there is said to be a letter in the library of the Vatican proving that the old Norse and Icelandic colonists in Greenland paid their "Peter's Pence" in the shape of Walrus-tusks and hides. However, in 890, as far back as the days of King Alfred of England, Æthere, "the old sea-captain who dwelt in Helgoland," gave a most circumstantial account to that monarch (who wrote it down in his *Orosius*) of slaying, he and his six companions, no less than "three score Horse-whales" in one day. At the present period it is principally captured in Spitzbergen by Russian and Norwegian hunters, who visit that island for the purpose. In Danish Greenland, though it was once so abundant that the principle article of trade with Europe, in the days of Erik Raude's colonists, was the tusks of this animal, it may be said now-a-days, so far as its hunting or commercial value is concerned, to be extinct. There are never more than a few killed yearly, and it frequently happens that a year passes without any at all being killed within the limits of the Danish trading-posts. It is more than probable that they never were abundant in South Greenland, but that the old colonists went north in pursuit of them. From the Runic column found on the island of Kingatarsoak in 73° N. lat., we know that these enterprising rovers did sail far north; and it is more than reasonable to suppose that it was on one of these Walrus-hunting expeditions that this monument was erected. Indeed so few are now killed in Danish Greenland (whether through degeneracy of the hunters or scarcity of the Walrus it is scarcely worth inquiring too closely) that as, notwithstanding all the appliances of European civilization now accessible to the natives, ivory cannot be dispensed with in the manufacture of Eskimo implements of the chase, its tusks have sometimes to be reimported from Europe into Greenland. North of the glaciers of Melville Bay, the hardy Arctic highlanders, aided by no *kayak* or rifle, but with a manly self-reliance, enfeebled by no bastard civilization engrafted upon their pristine savagedom, with their harpoon and *allunaks* still boldly attack the Walrus as he lies huddled upon the ice foot; and thereby the native supplies to his family the food and light which make tolerable the darkness of the long Arctic night of Smith's Sound. The whalers kill a few annually, striking them, as they do the Whale, with the gun-harpoon, and killing them with

steel lances* ; but even then it is dangerous work, and not unfrequently brings the hunter to grief. I have been one of a party who have killed several in this manner, and have also seen them captured by the wild Eskimo at Pond's Bay, on the western shores of Davis's Strait, after the aboriginal fashion ; but as this has been excellently described by Kane† and Hayes‡ in their different narratives, I will not trouble you with any details. The Swedish expedition to Spitzbergen §, and Lord Dufferin|| and Mr. Lamont¶, have given many particulars of its capture by the Spitzbergen hunters. Baron Wrangell** has supplied an account of its chase on different portions of the Siberian coasts ; and Nilsson†† and Keilhau‡‡ complete the list of the principal writers regarding its hunting and commercial importance generally. As I can add nothing of any novelty to their descriptions, you will therefore allow me to refer to them for the particulars which otherwise might have been given under this paragraphic heading.

(7) *CYSTOPHORA CRISTATA* (Erxleb.), Nilss.

Phoca cristata, Erxleb.

Phoca leonina, O. Fab. (non Linn.).

Phoca mitrata, Milbert (Cuv.).

Phoca leucopla, Thienem.

Phoca cucullata, Bodd.

Phoca dimidiata, Cretzsch. (*vide* Rüpp.).

Phoca isidorei, Less.

Mirounga cristata, Gray.

Cystophora cristata, Nilss.

Cystophora borealis, Nilss.

Stenmatopus cristatus, F. Cuv.

Stenmatopus mitratus, Gray.

Popular names.—“*Bladdernose*” or, shortly, “*Bladder*” (of northern sealers, Spitzbergen sea) ; *Klappmysta* (Swedish) ; *Klakkekal*, *Kabbutskobbe* (Northern Norse) ; *Kiknebb* (Finnish) ; *Avjor*, *Fatte-Nuorjo*, and *Oaado* (Lapp) ; *Klapmyds* (Danish ; hence Egede, Grönl. p. 46 : the word *Klapmyssen*, used by him on page 62 of the same work, Engl. trans., and supposed by some commentators to be another name, means only *the* *Klapmyds*, according to the Danish orthography) ; *Klapmütze* (German ; hence Crantz, Grönl. i. p. 125 : I have also occasionally heard the English sealers call it by this

* The ordinary rifle is of comparatively little use in hunting this monster Seal. Musket-balls will scarcely affect their pachydermatous side ; and I have often seen leaden balls flattened on their skulls ! I have more than once seen it snap a steel lance in two with its powerful molars.

† Arctic Explorations.

‡ ‘The Open Polar Sea,’ and ‘An Arctic Boat-voyage.’

§ Svenska Expeditionen til Spetsbergen år 1861, &c., pp. 168-182.

|| Letters from High Latitudes.

¶ Seasons with the Sea-horses.

** Nordküste von Sibirien, ii. pp. 319, 320.

†† *Lib. cit.* i. pp. 320-325.

‡‡ Reise i Ost- og Vest-Finnmarken &c. pp. 146-149.

name, apparently learnt from the Dutch and German sailors). All of these words mean the "Seal with a cap on," and are derived from the Dutch, who style the frontal appendage of this species a *mutz* or cap, hence the Scotch *mutch*. This prominent characteristic of the Seal is also commemorated in various popular names certain writers have applied to it, such as *Blas-Skül* (Bladder-Seal) by Nilsson (Skand. Faun. i. p. 312), *Hooded Seal* by Pennant (Synopsis, p. 342), *Seal with a caul* by Ellis (Hudson Bay, p. 134), in the French vernacular *Phoque à capuchon*, and in the sealers' name of *Bladdernose*, *Neitersoak* (Greenland), and *Kakortak* (when two years old).

Descriptive remarks.—This is one of the largest Seals in Greenland, and in its adult state is at once distinguished by the curious bladder-like appendage to its forehead, which is connected with the nostrils and can be blown up at will*. This has been well described by Dr. Dekay in the 'Annals of the Lyceum of Natural History of New York,' vol. i.; and with his observations I perfectly agree. The eye of this Seal is large, and of a glassy black colour with a dark-brown iris. It has, like all the family, no external auricle; and the orifice of the ear is very small. The body is long and robust; its colour on the upper or dorsal aspect is dark chesnut or black, with a greater or less number of round or oval markings of a still deeper hue. The hair is long and somewhat erect, and the thick fur-like coating next the skin is often tinged with a reddish coppery colour. The head and flippers are of the same dark chesnut-colour. The pectoral and ventral regions are of the same dark-grey or tarnished-silvery hue which has been described in the *P. groenlandicus*.

Habits &c.—The Bladdernose is not only one of the largest, but the fiercest of the northern Seals; and as its capture requires some skill, it is only the most expert *kayaker* that can procure any. It will chase a man and bite him, besides making a great commotion in the water. Therefore the hunt is very dangerous to a man in such a frail craft as the Greenland *kayak*. Like all Seals, during the rutting-time, there are great battles on the ice between the males; and the roaring is said to be sometimes so loud that it can be heard four miles off. The skin is often full of scratches from these fights; but as long as the memory of the oldest inhabitant of South Greenland extends, only one man in the district of Julianshaab (where they are chiefly captured) has been killed by the bite of the Klapmyds, though not unfrequently the harpoon and line have been broken. The hunting is not so dangerous, however, within late years, as it has been effected by the rifle from the ice; but when the Seal has not been killed outright, the hunter goes out in his kayak and despatches it with the lance.

With regard to the favourite localities of this species of Seal, Crantz and the much more accurate Fabricius disagree—the former affirming that they are found mostly on great ice islands where they

* It is often asserted by the sealers that this "bladder" is a sexual mark, and is not found on the female. I do not think there is any just ground for this belief.

sleep in an unguarded manner, while the latter states that they delight in the high seas, visiting the land in April, May, and June. This appears contradictory and confusing; but in reality both authors are right, though not in an exclusive sense. The hood appears to be an organ of defence from any stunning blow on the nose, the most vulnerable place in a Seal. It only inflates this "bladder" when irritated. The sealers look upon it as a reservoir of air when under the water*. The story which Fabricius relates about its "shedding tears abundantly" when surprised by the hunter is, I suspect, only an Eskimo tale of wonder. I could find no one credulous enough to believe it; nor during the whole time I passed among the seal-hunters of the far north did I find that any one esteemed my credulity great enough to venture any such story on me.

It is affirmed, curiously enough, that the *Bladdernose* and the *Saddleback* are rarely or ever found together; they are said to disagree. At all events, the latter is generally found on the inside of the pack, while the former is on the outside. The latter is also much more common than the *Bladdernose*.

Procreation and young.—At first the young *Bladdernose* is pure white: during the first year, as it grows older and increases in size, a grey tinge appears; and gradually it assumes a deeper and deeper hue of the same colour. I cannot confirm the remarks of Otho Fabricius, that during the second year (when they are called *Kakortak*) they are snow-white, with a straight line of brown on their backs. Neither I nor any other Seal-hunter with whom I have talked ever saw such a Seal in the Greenland sea; and it appears to be equally unknown in Greenland. Mr. Tegner, who passed several years in a South-Greenland settlement, subsisting almost entirely by the catching of this Seal, informs me that he never heard of such an animal. It is therefore just possible that Fabricius may have been mistaken, though the characteristic marks mentioned are so prominent that it is hardly probable that he could have been in error. In fact, the majority of the "Bladdernoses" which I have seen were about two or three years old, and appeared, by a slow and gradual change, becoming similar to the old and mature Seals, by turning darker and darker in their colours, and assuming the roundish oval markings, while at the same time they were increasing in size. This species seems to produce its young earlier than *P. groenlandicus*.

Geographical distribution and migrations.—The *Bladdernose* is found all over the Greenland seas, from Iceland to Greenland and Spitzbergen, but chiefly in the more southern parts. The first Seals which we saw and killed on the making of the ice early in March 1861, were chiefly young "bladders" which had not yet got the hood-like appendage. It even finds its way to the temperate shores

* Mr. J. Walker, Master of the screw-steamer 'Wildfire,' and one of the most intelligent of the whaling captains, assured me (June 1861), from his own observation, that this Seal lies frequently on the top of elevated pieces of ice, and that the use of this hood, or "bladder," appears to be to raise it up with sufficient momentum to the surface (by filling it with air) so as to spring again on to the ice.

of Europe and America ; and rare stragglers now and then land on the shores of Britain, though it is by no means a member of our fauna proper. This Seal is not common anywhere. On the shores of Greenland it is chiefly found beside large fields of ice, and comes to the coast, as was remarked by Fabricius long ago, at certain times of the year. They are chiefly found in South Greenland, though it is erroneous to say that they are exclusively confined to that section. I have seen them not uncommonly about Disco Bay, and have killed them in Melville Bay, in the most northerly portion of Baffin's Bay. They are principally killed in the district of Julianshaab, and then almost solely in the most southern part, on the outermost islands from about the 20th of May to the last of June ; but in this short time they supply a great portion of the food of the natives, and form a third of the colony's yearly production. In the beginning of July the Klapmyds leaves, but returns in August, when it is much emaciated. Then begins what the Danes in Greenland call the "*magre klapmydsefangst*," or the lean-Klapmyds catching, which lasts from three to four weeks. Very seldom is a Klapmyds to be got at other places, and especially at other times. The natives call a Klapmyds found single up a fjord by the name of "Neriniartout," the meaning of which is "gone after food." They regularly frequent some small islands not far from Julianshaab, where a good number are caught. After this, they go further north, but are lost sight of, and it is not known where they go to (Rink, *l. c.*). Those seen in North Greenland are mere stragglers wandering from the herd, and are not a continuation of the migrating flocks. Johannes (a very knowing man of Jakobshavn) informed me that generally about the 12th of July a few are killed in Jakobs-havn Bay (lat. 69° 13' N.).

Economic value and hunt.—The Klapmyds yields, on the average, half a cask of blubber, and the dried meat of every Seal weighs about 24 Danish lbs. ; but this is not the whole Seal, which weighs about 200 lbs. The yearly catch in Greenland (Danish) is about 2000 or 3000*.

5. *Commercial Importance of the "Seal Fisheries."*

The Greenland (*i. e.* Spitzbergen) sealing fleet from the British ports meet about the end of February in Bressa Sound, off Lerwick, in Zetland ; it leaves for the north about the first week in March, and generally arrives at the ice in the early part of that month. The vessels then begin to make observations for the purpose of finding the locus of the Seals ; and this they do by crawling along the edge of the ice, and occasionally penetrating as far as possible between 70° and 73° N. lat., then continue sailing about until they find them, which they generally do about the first week of April. If they do not get access to them, they remain until early in May, when, if they intend to pursue the whaling in the Spitzbergen sea that summer, they go north to about 74° N. lat. to the "old sealing," or, further still (even to 81° N.), to the whaling. Most of them, however, if not successful

* Rink, *l. c.*

by the middle of April, leave for home, to complete their supplies in order to be off by the 1st of May to the Davis's Straits whale-fishery. During the months of March and the early part of April the sealers are subject to all vicissitudes of weather, calm and storm suddenly alternating, while the thermometer will stand for weeks at zero, or even many degrees below it.

The number of Seals taken yearly by the British and continental ships (principally Norse, Dutch, and German) in the Greenland sea when they get among them will average upwards of 200,000, the great bulk of which are young "saddlebacks," or, in the language of the sealer, "whitecoats." When they have arrived at their maximum quality, 80 generally yield a tun of oil; otherwise the general average is about 100 to the tun. In 1859 good oil sold for about £33 per tun; add to this the value of 100 skins at 5s. each, and the whole will amount to £58 sterling. From this simple calculation a very good estimate may be formed of the annual commercial value of the Greenland "Seal Fishery;" for, supposing 2000 tuns of oil to be about the annual produce, and assuming £58 as the value per tun inclusive of the skins, the whole produce of the fishery will amount to the yearly value of £116,000 sterling (*Wallace*). This, of course, does not take into calculation the produce the Danish Government derives from their colonies on the west coast of Greenland (which I notice under the head of each Seal), nor what the Russians derive from the coast of Spitzbergen and from the White Sea. The "fishery," however, is very precarious. Some years little or nothing is got, the ice being too thick for the ships to "get in to them." In one year it may happen that the fishery in the Spitzbergen Sea proves a failure while the Newfoundland one is successful. For some years past it has proved in the former sea almost a failure*. There seems, indeed, little doubt that the fishery must fail in course of time, as have the Seal- and Whale-fisheries in some other parts of the world; and if Seal-hunting is pursued with the energy it is at present, that day cannot be far distant. Some of the sealers laugh at this idea; but where is the enormous produce the South Seas used to yield, superior to anything ever heard of in the north. No doubt the South-Sea hunters said the same thing; and doubtless when the inhabitants of Smeerenberg, that strangest of all strange villages, saw the Whales sporting in thousands in their bays, and the oil-boilers steaming above the peaks of Spitzbergen, they laughed at the idea of their ever becoming scarce! Yet how false that idea has proved! for in our day the waters of those high northern seas are rarely troubled, even by a wandering Mysticete that perchance may have missed its way in making a passage from one secure retreat to another. So will it ultimately be with the Seals. Indeed some are even now of opinion that they are diminishing in numbers; at least they have evidently reached their zenith, as shown by statistics; and taking into

* It has been rather more successful in Newfoundland. This year (1868) up to the 28th of April 250,000 Seals had arrived at St. John and Harbour Grace. *Vide* a good account of the sealing by the continental vessels in Petermann's 'Geogr. Mittheil.' Feb. 1868.

consideration the appearance the young Seals presented on the ice in 1861, they did not approach the numbers reported to have been seen by sealers in many previous years. The South-Sea "fisheries" became extinct in fifteen years, and, making all allowance for the protection afforded to the Greenland Seals by the ice, and supposing the sealing prosecuted with the same vigour as at present, I have little hesitation in stating my opinion that, before thirty years shall have passed away, the "Seal-fishery," as a source of commercial revenue, will have come to a close, and the progeny of the immense number of Seals now swimming about in the Greenland waters will number but comparatively few. This event will then form another era in the northern fisheries.

3. Note on the Alleged Occurrence of the Rhinoceros in Borneo. By ANDREW MURRAY, F.L.S.

It is only lately that I have seen Dr. Gray's paper on the Rhinocerotidæ, published in the third part of the 'Proceedings' of this Society for 1867; and I should wish to be allowed to enter my caveat against the reception of one statement in it which is, I think, likely to mislead, namely, that the Rhinoceros is a native of Borneo.

Some time since I was informed by a friend that the theory by which I had attempted to account for the remarkable absence of all large Mammals, and the great scarcity of all but arboreal, aquatic, or aerial animals, in Borneo, was knocked on the head, for the Rhinoceros had now been actually found in it, and that all doubt as to the locality was set at rest by specimens having been sent to this country which, on examination, were found to belong to a new and distinct species. They not only had specimens of it, but, as Prince Hal said, "we can show it you here in the house"—the British Museum, to wit.

Of course in the face of such a stunning fact I had nothing for it but to eat my leek in silence, abandon my position, and endeavour to rally my disbanded and scattered ideas to the best of my ability.

The perusal of Dr. Gray's paper, however, not only reveals the source of my friend's information, but satisfies me that I have been too hasty in accepting it as correct.

Literally my friend's statement is quite borne out by Dr. Gray's paper. Dr. Gray says everything that he said; but I look in vain for any proof in support of it; and as any statement coming from a man of Dr. Gray's authority is likely to be accepted as *probatio probata*, I think it the more necessary to point out the insufficiency of the grounds on which his statement rests.

In the first place I observe that the sole evidence offered is that of a skull which "was purchased of a dealer, who said that he received it direct from Borneo." It does not follow, supposing the statement

to be quite true, that therefore the skull was that of an animal which *lived* in Borneo. A collector in the Malayan archipelago moving about from place to place, or a resident receiving curiosities from all sources, would have many things in his stores collected at various places; but it would never follow that they were all to be held to have been collected at the port from which they happened to be shipped home. It would be going a long way back to the infancy of collecting if we are to take the port of shipment as proof of the locality, and most of all in that archipelago, where different islands with different products lie so near to each other.

Next, before we can trust even the statement that it *had* been received direct from Borneo, we should require to know the name and reputation of the dealer. There are dealers who know the importance of accuracy in localities, and there are dealers who do not. There are dealers (such as Mr. Stevens) on whose word the utmost reliance can be placed, and there are others on whom none can be placed. Of the latter there are some whose word cannot be trusted without confirmation, simply because they are habitually careless; others are intentionally dishonest; and, so far as dealers are concerned, everything in this inquiry will depend on the character of the individual. We shall have plenty of Rhinoceroses offered from Borneo as soon as it is known that the locality will give them value. Dr. Gray should therefore have given the name of the dealer as a slight additional help to the expiscation of the truth; and others might then have been able to sift the statement, and trace the origin and history of the particular skull in question.

But, according to Dr. Gray, the skull has been found to belong to a different species from the Javan one. This is putting the case much too broadly. Dr. Gray says that it does; that is all; no one else does.

Not having seen the skull, and even if I had, not being competent to form a judgment on its osteological characters, I offer no opinion of my own on the value of Dr. Gray's species so far as based on them. But I have asked the opinion of one whose competence to pronounce on such questions none can dispute, viz. Professor Owen; and he informs me that "in his opinion the osteological characters on which Dr. Gray founds his *Tapirus laurillardii*, *Rhinoceros nasalis*, &c. are of no specific value; and in that opinion every European zoologist is at one." I may add that although I do not pretend to be qualified to give an opinion on the osteological characters, there is another point on which I consider that I am competent to form an opinion; and that is, the support the supposed species receives from difference of locality. Now the argument that the Rhinoceros is a native of Borneo because the skull "received direct from Borneo" belongs to a different species from the Javan Rhinoceros can only have weight if the Bornean type is confined to Borneo. But it would appear that this is not the case. There is another skull in the British Museum which Dr. Gray refers to this new species, but it is marked as from Java. Dr. Gray, however, thinks this is an error, and that it must have come from Borneo,

because it belongs to his supposed Bornean species. He says "It was purchased from a dealer and has been marked '*R. sondaicus*, Cuv., Java,' by some previous possessor. The habitat may depend on the person having decided it to be *R. sondaicus*." "He that is giddy thinks the world turns round." In the same spirit the person who has now decided it to be *R. nasalis* has given it the habitat of Borneo, that being boldly and unqualifiedly given as the habitat of the species in the diagnosis. This is no doubt ingenious, but it is not logical.

Were we to act on this principle, natural history must be removed altogether from the category of sciences of fact, and removed into those of conjecture and imagination.

In estimating the import of the foregoing facts I would only add that, seeing that the conclusions to which I demur rest so absolutely and entirely on the opinion and inquiries of one individual, the bent and tone of that individual's mind must form fair elements to be taken into account in arriving at a decision. If, for example, the individual belonged to that section of naturalists who are more disposed to diminish than increase the number of species, then his opinion in favour of an additional species would of course have more weight. But if, as I imagine my excellent friend Dr. Gray will not dispute, his mind rather belongs to that class whose discrimination of differences is keener than their perception of resemblances, then greater caution ought to be exercised in accepting his conclusions.

So dealing with the present question, I think it rests exactly as it did before Dr. Gray touched it. The Rhinoceros *may* be a native of Borneo; but as yet we have not the slightest evidence of it; while the fact of its presence never having been authenticated, although well-known to be disputed, is in itself a strong presumption to the contrary.

4. Synopsis of the American Rails (*Rallidæ*). By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.L.S., &c.

(Plate XXXV.)

The *Rallidæ*, when restricted to the genera *Rallus*, *Crex*, *Gallinula*, *Fulica*, and their immediate allies, constitute a very natural family of birds allied to the Cranes (*Gruidæ*) and to their somewhat abnormal relatives the genera *Eurypyga*, *Psophia*, and *Aramus*, and form part of Prof. Huxley's group *Geranomorphæ**. To these, however, we must add the genus *Heliornis*, which, according to the best authorities, both on anatomical and pterylographical grounds belongs here.

The American *Rallidæ*, which are alone considered in this com-

* See P. Z. S. 1867, p. 457.





munication, may be very naturally divided into three subfamilies, as follows:—

- a. digiti omnino sejuncti: tarsus elongatus: caudæ rectrices parvæ breves, laxæ, X aut XII.
 - a'. frons plumosus: pedes gressorii: tarsus plus minusve rotundatus: digiti non-membranati I. RALLINÆ.
 - b'. frons scutatus: pedes natatorii: tarsus plus minusve compressus: digiti plerumque aut membranati aut lobati II. FULICINÆ.
- b. digiti ad basin juncti: tarsus brevis: caudæ rectrices magnæ elongatæ, rigidæ, XVIII. III. HELIORNITHINÆ.

These three subfamilies, as far as we have become acquainted with them, contain 48 American species, belonging to 10 genera, namely:—

| | |
|----------------------------|-----------------------|
| <i>Rallinæ</i> | 5 genera: 35 species. |
| <i>Fulicinæ</i> | 4 genera: 12 species. |
| <i>Heliornithinæ</i> | 1 genus: 1 species. |

There remain, however, two described species unknown to us, viz. *Rallus maculosus* (Vieill. N. D. xviii. p. 556, et Enc. Méth. p. 1066) and *Orex facialis* (Tsch. F. P. p. 301).

Subfam. I. RALLINÆ.

Conspectus generum Rallinarum.

- a. nares apertæ, perviæ.
 - a'. nares lineares, angustæ 1. *Rallus*.
 - b'. nares dilatatæ, oblongo-lineares.
 - a''. rostrum longius quam caput 2. *Aramides*.
 - b''. rostrum brevius quam caput.
 - a'''. tarsus digito medio longior 3. *Porzana*.
 - b'''. tarsus digito medio brevior 4. *Orex*.
- b. nares antice membrana obtectæ, imperviæ 5. *Thyrorhina*.

Genus 1. RALLUS.

| | Type. |
|--|-----------------------|
| <i>Rallus</i> , Linn. S. N. i. p. 261 (1766)..... | <i>R. aquaticus</i> . |
| <i>Pardirallus</i> , Bp. C. R. xliii. p. 599 (1856) | <i>R. maculatus</i> . |
| <i>Limnopardalis</i> , Cab. J. f. O. 1856, p. 428..... | <i>R. maculatus</i> . |

Clavis specierum.

- a. albo variegatus 1. *maculatus*.
- b. non albo variegati.
 - a'. rostro incurvo.
 - a''. dorso variegato.
 - a'''. majores { dorsi flammulis nigris 2. *elegans*.
 - { dorsi flammulis fuscis 3. *longirostris*.
 - b'''. minores.
 - a'''. subtus rufescens 4. *virginianus*.
 - b'''. subtus plumbei { minor: lateribus distincte albo vittatis 5. *antarcticus*.
 - { major: lateribus obsolete vittatis 6. *semiplumbeus*.
 - b''. dorso unicolori 7. *rythirhynchus*.
 - b'. rostro recto 8. *nigricans*.

1. RALLUS MACULATUS.

Rallus maculatus, Bodd. ex Buff. Pl. Enl. 775; Schlegel, Mus. d. P.-B. Ralli, p. 13.

Rallus variegatus, Gm. S. N. i. p. 718; Burm. Syst. Ueb. iii. p. 382.

Ypacaha jaspeado todo, Azara, Apunt. iii. p. 217.

Pardirallus variegatus, Bp. C. R. xliii. p. 599.

Limnopardalis variegatus, Cab. Journ. f. Orn. 1856, p. 428; Gundl. Rep. Fis. Nat. i. p. 361.

Aramides maculatus, Hartl. Ind. Az. p. 23; Gray, Gen. B. p. 594.

Niger, dorso et alis oleagineis: omnino albo maculatus: subtus albo et nigro transfasciatus: gula et crisso albis: rostro flavo, macula ad basin sanguinea: long. tota 11, alæ 5·2, caudæ 2, rostri a rictu 1·9, tarsi 1·7 poll. Angl.

Hab. Cayenne (*Buff.*); South-eastern Brazil (*Burm.*); Paraguay (*Azara*); Cuba (*Gundl.*); Para (*Mus. Derb.*); New Granada (*Mus. Brit.*).

Mus. Brit., Derb.

2. RALLUS ELEGANS.

Rallus elegans, Aud. Orn. Biogr. iii. p. 27, t. 203; Cassin in Baird's Birds N. Am. p. 748; Gundl. Journ. f. Orn. 1856, p. 427, et Rep. Fis. Nat. i. p. 360.

Rallus longirostris, Scl. P. Z. S. 1864, p. 179 (err.).

Supra grisescenti-fuscus: dorso nigricante flammulato: subtus pallide rufescens, gula albicante: hypochondriis et tectricibus subalaribus fuscis albo transfasciatis: long. tota 15·5, alæ 6·5, caudæ 2·5, tarsi 2·2, rostri a rictu 2·7.

Hab. Southern States of Eastern America and California (*Baird*); Mexico (*White*); Cuba (*Gundlach*).

Mus. Brit., S. & G.

3. RALLUS LONGIROSTRIS.

Rallus longirostris, Bodd. (ex Buff. Pl. Enl. 849); Burm. Syst. Ueb. iii. p. 381; Newton, Ibis, 1859, p. 260; Gosse, B. Jamaica, p. 364; Léotaud, Ois. Trinidad, p. 491.

Rallus crepitans, Gm. S. N. i. p. 713; Cab. in Schomb. Guian. iii. p. 760; Cassin in Baird's B. N. Am. p. 747; Gundl. Journ. f. Orn. 1856, p. 427, et Rep. Fis. Nat. i. p. 361; Sclater, P. Z. S. 1861, p. 81.

Supra olivaceo-fuscus, dorsi plumis cineraceo marginatis: subtus pallide fulvus, gula albicante, hypochondriis et tectricibus subalaribus fuscis albo transfasciatis: long. tota 14·0, alæ 6·0, caudæ 2·5, tarsi, 2·1, rostri a rictu 2·9.

Hab. Sea-coast of Southern Atlantic States (*Baird*); Cuba (*Gundlach*); Jamaica (*Gosse*); S. Croix (*Newton*); Trinidad (*Léotaud*); Guiana (*Schomb.*); Cayenne (*Buff.*); Brazil, Bahia (*Burm.*).

Mus. Brit., S. & G.

Obs. Similis præcedenti, sed statura paulo minore, dorsi flammulis pallidioribus et pectore dilutiore, pallide fulvo nec rufescente, distinguendus.

4. RALLUS VIRGINIANUS.

Rallus virginianus, Linn. S. N. p. 263; Cassin in Baird's Birds N. Am. p. 748; Cab. J. f. O. 1856, p. 427; Gundl. Rep. F. N. i. p. 361; Scl. & Salv. Ibis, 1860, p. 277; Schlegel, Mus. d. P.-B. *Ralli*, p. 11.

Rallus limicola, Vieill. Enc. Méth. p. 1059.

Supra brunneus nigro flammulatus: alis extus rufis: subtus pallide rufescenti-fulvus: hypochondriis et tectricibus subalaribus nigris albo transfasciatis: long. tota 9·3, alæ 4·1, caudæ 1·7, tarsi 1·7, rostri a rictu 1·7.

Hab. America borealis univ. (*Baird*); Mexico; Guatemala (*Salvin*).

Mus. Brit., S. & G.

5. RALLUS ANTARCTICUS.

Rallus antarcticus, King, Zool. Journ. iv. p. 95.

Rallus rufopennis, Gray, in Mus. Brit. et List of Birds in B. M. iii. p. 116 (*descr. nulla*).

Rallus uliginosus, Phil. Wieg. Arch. 1858, p. 83.

Supra brunneus nigro flammulatus, tectricibus alarum rufis: alarum remigibus nigricantibus, unicoloribus: subtus plumbeus: hypochondriis et subalaribus nigris albo transfasciatis: long. tota 8·0, alæ 3·7, caudæ 1·5, rostri a rictu 1·3, tarsi 1·2.

Hab. Chili (*Philippi*).

Mus. Brit., S. & G.

Obs. Minor quam sequens, et lateribus albo vittatis et gula media albicante satis diversus.

6. RALLUS SEMIPLUMBEUS.

Rallus semiplumbeus, Sclater, P. Z. S. 1856, p. 31; Schlegel, Mus. d. P.-B. *Ralli*, p. 11.

Supra brunnescenti-olivaceus, nigro flammulatus: alis caudaque nigricanti-brunneis: alarum tectricibus rufis: capitis lateribus et corpore toto subtus plumbeis: tectricibus subcaudalibus albis nigro mixtis: hypochondriis albo subobsolete transfasciatis: rostri culmine et apice nigris, mandibula autem inferiore ruberrima: pedibus pallide brunneis: long. tota 8·5, alæ 4·4, caudæ 1·8, rostri 1·7.

Hab. Nova Granada.

Mus. Brit. (ex. typ.).

Sim. R. virginiano, sed major, subtus omnino plumbeus et gutture albicante.

7. RALLUS RYTHIRHYNCHUS, Vieill.

Ipacaha pardo, Azara, Apunt. iii. p. 220. no. 372.

Rallus rythirhynchus, Vieill. N. D. xiii. p. 521, et E. M. p. 1060; ScL. & Salv. P. Z. S. 1867, p. 990, et 1868, p. 145.

Aramides rythirhynchus, Burm. La Plata-Reise, ii. p. 504.

Rallus setosus, King, Zool. Journ. iv. p. 94.

Rallus cæsius, Tsch. F. P. *Aves*, pp. 52, 301; Schlegel, Mus. d. P.-B. *Ralli*, p. 8; Cassin, Gilliss's Exp. ii. p. 194.

Rallus sanguinolentus, Sw. An. in Men. p. 335; Bridges, P. Z. S. 1843, p. 118; Darwin, Zool. Voy. Beagle, iii. p. 133; Sclater, P. Z. S. 1867, p. 333.

Rallus bicolor, Gay, Faun. Chil. *Aves*, p. 434.

Aramides zeledori, Pelzeln, Novara-Reise, Vög. p. 133 (?).

Supra oleagineo-brunneus: *subtus plumbeus*: *rostro viridi*, *macula mandibulæ basali sanguinea*: *long. tota* 12·0, *alæ* 5·4, *caudæ* 2·8, *rostri a rictu* 2·1, *tarsi* 1·8 (*specim. ex Chili*).

Hab. Paraguay (*Azara*); rep. Argentina (*Burm.*); Chili (*Leybold*); West Peru (*Whitely*); South Brazil (*Zeledor*).

Mus. Brit., S. & G.

Concerning the variations of this species, see our remarks, P. Z. S. 1867, p. 990, and 1868, p. 145. In the British Museum is a skin from Hermite Island, Tierra del Fuego, which, though generally resembling the present bird, is of much larger dimensions, and will in all probability require specific separation.

8. RALLUS NIGRICANS.

Ipecaha obscuro, Azara, Apunt. iii. p. 219. no. 371.

Rallus nigricans, Vieill. N. D. xxviii. p. 560, et Enc. Méth. p. 1067; Max. Beitr. iv. p. 782; Schlegel, Mus. d. P.-B. *Ralli*, p. 8.

Aramides nigricans, Hartl. Ind. Az. p. 23; Burm. Syst. Ueb. iii. p. 385, et La Plata-Reise, ii. p. 504.

Rallus bicolor, Cuv. in Mus. Paris.; Blackwall, Brewster's Journ. vi. p. 77 (1832).

Gallinula cæsia, Spix, Av. Bras. ii. p. 73, t. 95.

Rallus cæsius, Sw. An. in Men. p. 335.

Rallus immaculatus, Licht. Doubl. p. 79.

Supra oleagineo-brunneus: *fronte, capitis lateribus et corpore subtus plumbeis*; *gula albicante*: *ventre imo, tibiis et cauda nigricantibus*: *rostro recto, unicolori, obscure viridi*: *long. tota* 10·0, *alæ* 4·8, *caudæ* 2·3, *rostri a rictu* 1·9, *tarsi* 1·7.

Hab. Brasil. merid. orient.; Minas Geraes (*Spix*); S. Paolo et Bahia (*Licht.*); Paraguay (*Azara*).

Mus. Brit., S. & G.

Genus 2. ARAMIDES.

Type.

Aramides, Puch. R. Z. 1845, p. 277..... *A. cayennensis*.

Ortygarchus, Cab. in Schomb. Guian. iii. p. 759 *A. cayennensis*.

Clavis specierum.

- a.* subalaribus rufis nigro transfasciatis.
a'. pectore griseo, ventre rufo.
a''. tibiis nigricantibus { minor: ventre castaneo-rufo
unicolori 1. *cayennensis*.
major: ventre dilutiore rufo
et medialiter albicante ... 2. *albiventris*.
b''. tibiis griseis 3. *zyecaha*.
b'. pectore et ventre rufis 4. *ruficollis*.
c'. pectore et ventre plumbeis 5. *saracura*.
b. subalaribus nigris albo transfasciatis.
capite et cervice undique cum pectore rufis 6. *axillaris*.
capite et cervice griseis 7. *mangle*.

1. ARAMIDES CAYENNENSIS.

Poule d'eau de Cayenne, Buff. Pl. Enl. 352.

Fulica cayennensis, Gm. S. N. i. p. 700.

Gallinula cayannensis, Lath. Ind. Orn. ii. p. 767; Max. Beitr. iv.

p. 798.

Ortygarchus cayannensis, Cab. in Schomb. Guian. iii. 759.

Aramides cayennensis, Gray, Gen. of B. iii. p. 594; Burm. Syst.

Ueb. iii. p. 385.

Gallinula ruficeps, Spix, Av. Bras. ii. p. 74, t. 96.

Gallinula ruficollis, var., Sw. Zool. Ill. iii. t. 173.

Chiricote, Azara, Apunt. iii. p. 214. no. 368.

Rallus chiricote, Vieill. N. D. xxviii. p. 558, et Enc. Méth. p. 1060. 1/

Aramides chiricote, Hartl. Ind. Az. p. 23.

Aramides chiricote, Léotaud, B. Trinidad, p. 196.

Rallus maximus, Vieill. Enc. Méth. p. 1058.

Aramides maximus, Schlegel, Mus. d. P.-B. *Ralli*, p. 14.

Aramides ruficollis, Lawr. Ann. L. N. Y. vii. p. 479 (?).

Supra olivaceus, collo cinereo, pileo fusco-rufescente, uropygio nigro, remigibus castaneis: subtus castaneus, gula alba, cervice cinerea: ventre imo cum crisso et cauda nigris: tibiis nigricantibus: subalaribus rufis nigro transfasciatis: long. tota 13.0, ala 6.8, cauda 2.6, tarsi 2.8, rostri a rictu 2.2.

Hab. Panama (*McCleannan*); New Granada, Bogota (*Mus. S. & G.*); Trinidad (*Léotaud*); British Guiana (*Schomb.*); Cayenne (*Buffon*); South-east Brazil (*Max., Spix, et Burm.*); prov. S. Paolo (*Natt.*); Paraguay (*Azara*).

Mus. Brit., S. & G.

We have compared skins of this wide-ranging species from Panama, New Granada, the vicinity of Bahia, and the province of S. Paolo, Brazil.

2. ARAMIDES ALBIVENTRIS.

Aramides albiventris, Lawr. Pr. Ac. Phil. 1867, p. 234.

Aramides cayennensis, Moore, P. Z. S. 1859, p. 64; ScL. & Salv. Ibis, 1859, p. 230; ScL. P. Z. S. 1859, p. 393, 1857, p. 206, 1856,

p. 143; Salv. P. Z. S. 1867, p. 161 (?); Scl. & Salv. P. Z. S. 1867, p. 280 (?).

Aramides ypacaha, Schlegel, Mus. de P.-B. *Ralli*, p. 14 (?).

Similis præcedenti, sed major, cervice cinerea latiore, abdomine fulvo-rufo, ad marginem ventris nigri albicante, et pedibus fortioribus distinguendus: long. tota 14.0, alæ 7.8, caudæ 2.6, tarsi 3.3, rostri a rictu 2.7.

Hab. Southern Mexico (*Sallé*); Oaxaca (*Boucard*); Honduras, Omoa (*Leyland*); Guatemala, Vera Paz and Pacific coast (*Salvin*).

Mus. S. & G.

We cannot now tell whether the specimens from David and Mosquitia ought to be referred to this northern form, or to its southern representative *A. cayennensis*, which certainly occurs as far north as Panama.

We are likewise uncertain what Prof. Schlegel's *A. ypacaha* from the "Isle de St. Thomas" may be, unless it is referable to the present bird. The true "*Ypacaha*" of Azara is undoubtedly the same species as that which Schlegel refers to as *A. gigas*.

3. ARAMIDES YPACAHA.

Ypacaha, Azara, Apunt. iii. p. 210. no. 367.

Rallus ypacaha, Vieill. N. D. xxviii. p. 568, et Enc. Méth. p. 1071.

Aramides ypacaha, Hartl. Ind. Az. p. 23; Gray, Gen. B. iii. p. 594; Scl. & Salv. P. Z. S. 1868, p. 144.

Gallinula gigas, Spix, Av. Bras. ii. p. 75, t. 99.

Aramides gigas, Burm. Syst. Ueb. iii. p. 383; La Plata-Reise, ii. p. 504; Gray, Gen. B. iii. p. 594; Schlegel, Mus. de P.-B. *Ralli*, p. 14.

Crex melampyga, Licht. Doubl. p. 79.

Supra olivacea, collo rufo, fronte cinerascens: uropygio et cauda nigris: subtus gula alba, pectore et cervice tota cinereis: abdomine rosaceo-rubro, ventre imo cum tibiis griseis: hypochondriis et crisso nigris: subalaribus rufis nigro transfasciatis: long. tota 19.0, alæ 8.5, caudæ 3.3, tarsi 3.5, rostri a rictu 2.9.

Hab. Paraguay (*Azara*); Brasil., Minas Geraes (*Burm.*); rep. Argentina, Parana (*Burm.*); Buenos Ayres (*Hudson*).

Mus. Brit., Smiths.

4. ARAMIDES RUFICOLLIS.

Black-bellied Gallinule, Lath. Syn. v. p. 253.

Fulica ruficollis, Gm. S. N. i. p. 700.

Aramides ruficollis, Schlegel, Mus. de P.-B. *Ralli*, p. 15.

Supra brunnescenti-olivaceus, pileo rufescente tincto: gula alba, cervice angusta cinerea: pectore toto cum ventre castaneo-rufis: ventre imo et crisso nigris.

Hab. Cayenne (*Latham*); Lima (*Mus. Brit.*).

Mus. Brit.

Obs. Similis *A. cayennensi*, sed pectore rufo ventre concolori, et corpore supra brunnescentiore olivaceo.

A single indifferent skin in the British Museum, marked "Lima," is the only specimen we have met with which seems to correspond with Latham's description of this bird; but we are not sure whether it is really distinct from *A. cayennensis*.

5. ARAMIDES SARACURA.

Chiricote aplomado, Azara, Apunt. iii. p. 231. no. 369.

Gallinula saracura, Spix, Av. Bras. ii. p. 75, t. 98 (1825).

Gallinula plumbea, Max. Beitr. iv. p. 795; Tsch. F. P. *Aves*, p. 52.

Aramides plumbeus, Hartl. Ind. Az. p. 23; Gray, Gen. B. iii. p. 594; Burm. Syst. Ueb. iii. p. 383; Schlegel, M. de P.-B. *Ralli*, p. 15.

"*Rallus nigricans*, Vieill.;" Bp. J. A. S. Phil. iv. p. 386.

Rallus melanurus, Bp. J. A. S. Phil. v. p. 139.

Supra saturate olivaceus, dorso superiore et collo rufescentibus, dorso inferiore cum cauda nigricantibus: pileo obscure cinereo: subtus omnino plumbeus, ventre imo nigricantiore, crisso nigro, gula alba: long. tota 15.5, alæ 7, caudæ 2.4, tarsi 3, rostri a rictu 2.4.

Hab. Paraguay (Azara); Brasil. merid. or. (Max. et Burm.); Ypanema, S. Paolo (Natt.).

Mus. Brit., S. & G.

Several authors have called this bird *A. plumbeus*, from Vieillot's *Gallinula plumbea*, which, however, is a Javan species, and has nothing to do with it (*cf.* Enc. Méth. p. 344). Spix's name *saracura* seems to be the oldest.

6. ARAMIDES AXILLARIS.

Aramides axillaris, Lawr. Proc. Acad. Phil. 1863, p. 107.

Ortygarchus mangle, Cab. in Schomb. Guian. iii. p. 760.

Aramides ruficollis, Léotaud, Ois. Trin. p. 498.

Fusco-viridis, dorso imo et cauda nigris, dorso summo plumbeo: capite toto et corpore subtus castaneis: gula alba, ventre medio cum crisso nigris: primariis extus rufis: tectricibus subalaribus albo nigroque transfasciatis: long. tota 11.5, alæ 6.5, caudæ 2.0, tarsi 2.0, rostri a rictu 1.6.

Hab. Venezuela, Barranquilla (*Crowther*); Brit. Guiana (*Schomburgk*); Belize (*Bocourt*).

Mus. Brit., Derb., Paris.

This is a very distinct species, easily known by its chestnut head and neck, which are nearly of the same colour as the body beneath. It is clearly the bird described by Cabanis as the adult of his *Ortygarchus mangle*, and by Léotaud as *A. ruficollis*.

7. ARAMIDES MANGLE.

Gallinula mangle, Spix, Av. Bras. ii. p. 74, t. 97.

Aramides mangle, Burm. Syst. Ueb. iii. p. 385.

Supra olivaceus, pileo et cervice cinerascens, dorso imo nigricante: subtus rufus; gutture albicante; ventre in cinereum trahente; crisso nigricante: tectricibus subalaribus nigris albo

transfasciatis: long. tota 12·0, alæ 6·5, caudæ 2·3, tarsi 2·1, rostri a rictu 1·8.

Hab. Brazil (*Spix*); vicinity of Bahia (*Wucherer*).

Mus. S. & G.

Genus 3. PORZANA.

| | Type. |
|--|----------------------------|
| <i>Porzana</i> , Vieill. Analyse, p. 61 (1816)..... | <i>P. maruetta</i> . |
| <i>Mustelirallus</i> , Bp. C. R. xliii. p. 599 (1856) | <i>P. albicollis</i> . |
| <i>Rufirallus</i> , Bp. C. R. xliii. p. 599 (1856) .. | <i>P. cayennensis</i> . |
| <i>Laterallus</i> , Bp. Ann. d. Sc. Nat. sér. 4. Zool. | |
| i. p. 46 (1854) | <i>P. melanophæa</i> . |
| <i>Laterirallus</i> , Bp. C. R. xliii. p. 599 (1856).. | <i>P. melanophæa</i> . |
| <i>Crybastes</i> , Cab. Journ. f. O. 1856, p. 428 .. | <i>P. flaviventris</i> . |
| <i>Creciscus</i> , Cab. Journ. f. O. 1856, p. 428 . | <i>P. jamaicensis</i> . |
| <i>Coturnicops</i> , Bp. Ann. Sc. Nat. sér. 4. Zool. | |
| i. p. 46 (1854) | <i>P. noveboracensis</i> . |

The American species of this genus present many slight modifications in the proportions of the tarsus and toes, the elevation of the culmen of the bill, the length of the tail and tail-coverts, and the denudation of the lower part of the tibiæ. It appears to us impossible to establish satisfactory generic divisions upon these characters, at any rate without a careful examination of the Old-World species of the group. It is even difficult to group the American species in minor sections; but the following may serve as a temporary arrangement of the subgenera:—

| | |
|---|--------------------------|
| a. majores: tarsus et digiti elongati. | |
| <i>a'</i> . dorso maculato | 1. <i>Porzana</i> . |
| <i>b'</i> . dorso immaculato. | |
| <i>a''</i> . hypochondriis puris | 2. <i>Rufirallus</i> . |
| <i>b''</i> . hypochondriis fasciatis | 3. <i>Laterirallus</i> . |
| b. minores: tarsus brevis. | |
| <i>a'</i> . digiti elongati | 4. <i>Crybastes</i> . |
| <i>b'</i> . digiti modici. | |
| <i>a''</i> . rostri culmine non elevato | 5. <i>Creciscus</i> . |
| <i>b''</i> . rostri culmine elevato | 6. <i>Coturnicops</i> . |
| c. major: tarsus et digiti breves..... | 7. <i>Neocrex</i> . |

(1) PORZANA.

Clavis specierum.

| | |
|---|---------------------------|
| a. loris et gula nigris: dorso albo lineolato | 1. <i>P. carolina</i> . |
| b. loris cinereis: gula alba: dorsi lineolis nullis | 2. <i>P. albicollis</i> . |

1. PORZANA CAROLINA.

Rallus carolinus, Linn. S. N. i. p. 363.

Ortygometra carolina, Gosse, Birds of Jamaica, p. 371; Léotaud, Ois. Trinid. p. 493.

Porzana carolina, Baird, Birds N. Am. p. 749; Gundl. Journ. f. Orn. 1856, p. 428; Scl. P. Z. S. 1861, p. 81, 1864, p. 179; Scl. & Salv. P. Z. S. 1864, p. 372; Ibis, 1859, p. 230; A. & E. Newton, Ibis, 1859, p. 260; Lawr. Ann. L. N. Y. vii. p. 479.

Rallus stolidus, Vieill. Enc. Méth. p. 1071.

Supra olivaceo-brunneus : nigro variegatus et lineolis albis notatus : facie et pileo medio nigris : superciliis cinereis : subtus cinereus, gula et cervice mediali nigris : lateribus albo nigroque transfasciatis : ventre medio et crisso albis, hoc fulvescente tincto : rostro flavo, pedibus olivaceis : long. tota 7·5, alæ 4·1, caudæ 1·8, tarsi 1·3, dig. med. cum ungue 1·7, rostri a rictu 0·9.

Hab. America bor. univ. (*Baird*); Mexico (*White*); Guatemala (*Salvin*); Jamaica (*Gosse*); Panama (*M'Cleann.*); Cuba (*Gundl.*); S. Croix (*Newton*); Trinidad (*Léotaud*).

Mus. Brit., S. & G., *Derb.*

2. PORZANA ALBICOLLIS.

Rallus albicollis, Vieill. N. D. xxviii. p. 560, et Enc. Méth. p. 1069 (ex Azara, no. 374).

Rallus olivaceus, Vieill. N. D. xxviii. p. 561; Enc. Méth. p. 1068.

Corethrura olivacea, Léotaud, Ois. de l'Île de Trinidad, p. 499; Gray, Gen. iii. p. 595.

Crex olivacea, Taylor, Ibis, 1864, p. 96.

Ortygometra albicollis, Burm. Syst. Ueb. iii. p. 387; Hartl. Ind. Az. p. 25.

Porzana albicollis, Schlegel, Mus. d. P.-B. *Ralli*, p. 34.

Mustelirallus albicollis, Bp. C. R. xliii. p. 599.

Crex mustelina, Licht. Doubl. p. 79; Schomb. Guian. iii. p. 760.

Crex gularis, Jard. & Selb. Ill. Orn. i. t. 39.

Supra olivaceo-brunneus, nigro variegatus : subtus cinereus, gula alba : hypochondriis et crisso nigris albo variegatis : rostro flavicante, pedibus olivaceis : long. tota 9·0, alæ 4·4, caudæ 2·0, tarsi 1·55, dig. med. cum ungue 1·7, rostri a rictu 1·1.

Hab. Paraguay (*Azara*); South Brazil, S. Paulo (*Burm.*); Surinam (*Schlegel*); Cayenne (*Poiteau*, in *Mus. Paris.*); Trinidad (*Léotaud & Taylor*).

(2) RUFIRALLUS.

a. supra olivacei.

Clavis specierum.

a'. pileo rufo 3. *P. cayanensis*.

b'. pileo olivaceo 4. *P. leuraudi*.

b. supra castanei.

a'. pileo plumbeo 5. *P. rubra*.

b'. pileo dorso concolori 6. *P. concolor*.

c'. pileo ventre concolori 7. *P. castaneiceps*.

3. PORZANA CAYANENSIS.

Le râle de Cayenne, Buff. Pl. Enl. 368.

Rallus cayanensis, Gm. S. N. i. p. 718.

Ortygometra cayannensis, Burm. S. U. iii. p. 386.

Porzana cayannensis, Scl. & Salv. P. Z. S. 1867, p. 592.

Rallus kiolo, Vieill. Enc. Méth. p. 1066.

Crex aurita, J. E. Gray, Zool. Misc. p. 13.

Gallinula pileata, Max. Beitr. iii. p. 802.

Gallinula ecaudata, Sw. An. in Men. p. 348.

Râle a ventre roux de Cayenne, Buff. Pl. Enl. 753; *undè Rallus poliotis*, Temm. Table d. Pl. Enl. p. 98.

Supra olivaceus: pileo castaneo: lateribus capitis cinereis: subtus castaneus: rostro plumbeo; pedibus carneis: long. tota 6·0, alæ 3·5, caudæ 1·3, tarsi 1·35, dig. med. cum ungue 1·4, rostri a rictu 0·8.

Hab. Cayenne (*Buffon*); Para (*Wallace*); Brasil. merid. orient. (*Max. & Burmeister*).

Mus. Brit., S. & G.

✓ 4. PORZANA LEVRAUDI, sp. nov. (Plate XXXV.)

Supra omnino fuscescenti-olivaceus, alis extus et cauda saturatioribus, fere nigricantibus: subtus rubiginoso-rufus, medialiter dilutior: gula et pectore medio albis: rostro et pedibus olivaceis: long. tota 6·0, alæ 3·0, caudæ 1·5, rostri a rictu 0·8, tarsi 1·1.

Hab. Venezuela, in vicin. urbis Caraccas (*Levraud*).

Mus. Parisiensi.

Obs. Species forma et crassitie *Porzanæ cayennensis*, sed differt corpore supra unicolori, subtus medialiter albo.

✓ 5. PORZANA RUBRA.

Corethrura rubra, Scl. & Salv. P. Z. S. 1860, p. 300; *Ibis*, 1860, p. 277.

Porzana rubra, Scl. & Salv. Ex. Orn. t. xvi. p. 31.

Læte rufa, subtus medialiter dilutior; gula albicantiore; pileo toto et lateribus capitis saturate cinereis: remigibus et rectricibus cum uropygio obscure fusco-nigris: rostro nigro: pedibus olivaceis: long. tota 6·0, alæ 3·3, caudæ 1·4, tarsi 1·35, digiti med. cum ungue 1·55, rostri a rictu 0·85.

Hab. Guatemala (*Salvin*).

Mus. Brit., S. & G.

6. PORZANA CONCOLOR.

Rallus concolor, Gosse, B. Jam. p. 369, et Ill. t. 103 (1847); *March*, Proc. Acad. Phil. 1864, p. 69.

"*Rallus castaneus*, Cuv.," Puch. R. Z. 1851, p. 279.

Rallina castanea, Schlegel, Mus. de P.-B. *Ralli*, p. 17.

Corethrura guatemalensis, Lawr. Proc. Acad. Phil. 1863, p. 106.

Corethrura cayennensis, Moore, P. Z. S. 1859, p. 64; Scl. & Salv. *Ibis*, 1859, p. 230.

Supra omnino fusco-rubiginosus unicolor: subtus pure rubiginoso-rufus: long. tota 8·5, alæ 4·8, caudæ 2·6, tarsi 1·7, rostri a rictu 1·1.

Hab. Jamaica (*Gosse*); Honduras, Omoa (*Leyland*); Guatemala (*Lawrence*); vicinity of Bahia (*Wucherer*).

Mus. Brit., Derb., Paris., S. & G.

We have compared *Leyland's* specimen of this bird from Omoa with *Gosse's* type from Jamaica, which is now in the British Museum, and find them identical. We therefore conclude that Mr.

Lawrence's *Corethrura guatemalensis* is referable to this species, as his description shows no reason to the contrary.

We have also examined the type of *Rallus castaneus* (Puch. ex Cuv.) in the Paris Museum, and have no doubt of its being a synonym of *Rallus concolor*, Gosse.

Prince Bonaparte names (C. R. xliii. p. 599), without describing, a *Rufirallus boeckii* from the Berlin Museum. Schlegel (*l. s. c.*) states that one of the types of this supposed new species is in the Leyden Museum, and places it as a synonym of this bird, which he calls *Rallina castanea*.

7. PORZANA CASTANEICEPS, sp. nov.

Supra olivacea: capite undique et corpore subtus ad imum pectus castaneis, gula dilutiore: ventre imo, tibiis et hypochondriis dorso concoloribus: long. tota 8.0, alæ 4.4, rostri a rectu 1.1, tarsi 2.0.

Hab. Rio Napo (*Mus. Brit.*).

Mus. Brit.

There is a single example of this apparently undescribed species in the British Museum. It was purchased from Mr. Gould in 1855. The species is nearly allied to *P. concolor*, but is easily recognizable by the chestnut colouring only extending over the head and front part of the body below.

(3) LATERIRALLUS.

Clavis specierum.

- | | |
|--|----------------------------|
| <i>a.</i> gula cum pectore castaneis | 8. <i>P. hauxwelli.</i> |
| <i>b.</i> gula alba, pectore albo aut rufo. | |
| <i>a'</i> . crisso rufo | 9. <i>P. melanophæa.</i> |
| <i>b'</i> . crisso albo nigroque transfasciato | 10. <i>P. albigularis.</i> |
| <i>c'</i> . crisso medio nigro utrinque albo | 11. <i>P. leucopyrrha.</i> |

8. PORZANA HAUXWELLI, sp. nov.

Corethrura, sp. ?, *Scl. & Salv. P. Z. S.* 1866, p. 200.

Porzana fasciata, *Scl. & Salv. P. Z. S.* 1867, p. 981.

Porzana hauxwelli, *Scl. & Salv. Ex. Orn.* p. 105, t. 53.

Fuscescenti-olivacea, alis obscurioribus, capite toto cum collo et corpore subtus ad imum pectus castaneis: abdomine rufo nigroque transfasciato: subalaribus rufis nigro maculatis: rostro obscure corneo, pedibus saturate corylinis: long. tota 6.5, alæ 3.5, caudæ 1.2, tarsi 1.6, rostri a rectu 0.85.

Hab. Amazonia Peruviana; Ucayali (*Bartlett*), Chamicurros et Pebas (*Hauxwell*).

Mus. Brit., S. & G.

Obs. Similis *P. castaneo*, sed ventre rufo nigroque conspicue transfasciato.

9. PORZANA MELANOPHÆA.

Ipecaha pardo obscuro, Azara, *Apunt.* iii. p. 230. no. 376.

Rallus melanophæus, Vieill. *N. D.* xxviii. p. 549, et *Enc. Méth.* p. 1064.

PROC. ZOOL. SOC.—1868, No. XXX.

Corethrura melanophæa, Hartl. Ind. Az. p. 24; Gray, Gen. iii. p. 595.

Crex lateralis, Licht. Doubl. p. 79.

Gallinula lateralis, Max. Beitr. iv. p. 805.

Ortygometra lateralis, Burm. Syst. Ueb. iii. p. 387.

Gallinula albifrons, Sw. An. in Menag. p. 338.

Porzana melanophæa, Scl. & Salv. Ex. Orn. p. 107, t. 54.

Fuscescenti-olivacea, alis extus et dorso postico obscurioribus; subtus alba, lateribus cervicis et pectoris cum crisso toto rufis; hypochondriis albo nigroque transfasciatis: rostro olivaceo apice flavicante; pedibus pallide corylinis: long. tota 6·3, alæ 3·1, caudæ 1·5, tarsi 1·25, rostri a rictu 0·8.

Hab. in Brasil. merid. (*Burmeister*); Paraguaya (*Azara*); Bolivia, Chiquitos (*D'Orbiguy*); Venezuela, Cumana (*Beaupérthuy*); Caraccas (*Levaud*).

Mus. Brit., S. & G.

10. PORZANA ALBIGULARIS.

Corethrura albigularis, Lawrence, Ann. Lyc. N. Y. vii. p. 302; Scl. & Salv. P. Z. S. 1864, p. 372.

Porzana albigularis, Scl. & Salv. P. Z. S. 1867, p. 280, et Ex. Orn. p. 109, t. 55.

Supra fusca, lateribus capitis et cervice postica castaneis: subtus alba, pectore castaneo perfuso: hypochondriis, ventris lateribus et crisso albo nigroque transfasciatis: rostro olivaceo, pedibus fuscis: long. tota 5·5, alæ 2·9, caudæ 1·1, tarsi 1·1, rostri a rictu 0·9.

Hab. in isthm. Panama (*M^cLeannan*); Costa Rica (*Arcé*); Mosquitia (*Wickham*).

Mus. S. & G.

11. PORZANA LEUCOPYRRHA.

Ipecaha pardo acanelado y blanco, Azara, Apunt. iii. p. 228. no. 375.

Rallus leucopyrrhus, Vieill. N. D. xxvii. p. 550, et Enc. Méth. p. 1064; v. Schreiber, Isis, 1823, p. 1063.

Corethrura leucopyrrha, Hartl. Ind. Az. p. 24; Gray, Gen. iii. p. 595; Burm. La Plata-Reise, ii. p. 505.

Corethrura hypoleucos, Licht. in Mus. Berol. et Nomencl. p. 96.

Laterirallus hypoleucus, Bp. C. R. xliiii. p. 599.

Fuscescenti-olivacea, capite rufescente, alis extus et cauda cum dorso postico obscurioribus: subtus alba; lateribus capitis, cervicis et pectoris castaneis; hypochondriis albo nigroque transfasciatis: crisso medio nigro, lateraliter albo: rostro olivaceo, pedibus flavidis: long. tota 6·75, alæ 3·1, caudæ 1·9, tarsi 1·3, rostri a rictu 0·8.

Hab. in Paraguaya (*Azara*); rep. Argentina, Tucuman (*Burm.*); Brasil. merid. (*Natt.*).

Mus. Brit., S. & G.

Obs. A *P. melanophæa* capite rufo, et crisso non rufo, sed medio nigro, albo utrinque marginato, diversa.

(4) CRYBASTUS.

12. PORZANA FLAVIVENTRIS.

Petit râle de Cayenne, Buff. Pl. Enl. 847.

Rallus flaviventer, Bodd.

Ortygometra flaviventris, Gray, Gen. iii. p. 593; Hartl. Ind. Az. p. 24.

Rallus minutus, Gm. S. N. p. 719.

Ortygometra minuta, Burm. Syst. Ueb. iii. p. 388; Gosse, B. Jam. p. 372.

Crex minuta, Scl. P. Z. S. 1861, p. 81.

Rallus superciliaris, Vieill. N. D. xxviii. p. 565, et Enc. Méth. p. 1070 (ex Azara, no. 377).

Laterirallus gossii, Bp. C. R. xliii. p. 599 (1856).

Crybastus gossii, Cab. J. f. Orn. 1856, p. 428; Gundlach, Rep. F. N. i. p. 361.

Erythra minuta, Bp. C. R. xliii. p. 600 (1856).

Supra flavicanti-brunnea, capite et dorso medio obscurioribus, nigricanti-brunneis: dorso et alis extus albo maculatis: superciliis et corpore subtus ochraceo-albidis, gula et ventre medio albicantibus: hypochondriis et crisso albo nigroque transfasciatis: rostro corneo, pedibus flavis: long. tota 5·0, alæ 2·7, caudæ 1·3, rostri a rictu 0·7, tarsi 0·9, dig. med. cum ungue 1·3.

Hab. Cayenne (*Buff.*); Jamaica (*Gosse et Osburn*); Cuba (*Gundlach*); Venezuela, Caraccas (*Levraud, in Mus. Par.*); South-eastern Brazil (*Burm.*); Paraguay (*Azara*).

Bonaparte has called the Jamaican form of this species *Laterirallus gossii*, without giving us any explanation of how it differs from the continental form which he calls *Erythra minuta*. We have examined a specimen now in the British Museum, obtained by Gosse, and compared it with a skin from Brazil, without being able to detect any differences which would justify the separation of the Jamaican bird.

(5) CRECISCUS.

a. plaga cervicali postica nulla.

a'. pectore immaculato.

a'', dorso toto albo punctato 13. *P. jamaicensis*.

b'', dorso fere immaculato 14. *P. spilonota*.

b'. pectore albo nigroque variegato 15. *P. notata*.

b. plaga cervicali postica rufa 16. *P. cinerea*.

13. PORZANA JAMAICENSIS.

Rallus jamaicensis, Gm. S. N. p. 718; Baird, Birds N. Am. p. 749.

Ortygometra jamaicensis, Gosse, B. Jam. p. 375; Salv. Ibis, 1866, p. 198.

Porzana jamaicensis, Scl. P. Z. S. 1861, p. 81; P. Z. S. 1867, p. 333 et p. 343; Schlegel, Mus. des P.-B. *Ralli*, p. 67.

Creciscus jamaicensis, Cab. J. f. Orn. 1856, p. 428; Gundl. Rep. F. N. i. p. 362.

Rallus salinasi, Philippi, Wieg. Arch. 1857, p. 262.

Crex pygmæa, Blackwall, Brewster's Journ. vi. p. 77 (1832).

Ortygometra jamaicensis et *O. chilensis*, Bp. C. R. xliii. p. 599.

Supra cinerea, brunneo, præcipue in dorso summo, perfusa: capite, dorso toto et alis extus albo stellatis: subtus cinerea, gula (in junioribus) albescente: hypochondriis, ventre imo et crisso albo transfasciatis: rostro plumbeo, pedibus pallide corylinis: long. tota 5·5, alæ 2·9, caudæ 1·4, rostri a rictu 0·7, tarsi 0·9, dig. med. cum ungue 1·15.

Hab. Amer. bor. status Atlanticos merid. (*Baird*); Jamaica (*Osburn*); Cuba (*Gundl.*); Guatemala (*Salvin*); New Granada (*Schlegel*); Lima (*Nation*); Chili (*Philippi*).

Mus. Brit. et S. & G.

We have compared skins of this bird from Guatemala, Jamaica, Lima, and Chili, without being able to detect any differences sufficient to distinguish them specifically. In some specimens the throat is nearly white; but this occurs in one skin from Chili, and not in a second, and may be attributable to immaturity. The southern specimens are also rather larger.

Ortygometra chilensis is a name probably intended by Bonaparte for this southern form, which seems also to be described by Philippi as *Rallus salinasi* (*l. s. c.*).

14. PORZANA SPILONOTA.

Zapornia spilonota, Gould, Zool. Voy. Beagle, iii. p. 132, t. 49.

Nigricanti-cinerea fere unicolor, dorso et alis extus oleagineo perfusis: hypochondriis et tectricibus caudæ inferioribus obsolete albo notatis: long. tota 5·25, alæ 2·75, caudæ 1·1, tarsi 0·85, rostri 0·75.

Hab. Galapagos (*Darwin*).

Mus. Brit.

Obs. Affinis *P. tabuensi* ex inss. maris Pacifici.

15. PORZANA NOTATA.

Zapornia notata, Gould, Zool. Voy. Beagle, iii. p. 132, t. 48.

Supra obscure olivaceo-brunnea, albo stellata: subtus nigra albo omnino variegata: long. tota 5·5, alæ 3·0, caudæ 1·3, tarsi 0·9, rostri a rictu 0·5.

Hab. in rep. Argentina (*Darwin*); Patagonia (*D'Orb. in Mus. Par.*).

Mus. Brit. et Paris.

16. PORZANA CINEREA.

Rallus cinereus, Vieill. N. D. xxviii. p. 556, et Enc. Méth. p. 1066.

Ortygometra cinerea, Gray, Gen. B. iii. p. 593; Léotaud, Ois. de Trin. p. 495.

Gallinula ruficollis, Sw. An. in Men. p. 349.

Rallus exilis, Temm. Pl. Col. 523.

Porzana exilis, Scl. & Salv. P. Z. S. 1866, p. 567.

Supra olivaceo-brunnea, pileo cinereo, cervice rufa, uropygio nigro albo transfasciato: subtus cinerea, gula alba, ventris lateribus et crisso nigris albo transfasciatis: rostro corneo, pedibus pallidis: long. tota 5·0, alæ 2·8, caudæ 1·4, rostri a rictu 0·65, tarsi 0·8, dig. med. cum ungue 1·1.

Hab. Cayenne (Vieill.); Amazonia Peruv., Ucayali (Bartlett); Para (*Mus. Derb.*); Trinidad (Léotaud).

Mus. Brit., Paris., et S. & G.

(6) COTURNICOPS.

17. PORZANA NOVEBORACENSIS.

Fulica noveboracensis, Gm. S. N. i. p. 701.

Gallinula noveboracensis, Lath. Ind. Orn. ii. p. 271.

Porzana noveboracensis, Baird, B. N. A. p. 750.

Rallus ruficollis, Vieill. N. D. xxviii. p. 556, Enc. Méth. p. 1070, et Gal. d. Ois. ii. t. 266.

Supra ochracea brunneo variegata, dorso et alis extus albo anguste transfasciatis: superciliis gula et pectore pure ochraceis: ventre medio albicante: hypochondriis nigris ochraceo mixtis et albo transfasciatis: crisso rufescente: rostro pallide corneo, basi albicante: pedibus pallidis: long. tota 6·5, alæ 3·5, caudæ 1·4, rostri a rictu 0·7, tarsi 1·0, dig. med. cum ungue 1·2.

Hab. America bor. status Atlanticos et merid.

Mus. S. & G.

(7) NEOCREX.

18. PORZANA ERYTHROPS.

Porzana erythrope, Selater, P. Z. S. 1867, p. 343, t. 21.

Porzana schomburgki, Schl. Mus. des P.-B. Ralli, p. 37 (?).

Supra fusciscenti-olivacea, alis et cauda concoloribus: capitis et cervicis lateribus cum corpore subtus pallide plumbeis, gula albicante: hypochondriis, alarum tectricibus inferioribus et crisso nigricantibus albo transfasciatis, uno fulvescente: rostro ad basin sanguineo, inde corneo, apice flavo: pedibus flavis: long. tota 7·5, alæ 4·2, caudæ 1·2, rostri a rictu 0·9, tarsi 1·2, dig. med. cum ungue 1·3.

Hab. Lima (*Nation*).

Mus. S. & G.

Genus 4. CREX.

Type.

Crex, Bechst. Gem. Naturg. p. 470 (1803) . . . *Crex pratensis*.

Ortygometra, Leach, Syst. Cat. p. 34 (1816) . . *Crex pratensis*.

CREX PRATENSIS.

Rallus crex, Linn. S. N. i. p. 261.

Crex pratensis, Bechst. Nat. iv. p. 470; Baird, B. N. A. p. 751.

Flavicanti-brunnea, nigro variegata, alis extus rufis: subtus cinereo-albida, gula et abdomine medio dilutioribus: hypochondriis rufo

variegatis: *subalaribus rufis*: *long. tota* 10·5, *alæ* 5·8, *caudæ* 2·1, *rostri a rictu* 1·15, *tarsi* 1·55, *dig. med. cum ungue* 1·6.

Hab. accidentaliter in America boreali (*Baird*).

Genus 5. THYRORHINA*.

THYRORHINA SCHOMBURGI.

Crex schomburgki, Cab. in Schomb. Guian. ii. p. 245, et iii. p. 760; Scl. & Salv. P. Z. S. 1868, p. 169.

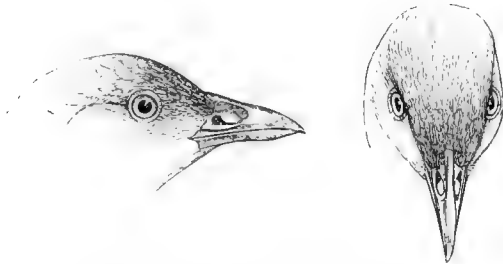
Micropygia schomburgki, Bp. C. R. xliii. p. 599.

Supra olivacea albo guttata, his maculis albis nigro circumdatis: *subtus rubiginosa, gula albicante, abdomine medio albo*: *rostro corneo, mandibulæ apice flavo*: *pedibus aurantiacis*: *long. tota* 5·0, *alæ* 3·3, *caudæ* 1·4, *rostri a rictu* 0·6, *tarsi* 0·85, *dig. med. cum ungue* 0·9.

Hab. Brit. Guiana (*Schomb.*); Venezuela, Caripé (*Goering*); Caracas (*Levraud, in Mus. Paris.*).

Mus. S. & G.

Fig. 1.



Head of *Thyrorhina schomburgki*.

The peculiar form of the nasal openings, which are partly covered over in front by a horny membrane and are completely divided from each other by a median septum, induces us to refer this species to a new genus, these characters not occurring in any other American form of *Rallinæ*. In other respects this little Crake agrees generally with the smaller American species of *Porzana*. The form of the wing corresponds nearly with that of *P. noveboracensis*, the second and next three following primaries being nearly equal and longest, and the external secondaries elongated, so as to be longer than the outer primary. The toes are slender, the middle toe with its nail hardly exceeding the tarsus in length. The tibiæ are feathered nearly down to the joint. The tail is rather longer than is usual among the smaller *Rallidæ*, and not so much concealed by the coverts.

Dr. Schlegel's *Porzana schomburgki* (*Mus. des P. B. Ralli*, p. 37) can hardly be of this species, if his description is correct †. It would appear to be more like Sclater's *P. erythropis*, to which, therefore, we have provisionally referred it.

* *Θυράς, porta, et ρίς, nasus.*

† Dessus d'un brun olivâtre. Dessous gris d'ardoise; bas ventre et sous-caudales noires avec des bandelettes blanches.

Subfam. II. FULICINÆ.

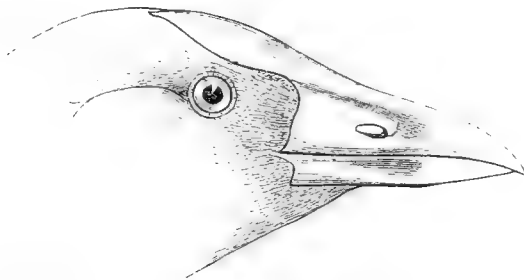
Conspectus generum Fulicinarum.

- a.* digiti membrana laterali omnino carentes: nares ovales ... 6. *Porphyrio*.
b. digiti membrana laterali instructi: nares lineariformes.
 · *a'*. digitorum membrana angusta, continua.
 a''. clypeo frontali parvo, triquetro, elevato 7. *Porphyriops*.
 b''. clypeo frontali expanso, rotundato 8. *Gallinula*.
b. digitorum membrana lobiformi 9. *Fulica*.

Genus 6. PORPHYRIO.

| | Type. |
|---|------------------------|
| <i>Porphyrio</i> , Temm. | <i>P. antiquorum</i> . |
| <i>Ionornis</i> , Reichenb. Nat. Syst. p. xxi (1853) .. | <i>P. martinicus</i> . |
| * <i>Porphyryla</i> , Bp. C. R. xliii. p. 599 (1851) | <i>P. martinicus</i> . |
| <i>Glaucestes</i> , Reichenb. Nat. Syst. p. xxi (1853).. | <i>P. parvus</i> . |

Fig. 2.

Head of *Porphyrio martinicus*, showing the oval nostril.

I. PORPHYRIO MARTINICUS.

Fulica martinica, Linn. S. N. i. p. 259.

Gallinula martinica, Lath. Ind. Orn. ii. p. 812.

Gallinula martinicensis, Max. Beitr. iv. p. 812.

Crex martinica, Licht. Doubl. p. 79.

Porphyrio martinica, Temm. Pl. Col. 405 (text); Burm. Syst. Ueb. iii. p. 392; Gosse, B. Jam. p. 377; Schomb. Guian. iii. p. 761; Sclater, P. Z. S. 1861, p. 81; Sc. & Salv. P. Z. S. 1864, p. 372, et 1867, p. 592; Ibis, 1859, p. 230; Moore, P. Z. S. 1859, p. 64; Taylor, Ibis, 1864, p. 96 et p. 171; Léotaud, Ois. Trin. p. 501.

Ionornis martinicensis, Reichenb. Nat. Syst. p. xxi.

Gallinula martinica, Baird, B. N. A. p. 753; Sclater, P. Z. S. 1864, p. 179.

Porphyrio tavoua, Vieill. Gal. ii. t. 267.

Porphyryla martinica, Bp. C. R. xliii. p. 599 (1856); Gundlach, Rep. F. N. i. p. 362.

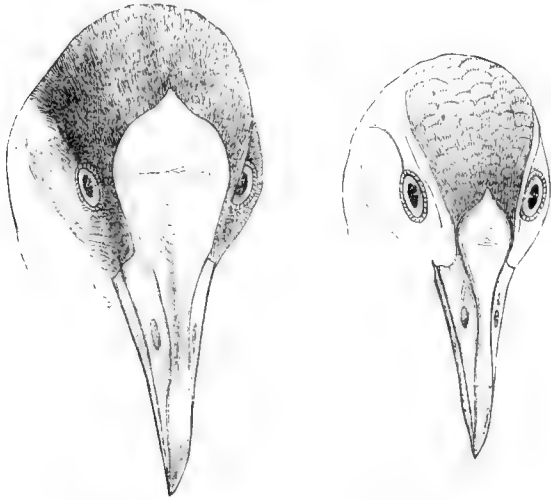
* *Porphyryla* is a genus originally established by Blyth (Cat. B. As. S. Mus. p. 283), of which the type is *Porphyrio chloronotus*, described by Blyth (J. A. S. B. xviii. p. 283) from an unknown locality. Bonaparte misapplied this term to *P. martinicus*, and has misled Baird (B. N. A. p. 753) into following him.

Supra viridis, alis extus et cervice postica cæruleo lavatis: occipite nigricante: subtus purpureus, ventre imo nigricante, crisso albo: scuto frontali cærulescente, rostro coccineo, apice flavo: pedibus flavidis: long. tota 10·0, alæ 6·8, caudæ 2·8, rostri a rictu 1·2, tarsi 2·2, dig. med. cum ungue 2·9.

Avis jr. Supra olivaceus, alis extus cæruleo tinctis: capite, collo et dorso postico brunnescentibus: subtus albus, ochraceo perfusus.

Hab. Americæ bor. st. Atlanticos merid. (*Baird*); Guatemala (*Salvin*); Cuba (*Gundlach*); Jamaica (*Gosse et Osburn*); Porto Rico (*Taylor*); Trinidad (*Léotaud*); British Guiana (*Schomb.*); Para (*Wallace*); South-eastern Brazil (*Max. et Burm.*); Paraguay (*Azara*).
Mus. Brit., S. & G.

Fig. 3.

*Porphyrio martinicus.**Porphyrio parvus.*

2. PORPHYRIO PARVUS.

Favorite de Cayenne, Buff. Pl. Enl. 897.

Fulica parva, Bodd.

Gallinula flavirostris, Gm. S. N. p. 699.

Gallinula parva, Schlegel, Mus. d. P.-B. *Ralli*, p. 39.

Porphyrio parvus, Scl. & Salv. P. Z. S. 1867, p. 592.

Glaucetes flavirostris, Reichenb. Nat. Syst. p. xxi.

Porphyryla martinica, Bp. C. R. xliii. p. 599 (*partim*).

Supra cærulescenti-viridescens, medialiter brunnescens: dorso postico nigricante: subtus pure albus, capite et cervice lateraliter cæruleo perfusis: scuto frontali et rostro flavicanti-olivaceis: pedibus flavis: long. tota 9·0, alæ 5·0, caudæ 2·7, rostri a rictu 1·0, tarsi 1·75, dig. med. cum ungue 2·5.

Hab. Cayenne (*Buff.*); Surinam (*Mus. Lugd.*); Amazons (*Wallace*); Brasil. int. Rio Araguay (*Natterer*).

Mus. Brit., S. & G.

Obs. Cum juniore sp. præc. sæpe confusus, sed scuto frontali

parvo triquetro, crassitie minore, et corpore subtus pure albo facile distinguendus!

Genus 7. PORPHYRIOPS.

Porphyriops, Puch. R. Z. 1845, p. 278.

Hydroiccca, Cab. Wieg. Arch. 1847, p. 351.

1. PORPHYRIOPS CRASSIROSTRIS.

Fulica crassirostris, J. E. Gray, Griffith's A. K. iii. p. 542.

Gallinula crassirostris, Darwin, Zool. Beagle, iii. p. 133; Bridges, P. Z. S. 1843, p. 118; Pelzeln, Novara-Reise, Vög. p. 135; Schl. Mus. d. P.-B. Ralli, p. 49.

Porphyriops crassirostris, Salvad. Att. Sc. It. viii. p. 285.

Hydroiccca melanops, Sclater, P. Z. S. 1867, p. 333.

Olivaceus, pileo medio obscuriore: alis fuscis, harum tectricibus castaneo perfusis, secundariis externis albicante marginatis: subtus cinereus, ventre medio et crisso albo; hypochondriis olivaceo perfusis et albo maculatis: rostro obscure olivaceo, apice flavicante; pedibus corylinis: long. tota 9, alæ 5·2, caudæ 2·2, rostri a rictu 0·95, tarsi 1·8, digiti medii cum ungue 2·5.

Hab. Chili (*Bridges, Leybold*).

Mus. Brit., S. & G.

2. PORPHYRIOPS MELANOPS.

El cara negra, Azara, Apunt. iii. p. 223. no. 373.

Rallus melanops, Vieill. N. D. xxviii. p. 553, et E. M. p. 1065.

Hydroiccca melanops, Cab. Wieg. Arch. 1847, p. 351.

Ortygometra melanops, Burm. La Plata, ii. p. 505.

Crex femoralis, Tsch. Wieg. Arch. 1843, pt. 1. p. 388, et F. P. Aves, p. 301(?).

Amaurornis femoralis, Bp. C. R. xliiii. p. 600(?).

Porphyriops leucopterus, Salvadori, Att. S. I. viii. p. 382; Scl. & Salv. P. Z. S. 1868, p. 175.

Sim. præc. sed minor, pileo medio obscuriore, et remigibus secundariis intus et extus albo magis distincte notatis: long. tota 7·5, alæ 4·9, caudæ 2·3, tarsi 1·4, digiti medii cum ungue 1·8, rostri a rictu 0·9.

Hab. Paraguay (*Azara*); Bogota (*Mus. Derb.*); Bolivia (*D'Orb. in Mus. Paris.*); Peru (*Tschudi*); New Granada (*Mus. Derb.*).

Mus. Derb.

We have examined the type specimen of *P. leucopterus* of Salvadori, which has been kindly lent to us by the describer, and find it distinguishable from the Chilian bird by the characters above given. If the locality of "Paraguay," assigned to it by Dr. Salvadori, is correct, it seems probable that all the birds met with on the eastern slope of the Andes will turn out to be of this form. But we have as yet only been able to examine one Cisandean specimen, from New Granada, in the Derby Museum. This certainly belongs to the white-winged form. We shall not consider the specific dis-

tinctness of the two forms established until we have had an opportunity of examining a series of specimens from several localities.

Genus 8. GALLINULA.

Type.

Gallinula, Latham, Ind. Orn. ii. p. 770 *G. chloropus*.

GALLINULA GALEATA.

Crex galeata, Licht. Doubl. p. 80 (1823).

Tahana, Azara, Apunt. iii. p. 238.

Gallinula galeata, Max. Beitr. iv. 807 (1833); Schomb. Guian. iii. p. 760; Tsch. F. P. *Aves*, p. 302; Gay, Faun. Chil. *Aves*, p. 437; Burm. S. U. iii. p. 389; Burm. La Plata-Reise, ii. p. 505; Gosse, Birds of Jamaica, p. 381; A. & E. Newton, Ibis, 1859, p. 260; Taylor, Ibis, 1860, p. 314; Salv. Ibis, 1866, p. 198; Scl. P. Z. S. 1861, p. 81, et 1867, p. 339; Scl. & Salv. P. Z. S. 1868, p. 176; Sallé, P. Z. S. 1857, p. 237; Gundl. Rep. F. N. p. 362; Bryant, Proc. Bost. Soc. xi. p. 97; Léotaud, Ois. de Trin. p. 503.

Ardesiacus: dorso medio et alis extus olivaceis in brunneum trahentibus, ventre medio albicante; margine alari, strigis hypochondriorum elongatis et crisso pure albis, hujus plumis mediis et caudæ rectricibus nigris: clypeo frontali et rostro coccineis, hujus apice flavo: pedibus olivaceis flavo variegatis; tibiæ parte nuda sanguineo-rubra: long. tota 15·0, alæ 7·5, caudæ 3·3, rostri a rictu 1·5, tarsi 2·3, digiti med. cum ungue 3·7.

Hab. Americæ bor. stat. merid. (*Baird*); Cuba (*Gundlach*); Jamaica (*Gosse* et *Osburn*); St. Domingo (*Bryant*); Trinidad (*Léotaud*); Guatemala (*Salvin*); St. Croix (*Newton*); Guiana (*Schomb.*); Brazil (*Max.* et *Burm.*); Paraguay (*Azara*); Honduras (*G. C. Taylor*); St. Domingo (*Sallé*); Chili (*Gay*); Peru (*Tschudi* et *Whitely*).

Mus. Brit., S.-G.

Genus 9. FULICA.

Type.

Fulica, Linn. S. N. i. p. 277 (1766) *F. atra*.

Phalaris, Reich. Nat. Syst. p. 21 (1852) *F. gigantea*.

Lysca, Reich. Nat. Syst. p. 21 (1852) *F. ardesiaca*.

Lycornis, Bp. Ann. Sc. Nat. ser. 4, Zool. i. p. 46 (1854) *F. cornuta*.

Clavis specierum Americanarum.

- a. clypeo frontali carunculato 1. *cornuta*.
 b. clypeo frontali lævi.
 a. crisso præcipue nigro, lateraliter albo mixto.
 major: flexura alari nigra 2. *gigantea*.
 minor: flexura alari alba 3. *ardesiaca*.
 b. crisso præcipue albo.
 a''. secundariis omnino concoloribus.
 margine alari albo 4. *armillata*.
 margine alari concolori 5. *leucopyga*.
 b''. secundariis albo terminatis.
 major: rostro flavo 6. *leucoptera*.
 minor: rostro rubro notato 7. *americana*.

1. *FULICA CORNUTA.*

Fulica cornuta, Bp. C. R. xxxvii. p. 925 (1853); Hartl. J. f. Orn. i. Extra-H. 1853, p. 82.

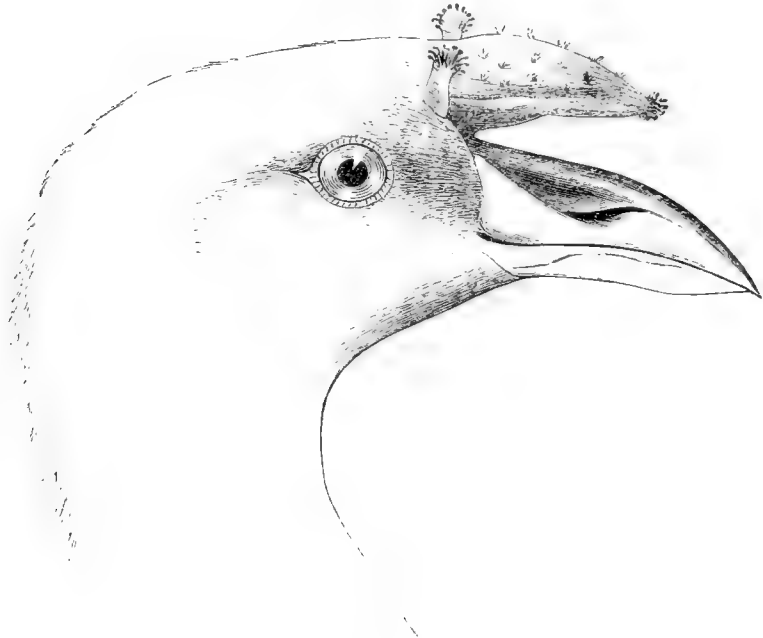
Lycornis cornuta, Bp. C. R. xliii. p. 600.

Cinereo-nigra, capite et cervice obscurioribus: crisso nigro, albicante partim mixto: clypeo frontali caruncula longa eminente instructo: long. tota 19·0, tarsi 3·1.

Hab. Potosi, Bolivia (*Cast. et Dev.*).

Mus. Paris.

Fig. 4.

Head of *Fulica cornuta*.

We have seen the only known specimen of this remarkable species in the Paris Museum, but have nothing to add to Dr. Hartlaub's notes on it. The drawing of the head (fig. 4) is from the typical specimen.

2. *FULICA GIGANTEA.*

Fulica gigantea, Eyd. & Soul. Voy. Bonite, Zool. p. 102, t. 8; Tsch. F. P. p. 302; Hartl. Cab. J. f. Orn. 1853, Extra-H. p. 80.

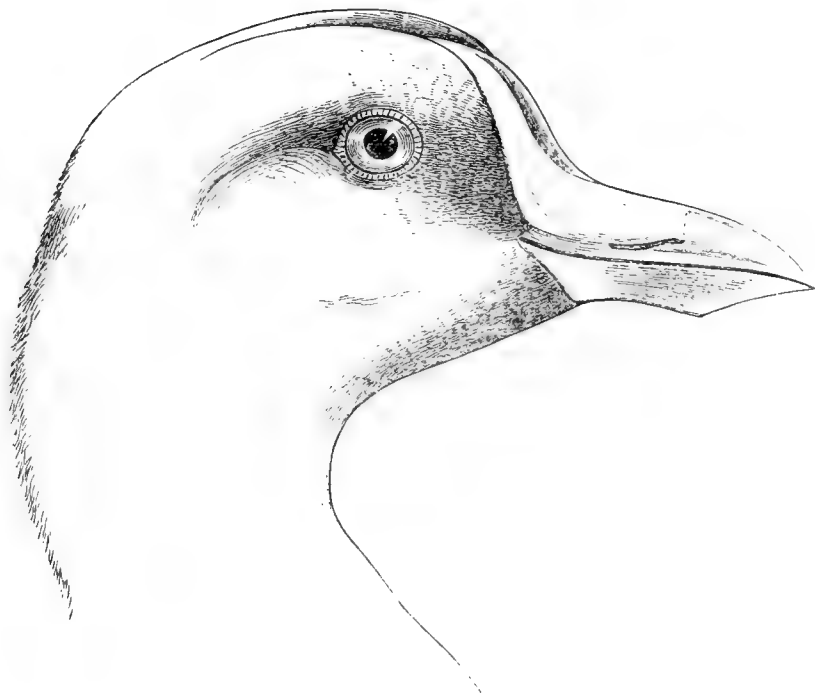
Phalaria gigas, Reichl. Nat. Syst. p. xxi.

Nigra: crisso albo partim mixto: rostro rubricante: clypeo frontali flavo: pedibus rubris: long. tota 21·0, alæ 10·9, tarsi 3·9, dig. med. cum ungue 5·3.

Hab. Andes of Peru; Altos of Huaihuai (*Tschudi*); between Arequipa and Cusco (*Cast. et Dev.*).

Mus. Paris.

Fig. 5.

Head of *Fulica gigantea*.

We have only seen the examples of this scarce species in the Paris Museum, whence our figure of the head (fig. 5) was taken.

3. FULICA ARDESIACA:

Fulica ardesiaca, Tsch. F. P. *Aves*, p. 303.

Lysca ardesiacea, Reich. Nat. Syst. p. xxi.

Fulica chilensis, Des Murs in Gay's Faun. Chil. viii. p. 474, Atl. t. 10; Hartl. J. f. Orn. 1853, Extra-H. p. 81; Sclater, P. Z. S. 1860, p. 82; ScL. & Salv. P. Z. S. 1868, p. 177.

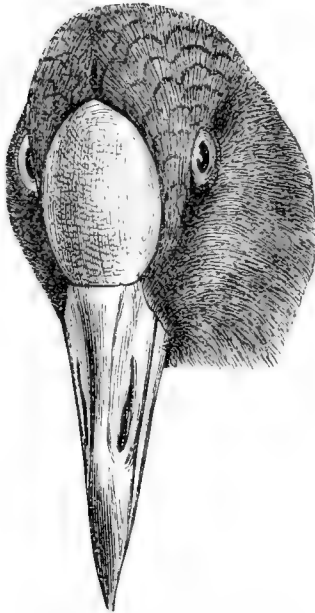
Obscure schistacea, capite undique nigrescente: flexura alari et remigis externi margine albis: crisso nigro lateraliter albo mixto: clypeo frontali tuberositatem parallelogrammicam formante, in tempore nuptiali rubente, aliter albicanti-plumbeo, a rostro linea impressa diviso: pedibus obscure schistaceis: long. tota 16.5, alæ 8.5, caudæ 2.2, rostri a rictu 1.5, tarsi 2.6, dig. med. cum ungue 3.8.

Hab. Bolivian Andes (*D'Orb.*); La Paz (*Cast. et Dev.*); Western Peru, Tambo valley (*Whitely*); Andes of Ecuador, between Rionbamba and Mocha (*Fraser*); Western Peru (*Tsch.*).

Mus. Brit., S.-G.

Since we wrote our notes on Mr. Whitely's second collection (P. Z. S. 1868, p. 173), we have had, through the kindness of M. Coulon of Neuchâtel, an opportunity of examining the type of

Fig. 6.

Head-shield of *Fulica ardesiaca*.

Tschudi's *F. ardesiaca*. It turns out, as we had anticipated, to be the same as *F. chilensis*, Gay; and the species must therefore be called *F. ardesiaca*, Tschudi's name having the priority. This is quite as well, since, as we have already stated (*l. s. c.* p. 177), it is very doubtful whether this Coot ever occurs in Chili, the only authority for its so doing being Gay's untrustworthy assertion.

4. FULICA ARMILLATA.

Focha de ligas roxas, Azara, Apunt. iii. p. 474. no. 448.

Fulica armillata, Vieill. N. D. xii. p. 47, et E. M. p. 343; Hartl. Ind. Azar. p. 28 et J. f. O. 1853, Extra-H. p. 82; Burm. Syst. Ueb. iii. p. 390; La Plata-Reise, ii. p. 505.

Fulica chilensis, Landb. Wieg. Arch. 1862, p. 221.

Fulica chilensis, Schlegel, Mus. des P.-B. Ralli, p. 63 (?).

Fulica frontata, G. R. Gray in Mus. Brit.

Fulica gallinuloides, King, Zool. Journ. iv. p. 96 (?).

Nigricanti-schistacea, capite toto obscuriore: flexura alari et remigis externi margine albis: crisso albo, plumis quibusdam medialibus albis: rostro flavo maculis basalibus rubris: clypeo frontali magno, ovali, flavo, rubro marginato: pedibus maximis, flavicanti-olivaceis, tibiæ parte ima et tarsi antice ruberrimis: long. tota 16·5, alæ 7·8, caudæ 2·0, rostri a rictu 1·4, tarsi 2·8, dig. med. cum ungue 4·0.

Hab. South-east Brazil, St. Catharina (Burm.); Paraguay (Bonpland, Azara); Patagonia (D'Orb.); Chili (Landbeck).

Mus. Brit., Derb.

Fig. 7.

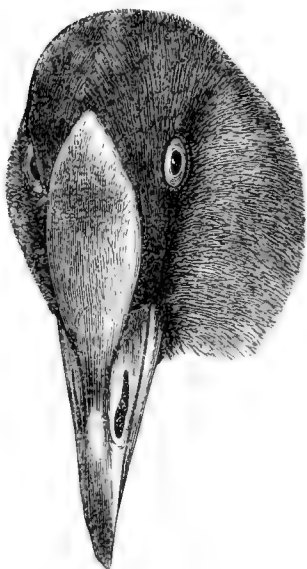
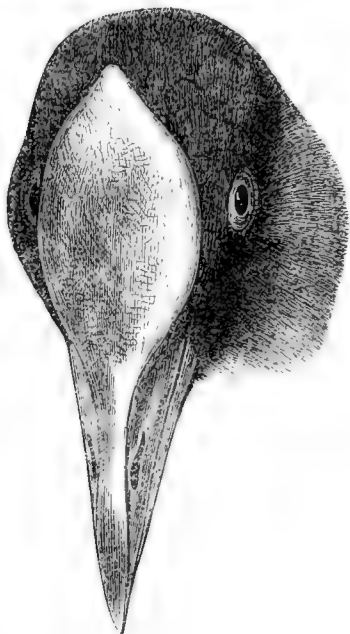
Head-shield of *Fulica armillata*.

Fig. 8.

Head-shield of *Fulica frontata*, G. R. Gray.

This Coot is readily distinguishable among the white-rumped species by its large dimensions, and in particular by the great size of the legs and toes, especially the length of the middle toe, which (taken with that of the nail) usually exceeds four inches. In *Fulica leucopyga* and *F. leucoptera* the corresponding length of the middle toe and tail is barely 3·5. *F. frontata*, Gray, MS., is, as far as we can decide from examination of the single example in the British Museum, merely a specimen of this species with the frontal shield very much developed. Fig. 8 represents the head-shield of this bird.

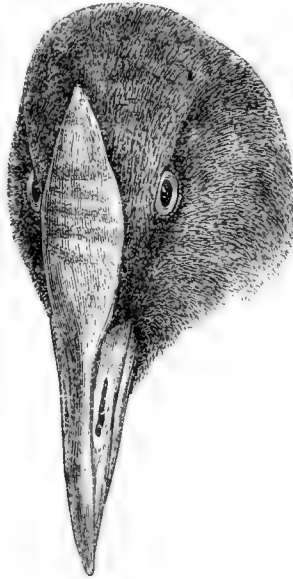
5. FULICA LEUCOPYGA.

Fulica leucopyga, Licht. in Mus. Berol.; Hartl. J. f. O. 1853, Extra-H. p. 84; Schlegel, M. des P.-B. *Ralli*, p. 64.

Fulica rufifrons, Landbeck, Wieg. Arch. 1862, p. 223.

Fulica chloropoides, King, Zool. Journ. iv. p. 95 (?).

Fig. 9.



Fulica leucopyga.

Obscure ardesiaca, capite undique nigricante: crisso albo, plumis quibusdam medialibus nigris: remigis externi margine concolori neque albo: rostri apice flavo, basi cum scuto frontali ruberrimis: hoc angusto, supra acute angulato: pedibus olivaceis: long. tota 16·0, alæ 6·8, caudæ 2·4, rostri a rictu 1·3, tarsi 3·2, dig. med. cum ungue 3·5.

Hob. Uruguay (*Sello*); Chili (*Landb.*); Patagonia (*King*); Falkland Islands (*Mus. Brit.*).

Mus. Brit., *Derb.*

6. *FULICA LEUCOPTERA*.

Focha, Azara, Apunt. iii. p. 472; *undè*

Fulica leucoptera, Vieill. N. D. xii. p. 48, et E. M. p. 343; Hartl. Ind. Azar. p. 28; Burm. La Plata-Reise, iii. p. 505.

Fulica stricklandi, Hartl. J. f. O. 1853, Extra-H. p. 86.

Fulica chloropoides, Landb. Wieg. Arch. 1862, p. 218.

Fig. 10.

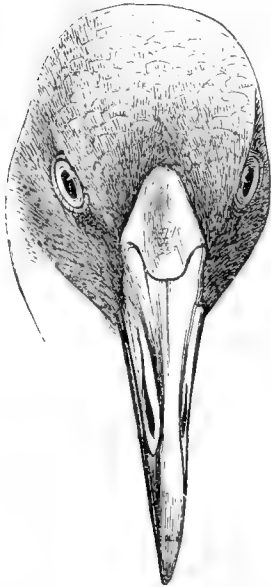
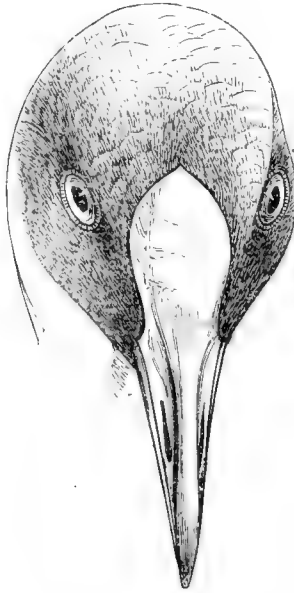
*Fulica americana*.

Fig. 11.

*Fulica leucoptera*.

Obscure ardesiaca, capite undique nigricante: crisso albo, plumis quibusdam medialibus nigris: flexura alari et remigis externi margine angusto necnon secundariorum quorundam apicibus albis: rostro flavo: clypeo frontali minore, supra rotundato, aurantiaco: pedibus olivaceis: long. tota 15, alæ 7·8, caudæ 2·3, rostri a rictu 1·25, tarsi 2·4, dig. med. cum ungue 3·5.

Hab. Paraguay (*Azara*); Uruguay (*Sello*); Parana (*Burm.*); Chiquitos, Bolivia (*Behn*).

Mus. Bremensi.

Obs. Haud dissimilis *F. leucopygæ*, sed secundariis albo terminatis, et scuto frontali postice rotundato dignoscenda.

7. *FULICA AMERICANA*.

Fulica americana, Gm. S. N. i. p. 704; Baird, Birds N. Am. p. 751; Hartl. J. f. Orn. 1854, Extra-H. p. 87, et 1855, p. 99; Scl. & Salvin, Ibis, 1859, p. 230; Gosse, Birds of Jamaica, p. 304; Léotaud, Ois. Trin. p. 504; Sclater, P. Z. S. 1857, p. 206, et 1859, p. 369; Moore, P. Z. S. 1859, p. 64; Gundlach, Rep. F. N. i. p. 363.

Obscure cinerea, subtus dilutior; capite undique nigricante: flexura alari, remigis primi margine externo angusto, necnon secundariorum internorum apicibus albis: crisso albo: rostro albicante rubro maculato: scuto frontali parvo, subtriquetro, rubro: pedibus olivaceis: long. tota 12·0, alæ 7·5, caudæ 1·8, rostri a rictu 1·35, tarsi 2·1, dig. med. cum ungue 3·3.

Hab. America bor. universa (*Baird*); Mexico, Jalapa (*Sallé*); Honduras (*Leyland*); Guatemala, Duenas (*Salvin*); Cuba (*Gundlach*); Jamaica (*Gosse*); Trinidad, accidentally (*Léotaud*).

Mus. Brit., S.-G.

Subfam. III. HELIORNITHINÆ.

Genus HELIORNIS.

| | |
|--|--------------------|
| | Type. |
| <i>Heliornis</i> , Bonn. Enc. Méth. p. 64 (1790) | <i>H. fulica</i> . |
| <i>Podoo</i> , Ill. Prodr. Syst. p. 267 (1811). | <i>H. fulica</i> . |

HELIORNIS FULICA.

Le Grèbe-foulque de Cayenne, Buff. Pl. Enl. 893.

Colymbus fulica, Bodd.

Plotus surinamensis, Gm. S. N. i. p. 581.

Podoo surinamensis, Max. Beitr. iv. p. 823; Cab. in Schomb. Guian. iii. p. 763; Burm. Syst. Ueb. iii. p. 391; Hartl. Ind. Az. p. 28.

Heliornis fulicarius, Bonn. Enc. Méth. p. 64.

Dedales, Azara, Apunt. iii. p. 468. no. 446.

Heliornis fulica, Gray, Gen. B. iii. p. 634; Sel. & Salv. Ibis, 1859, p. 234; P. Z. S. 1864, p. 372, 1866, p. 200, 1867, pp. 754, 979; Léotaud, Ois. de Trin. p. 531; Lawrence, Ann. L. N. Y. vii. p. 302.

Supra olivaceo-brunneus, capite cum cervice postica et laterali nigris: superciliis, linea cervicis utrinque et corpore subtus albis: crisso nigricante: cauda nigra albo terminata: rostri maxilla nigricante, mandibula flava: pedibus flavis nigro variegatis: long. tota 11·0, alæ 5·2, caudæ 3·3, tarsi 8·5, dig. med. cum ungue 1·45.

♀. *Mari similis, sed macula magna auriculari utrinque ochraceo-rufa.*

Hab. Guatemala (*Salvin*); Panama (*McCleannan*); Cayenne (*Buff.*); Brit. Guiana (*Schomb.*); Eastern Peru, Chyavetas (*Bartlett*), Pebas (*Hauxwell*); South-east Brazil (*Max. et Burm.*); Paraguay (*Azara*).

Mus. Brit., S.-G.

Tabula Rallidarum Americanarum Geographica.

| | North America, | Mexico and Central America. | New Granada. | Western Ecuador and Peru. | Antilles. | Trinidad and Venezuela. | Guiana. | Amazonia. | Bolivia. | South-east Brazil. | Paraguay and Ar- gentine Republic. | Chili and Patagonia. | Galapagos Islands. |
|--|----------------|--------------------------------|--------------|------------------------------|-----------|----------------------------|---------|-----------|----------|--------------------|---------------------------------------|-------------------------|--------------------|
| I. RALLINÆ. | | | | | | | | | | | | | |
| 1. <i>Rallus maculatus</i> | .. | .. | .. | .. | * | * | * | * | .. | * | .. | .. | .. |
| 2. — <i>elegans</i> | * | * | .. | .. | * | * | * | .. | .. | * | .. | .. | .. |
| 3. — <i>longirostris</i> | * | * | .. | .. | * | * | * | .. | .. | * | .. | .. | .. |
| 4. — <i>virginianus</i> | * | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 5. — <i>antarcticus</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 6. — <i>semiplumbeus</i> | .. | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 7. — <i>rythirhynchus</i> | .. | .. | .. | * | .. | .. | .. | .. | .. | * | .. | * | .. |
| 8. — <i>nigricans</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | * | * | .. |
| 9. <i>Aramides cayennensis</i> | .. | .. | * | .. | .. | * | * | .. | .. | * | * | * | .. |
| 10. — <i>albiventris</i> | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 11. — <i>ypecaba</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | * | * | .. |
| 12. — <i>ruficollis</i> | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | .. | .. |
| 13. — <i>saracura</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | * | * | .. |
| 14. — <i>axillaris</i> | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | .. | .. | .. |
| 15. — <i>mangle</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | * | * | .. |
| 16. <i>Porzana carolina</i> | * | * | .. | .. | * | .. | .. | .. | .. | .. | .. | .. | .. |
| 17. — <i>albicollis</i> | .. | .. | .. | .. | .. | * | * | .. | .. | * | * | * | .. |
| 18. — <i>cayanensis</i> | .. | .. | .. | .. | .. | .. | * | * | .. | * | * | * | .. |
| 19. — <i>levraudi</i> | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | .. | .. | .. |
| 20. — <i>rubra</i> | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 21. — <i>concolor</i> | .. | * | .. | .. | * | .. | .. | .. | .. | * | .. | .. | .. |
| 22. — <i>castaneiceps</i> | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | .. |
| 23. — <i>hauxwelli</i> | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | .. |
| 24. — <i>melanophæa</i> | .. | .. | .. | .. | .. | * | .. | .. | * | .. | .. | .. | .. |
| 25. — <i>albigularis</i> | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 26. — <i>leucopyrrha</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 27. — <i>flaviventris</i> | .. | .. | .. | .. | * | * | * | .. | .. | * | * | * | .. |
| 28. — <i>jamaicensis</i> | * | * | * | * | * | * | * | .. | .. | * | * | * | .. |
| 29. — <i>spilonota</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | * |
| 30. — <i>notata</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | * | .. |
| 31. — <i>cinerea</i> | .. | .. | .. | .. | .. | * | * | * | .. | .. | .. | .. | .. |
| 32. — <i>noveboracensis</i> | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 33. — <i>erythrops</i> | .. | .. | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 34. <i>Crex pratensis</i> | * | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 35. <i>Thyrorhina schomburgki</i> | .. | .. | .. | .. | .. | * | * | .. | .. | .. | .. | .. | .. |
| II. FULCINÆ. | | | | | | | | | | | | | |
| 36. <i>Porphyrio martinicus</i> | * | * | .. | .. | * | * | * | * | .. | * | * | * | .. |
| 37. — <i>parvus</i> | .. | .. | .. | .. | .. | .. | * | * | .. | * | * | * | .. |
| 38. <i>Porphyriops crassirostris</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 39. — <i>melanops</i> | .. | .. | * | * | .. | .. | .. | .. | * | .. | .. | .. | .. |
| 40. <i>Gallinula galeata</i> | * | * | * | * | * | * | * | .. | .. | * | * | * | .. |
| 41. <i>Fulica cornuta</i> | .. | .. | .. | * | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 42. — <i>gigantea</i> | .. | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. |
| 43. — <i>ardesiaca</i> | .. | .. | .. | * | .. | .. | .. | .. | * | .. | .. | .. | .. |
| 44. — <i>armillata</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. |
| 45. — <i>leucopyga</i> | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | * | * | .. |
| 46. — <i>leucoptera</i> | .. | .. | .. | .. | .. | .. | .. | .. | * | .. | * | * | .. |
| 47. — <i>americana</i> | * | * | .. | .. | * | * | .. | .. | .. | .. | .. | * | .. |
| III. HELIORNITHINÆ. | | | | | | | | | | | | | |
| 48. <i>Heliornis fulica</i> | .. | * | .. | .. | .. | * | * | * | .. | * | * | * | .. |





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OTIS AUSTRALIS ♂

5. Observations concerning the presence and function of the Gular Pouch in *Otis kori* and *Otis australis*. By JAMES MURIE, F.L.S., F.G.S., &c., Prosector to the Society.

(Plate XXXVI.)

Introductory.—A remarkable paper appeared in the 'Ibis' * for 1862,—remarkable alike for the able defence therein sustained of the veracity of the observations of three eminent British naturalists impugned by Dr. Gloger of Berlin, and for the facts substantiating the following curious anomaly. The data given showed that in some male Bustards a large gular pouch had been found, while in other birds of the same species no trace of such a structure or organ existed.

The substance of the above discussion supports the individual statements and opinions of between twenty and thirty trustworthy persons. While thus bearing the impress of science and of facts, it nevertheless, with our more extended present knowledge, savours and reminds one of Merrick's well-known verses upon the varying colour of the Chameleon. All seem to have had truth on their side when viewed in a certain light.

Since the publication of the above elaborate and historical article by Professor Newton, the careful observations of Dr. Cullen (*Ibis*, 1865, p. 143) and of Mr. Flower (*P. Z. S.* 1865, p. 747) have further proved the occasional existence of a large gular sac in the male of *Otis tarda*, Linn., to be a circumstance about which not a shadow of doubt can be entertained.

The subject, however, is one which still calls for more extended examination in other species of the family *Otidæ*. For example, the use which such a curious appendage subserves is still within certain limits a matter of discussion; as it too often happens that organic function, where obscure, puzzles by the apparent multiplicity of uses to which it may be applied.

It has appeared to me, therefore, that the observations which I shall here communicate are not without interest, concerning the function of this little less than wonderful apparatus. The gular-pouch question, though to all intents and purposes amicably settled, is not yet entirely known. Some anomalies thereon are certainly difficult of explanation.

The present communication is mainly based upon the examination of the dead body of a male specimen of Burchell's Bustard (*Otis kori*, Burchell), and upon observations on a living Australian Bustard (*Otis australis*, Gray), both the property of the Society.

Gular Pouch in O. kori.—The former bird, a male but not old specimen of *Otis kori*, was forwarded from South Africa, and purchased by the Society May 10th, 1866. Its death occurred in March

* "On the supposed Gular Pouch of the Male Bustard (*Otis tarda*, Linn.)," by Alfred Newton, M.A., F.L.S. (*The Ibis*, April 1862, pp. 107-127).

1867, when I had the opportunity of ascertaining the presence of a distinct but small-sized gular pouch.

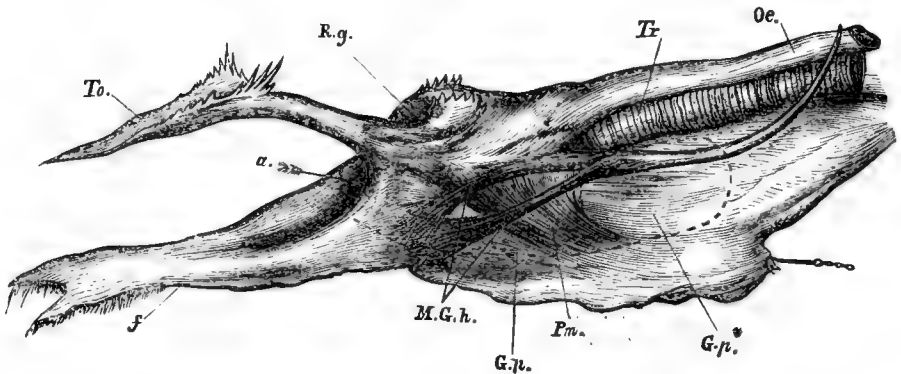
It may not be inappropriate to describe this *in situ*, referring at the same time to the accompanying drawing (fig. 1), as illustrating the appearance and relative position of the parts on their removal from the body.

On examining the mouth when distended, an opening could be seen beneath the tongue, which in size and general relative appearance corresponded very well with the descriptions of the several authors who have found such an entrance into a pouch. It agreed with Mr. Flower's precise anatomical verbal delineation (*loc. cit.* p. 748).

Without any apparent contraction, the aperture above mentioned led into a thin-walled empty sac, which differed from the hitherto recorded cases of gular pouch in *Otis tarda* in being only three inches in length and about an inch in transverse diameter.

In the recent undisturbed state the sac or bag was of nearly equal width above and below, exhibiting no contraction and additional terminal sacculus, as figured and described by Dr. Cullen (*op. cit.* p. 144). Superficially (*i. e.* inferiorly) its walls were in close contact with the delicate skin of the throat; and deeply (*i. e.* superiorly) the sac lay on the trachea (see fig. 1, *infra*).

Fig. 1.



Lateral view showing the position of the gular pouch and surrounding parts in *Otis kori*, the skin and subjacent tissue being thrown back so as to cover it.

G.p. *G.p.** Gular pouch included within the dotted line; *a.* the aperture beneath. *To.* the tongue, which is raised above *f.* floor of mouth. *R.g.* *Rima glottidis*, or laryngeal fissure. *Tr.* Trachea. *Oe.* Oesophagus. *P.m.* The superficial muscular fibres of the *platysma myoides*, or the so-called sphincter of the gular pouch. *M.G.h.* The mylo- and genio-hyoidei muscles, cut through towards their mandibular origin.

The structural elements of this small gular pouch were composed of material very similar to what Mr. Flower mentions, namely, membranous tissue and a minute quantity of elastic fibres interwoven with the areolar tissue. Its lining membrane was apparently a continuation of the mucous coat of the mouth and general faucial aper-

ture, and, like it, of a dark colour. The mucous surface of the floor of the mouth under the tongue and between the rami of the lower mandible had a linear median row of small glandular openings (some dozen in number) in its middle. And laterally, or nearer the mandibular bones, were more numerous irregularly placed minute puncta, likewise the apertures of secreting crypts, *glandulæ sublinguales*. The interior of the gular pouch, however, was free from any such follicles.

The only other point worthy of mentioning, in immediate connexion with the structure of the gular pouch, is the questionable occurrence of a special sphincter muscle for closing its aperture. According to my dissection of the parts which fig. 1 illustrates, the hinder portion of the sac is devoid of any appreciable muscular envelope, and appears only covered by the skin and subcutaneous tissue. In front of this, and situated at what may be considered the neck of the pouch, a delicate layer of somewhat transverse muscular fibres passed across and backwards (see fig. 1, *Pm.*).

This film of muscle doubtless represents an anterior portion of the so-called *platysma myoides* of Mammalia; or it may be part of the constrictor colli found by Prof. Owen* in the Apteryx, if not the true *platysma*, also present in that bird.

Habits and Inferences.—Concerning the habits of this specimen of Burchell's Bustard, Mr. Bartlett, our Superintendent, and the keeper, George Misselbrook, who have had more opportunity of watching the bird while alive than I, related to me the following memoranda. That they had never heard it utter any note; that on no occasion had it been seen to inflate or dilate the throat in the manner often witnessed in the common Bustard; that as regards disposition it appeared remarkably quiet and inoffensive, living in perfect harmony with the other birds in the same enclosure.

The points of importance elucidated from dissection and the observations on the living bird resolve themselves into these three:—

1. It would seem that some specimens of Burchell's Bustard (*O. kori*) possess a "gular pouch" identical in position and structure with that of the Great Bustard (*O. tarda*).

2. This sac in the young African male bird in question is very small compared with what other observers have found in the European species of the same genus.

3. The noiseless manner of the bird and want of inflation of this throat-pouch may respectively be dependent on the age or attributed to the absence of sexual desires.

Pouch in the living O. australis.—My attention having thus specially been called to the Bustard's curious gular pouch through the examination of the above specimen, I was naturally the more pleased to find what I think may be termed an exaggerated example of this organ in the Australian Bustard.

A male specimen of *Otis australis*, Gray, was received from the Acclimatization Society of Sydney in April 1866. During the same month a second supposed male Australian Bustard was purchased.

* Trans. Zool. Soc. vol. iii. pp. 278-279.

They were both placed in the paddock along with other specimens of the Bustard tribe.

No particular change was observed in them until the beginning of May 1867, when one began "to show off" as the keeper termed it, and this bird continued to do so at intervals until the end of June, after which it resumed its usual quiet and stately demeanour.

During the current year (1868), about the same time, namely the beginning of May, the same phenomenon has occurred, and this has continued up till the present date (24th June), but is now visibly declining.

This "showing off," which is in truth a most extraordinary sight, may best be comprehended by a study of the accompanying sketch (Plate XXXVI.) drawn from nature during one of those paroxysmal periods of excitement.

The premonitory symptoms observable when the Bustard is about to exhibit himself in the pride of lust (for such it seems to me to be) is a slight swelling of the inframandibular portion of the throat, while the head is thrown upwards. Immediately afterwards the neck swells and the feathers of the lower parts concomitantly bulge out and descend gradually downwards in the form of a bag, oftentimes nearly reaching the ground.

If the paroxysm is a strong one, then the tail is shot upwards and forwards over the back, the rectrices coming almost in contact with the neck.

In this peculiar attitude, with bloated neck, hanging baggy chest, elevated tail, and stiff stilt-like legs, the creature struts about in a somewhat waddling manner, the elongated pouch swaying to and fro. The feathers of the throat start out on end; those of the depending sac are also raised, but less upright. While all this has taken place the bird seems to have gulped in the air, or rather, with partly opened gape, to have taken a long, deep and forced inspiration.

The acme of inspiratory effort and strange attitude attained, the Bustard begins to snap the mandibles together in a loud manner and utter a series of cooing sounds for a short interval of time. Usually, and more frequently, he struts towards the female Bustards in a most dignified manner, or, oblivious as to sex, totters up to any of the birds in the same enclosure.

Occasionally the paroxysm is less marked, and he sits or stands, blowing out in a playful manner the subglobular dilatation under the maxillæ, but not throwing down the pouch or erecting the tail.

This periodical excitement, although lasting altogether about a couple of months, does not continue with vigour the whole of that time. In the beginning of May it is observed at distant intervals, and chiefly the puffing out of the throat occurs. Towards the end of that month the paroxysms take place oftener, and the whole sequelæ of the phenomenon are passed through. By the commencement of June the bird "shows off" very often, and most grandly; before the middle of that month the greatest frequency of the pa-

roxysms has been reached. Each day afterwards they lessen, until as July arrives the Bustard has resumed his usual gentle habits.

The accession of this most remarkable display occurs chiefly early in the morning or at sundown during the period of excitement; and it is only near the climax that it happens during the middle of the day. At such times the fits succeed each other frequently, as often as every hour.

Curiously enough, the companion (*Otis australis*) which arrived in the same month of 1866, and is supposed also to be a male, has never exhibited any such change in its habits.

I should be doing injustice to Prof. Newton's excellent communication did I not specially refer to the circumstance mentioned (*ibid.* p. 114)—that Mr. J. H. Gurney informed him the late Mr. Frederick Strange had published a notice in an Australian newspaper affirming that the *Otis australis* possessed a gular pouch. Mr. Strange, then, is entitled to priority of observation; but as regards his statements concerning the organs in question I am, like Prof. Newton, perfectly ignorant of them.

Notes on other Bustards.—Before drawing inferences from the facts which I have first related, I shall allude to an examination of two other species of Bustard made by me. One was a Little Bustard (*Tetrax campestris*), an old male, possessed by the Society, and which died on the 17th September, 1867. No gular pouch was found in this bird. The other, a young male Houbara Bustard (*Otis houbara*, Gm.), examined on the 22nd of the same month, exhibited not a trace of a gular sac.

The peculiar actions and amorous propensities of the Great Bustard (*O. tarda*), noticed almost a century ago, and again and again verified by later writers, and no less skilfully depicted by Wolf (*Zoological Sketches*, vol. i. pl. 45), finds a modified counterpart in *Tetrax campestris* and in *Otis australis*.

Conclusions.—The present anatomical examination of the diminutive gular pouch in *Otis kori* cannot of itself in propriety be adduced as evidence of any economical function to which the sac may be applied. The dissection, however, and observations on the living Australian bird, &c., together with the published accounts of others, concerning the presence and functions, or absence of such an organ, have led me to the following reflections:—

1. There is nothing in the structure of the gular pouch, in its position, or in the habits of Bustards, so far as I am informed and can judge, which justifies a belief that its use is that of a water-reservoir. I should therefore incline to Naumann's* and Yarrell's† opinion rather than that of the original discoverer Dr. Douglas‡ and some later writers.

2. Its nature &c. equally affords grounds for considering that it is not a residual sac for food; the fact of a trifling quantity of

* Naturgesch. der Vögel Deutschl. vii. pp. 20, 21; quoted by Newton, *Ibis*, 1862, p. 115.

† In a letter to Newton, *loc. cit.* p. 118.

‡ Albin, *Nat. Hist. Birds*, iii. p. 36; also quoted by Newton, *l. c.* p. 108.

seeds, grass, or leaves being found in it appears to me only an accidental circumstance, the absence of great muscularity in the walls permitting the foreign body temporarily to lie there. In this respect I also agree with Naumann* and Yarrell†, although I hardly think that the latter naturalist was right in stating "such foreign substances would destroy the bird by inflammation."

3. What Cullen and other earlier authors (Schneider and Degland‡, for example) have said regarding the presence of the gular pouch during the breeding-season in *Otis tarda*, and what has been observed in the Australian Bustard in our Gardens, show that the pouch is a feature connected with the reproductive function, and only a temporary air-chamber.

The gaudy Peacock swells out with tremulous emotion; the Turkey Cock, the Tragopan, and other birds erect their wattles; the Pouter Pigeon no less shows sexual phenomena akin, though in some respects differing from that of the Bustards.

4. From the statements of various observers, then, it would thus appear that at least five species of Bustard occasionally possess a gular pouch, namely *Otis tarda*, *O. kori*, *O. australis*, *O. nigriceps*, and *O. tetrax*; but others yet unexamined may also have it; so probably it obtains in the family *Otidæ*.

5. In a moderate-aged male Burchell's Bustard, as we have seen, the pouch is very limited in dimensions. In young birds of this and other species it has never been found; and where its existence has distinctly been proved, it invariably (with one apocryphal exception) has occurred in fully grown males. From these data I think it may be inferred that the said "gular pouch" is an organ of adult growth possessed alone by the male, and not attaining its full dimensions until the bird has arrived at maturity. To such circumstances the incidental non-development of the organ may be ascribed.

6. There still remains the unexplained peculiarity that some adult, and possibly it may be *old*, males have it not. This I confess is not at all clear to me. If the organ is reciprocal with the procreative faculty, enlarged or subject to an accession of growth during the instinctive sexual season, then I cannot conceive why traces of the pouch, and especially its opening, do not at all times exist—that is, as soon as the bird has arrived at maturity. That the sac is not the result of a bursting and expansion of the cellular tissue of the throat, as Mr. Bartlett has suggested, I am perfectly satisfied of. In emphysematous disease of the lungs in the higher Mammalia rupture of the pulmonary cells and enlargement into a sacculus does peradventure take place; but in the cellular tissue of the neck of birds we have tissues differently constructed. Moreover the same objection applies in either instance; for in the lung, as would be in the Bustard's neck, such a lesion could not be inflated and com-

* *Op. cit.*, and *Ibis*, 1862, p. 115.

† *L. c.* p. 118.

‡ See Newton's paper, *l. c.* pp. 107, 115, quotations being there given from the authors; the original volumes it has not been my fortune to consult.

pressed at the will of the bird, as evidently is the case in the organ in question. Besides this, the sac presents a wide external aperture (*i. e.* into the mouth) with natural and healthy-looking walls lined with mucous membrane. As has been demonstrated, the enlarged tracheal pouch of the Emu is not a sudden or accidental circumstance, but the further development of a rudimentary structure found in the young; so in an analogical manner should we expect to find rudiments of the gular pouch in the young male Bustard. If the gular pouch is, so to speak, sporadic, irregularly dispersed among individual specimens, merely the product of inconstant fortuitous circumstances, and produced in old birds in what must seem an incredibly short space of time, then in it we have a most extraordinary physiological fact, and such as does not tally with our present knowledge of the laws of development.

7. Observations respecting the development of this appendage, and especially such as point out the precise period and manner of growth, are yet a desideratum. As I have already hinted in my introductory remarks, some anomalies are certainly difficult of explanation.

8. Finally, with regard to the mechanism of inflation, the first thing is how the air gets there. Now, according to the laws of pneumatics applied physiologically, the pressure of the surrounding atmosphere ordinarily would not be sufficient to overcome the resistance and tonicity of the living tissues, such as to produce complete distention. Neither is it likely that sufflation is the result of a vacuum. A lengthened inspiration may aid, but I believe cannot directly and fully dilate the cavity; that is to say, the tongue being raised and the aperture into the gular pouch unobstructed, the air drawn into the lungs during the inspiratory effort would not equally rush in and fill the gular sac to repletion, as necessarily it does the pulmonary cells and pneumatic cavities. The lungs and subsidiary air-passages once full, however, and expiration naturally taking place, the mouth and posterior nasal passages require only to be partially closed for the thoracic muscular contraction to drive the air into the sac. In other words, muscular power is as requisite to inflate it as to empty it. A familiar illustration might be given in the blowing out of a bladder. Judging from the actions of the living Australian Bustard, the above explanation holds good, inasmuch as previous to expansion of the gular pouch it does not gape, but inspires quietly. When the pouch is blown out and the bird utters the cooing snapping sounds, the mouth is then more or less open. The cooing noise may be laryngeal. If from the gular pouch, compression of the muscular and fibro-elastic tissues of the neck must drive the air out, which, the fibres at the neck of the sac resisting, cause it to escape in jets. By relaxation of the mandibular fibres and contraction of those of the inferior part of the neck, emptiness of the pouch results, and the neck assumes its usual proportions.

6. First Account of Species of Tailless Batrachians added to the Collection of the British Museum. By Dr. A. GÜNTHER, F.R.S., F.Z.S.

(Plates XXXVII., XXXVIII., XXXIX., XL.)

AFTER the arrangement of the collection of Tailless Batrachians had been completed (in 1858), particular attention was paid to the acquisition of such species as were desiderata. A considerable number of specimens were received into the collection, illustrative of the development, sex, variation, and geographical distribution of species hitherto incompletely represented in the collection. It is not my object to refer to these specimens in this paper, but I shall confine myself to an enumeration of those which were entirely wanting in the collection, or which, since the time mentioned, have been described as new.

The number of species contained in the collection at the time of the publication of the 'Catalogue of Batrachia salientia' was 214; this is now increased to 313*, the number of typical specimens amounting to 125.

I. *List of species acquired which were previously desiderata.*

DACTYLETHRA MUELLERI (Ptrs.). Ten examples from various localities.

RANA FUSCA (Blyth). Tennasserim. Mr. Theobald.

RANA MONTEZUMÆ (Baird). Mexico. Hr. Doorman.

GOMPHOBATES KRÖYERI (Rnhrdt.). —? C. Darwin, Esq.

GOMPHOBATES NOTATUS (Rnhrdt. & Lüt.). Lagoa Santa. Copenhagen Museum.

PYXICEPHALUS EDULIS (Ptrs.). Mozambique. Prof. Peters.

CYSTIGNATHUS MACROGLOSSUS (D. & B.). Montevideo. Purchased.

CRINIA VERRUCOSA (Rnhrdt. & Ltk.). Australia. Earl of Derby.

CRINIA FASCIATA (Steind.). East and West Australia. G. Krefft, Esq.

LIMNODYNASTES DUMERILII (Ptrs.). Adelaide. G. Krefft, Esq.

TARSOPTERUS TRACHYSTOMUS (Rnhrdt. & Lüt.). Lagoa Santa. Copenhagen Museum.

LIOPELMA HOCHSTETTERI (Fitz.). New Zealand. Sir A. Smith.

* The second richest collection of Tailless Batrachians is in the Paris Museum, which contained 187 species in 1865, according to a statement of Prof. Duméril, *Nouv. Arch. Mus. d'Hist. Nat.* 1865, vol. i. p. 47.



4.



3a



3.



1.

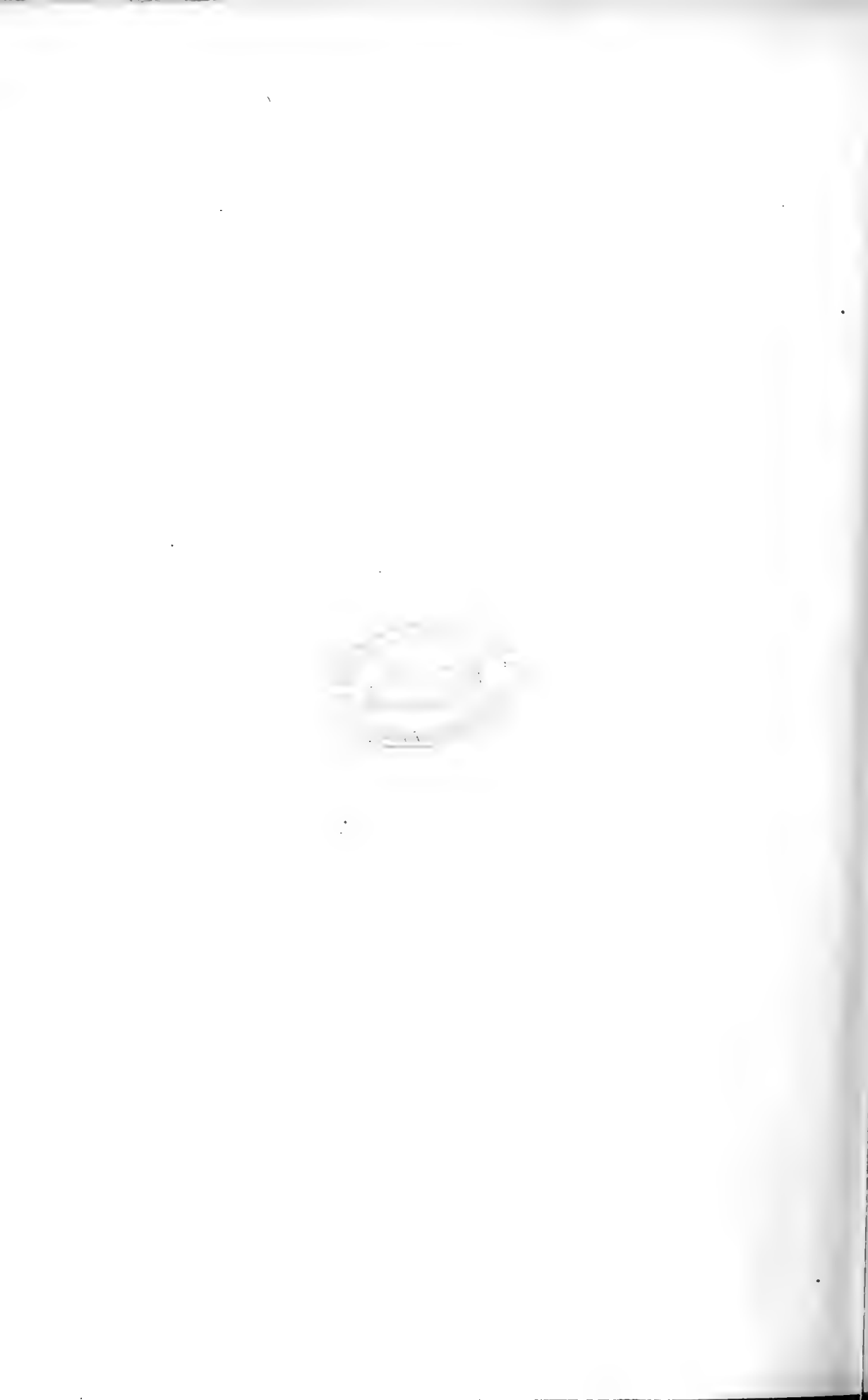


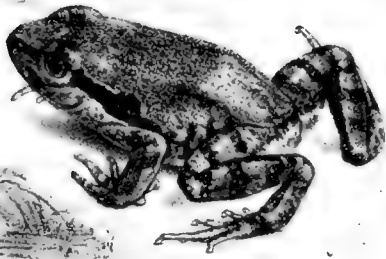
1a



2.

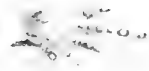
1. *Cystignathus rhodonotus*. 2. *Bufo glaberrimus*.
3. *Ixalus opisthorhodus*. 4. *Hyla rhodoporus*.





5.

5a



2.



4.



3.



1.



1. *Glyphoglossus molossus*. 2. *Hyla dasynotus*.

3. *Hylodes sallæi*. 4. *Hyla triangulum*.

5. *Cacotus maculatus*.



1



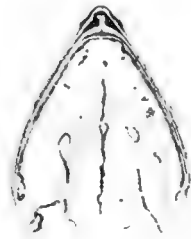
4.



3.



2.



1. *Polypedates cavirostris*. 2. *Polypedates nasutus*.
3. *Polypedates nanus*. 4. *Ixalus macropus*.



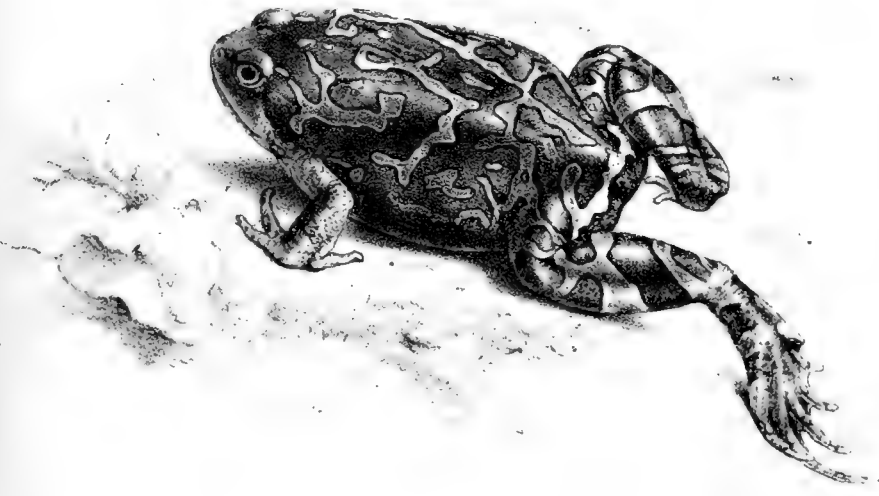
4



3



2



1

1. *Callula guttulata*. 2. *Rappia lagoensis*
3. *Hyla rubicundula*. 4. *Hyla leucotania*



- PHRYNISCUS VARIUS (Stannius). Costa Rica. Prof. Peters.
 ATELOPUS FLAVESCENS (D. & B.). Chyavetas. Mr. Bartlett.
 DIPLOPELMA BERDMORII (Blyth). Pegu. Mr. Theobald.
 BUFO GYMNAUCHEN (Blkr.). Bintang. Dr. Bleeker.
 PSEUDOBUFO SUBASPER (Blkr.). East-Indian archipelago. Dr. Bleeker.
 HYLORANA MACULARIA (Blyth). Ceylon and Pegu. Purchased.
 POLYPEDATES LIVIDUS (? Blyth). Pegu. Mr. Theobald.
 IXALUS GLANDULOSUS (? Jerdon). Nilgherries. Mr. Theobald.
 RAPPIA STEINDACHNERI (Bocage). Old Calabar. Purchased.
 RAPPIA FULVO-VITTATA (Cope). Angola. Dr. Bocage.
 RAPPIA FUSCIGULA (Bocage). Sierra Leone. J. C. Salmon, Esq.
 RAPPIA FORNASINII (Bianconi). Twelve examples from various sources.
 RAPPIA TÆNIATA (Ptrs.). Zambeze. Livingstone expedition.
 RAPPIA SALINÆ (Bianconi). Zambeze. Livingstone expedition.
 RAPPIA ARGUS (Ptrs.). Zambeze. Livingstone expedition.
 RAPPIA INSIGNIS (Bocage). Benguella. Dr. Bocage.
 RAPPIA MARGINATA (Ptrs.). West Africa. Purchased.
 HYLAMBATES MARMORATUS (Dum.). Six examples from various sources.
 PHYLLOBATES ELEGANS†. Bogota. Purchased.
 HYLODES BOGOTENSIS (Ptrs.). Bogota. Prof. Peters.
 POHLIA PALMIPES (Steindachner). Pebas. Mr. Hauxwell.
 HYLA PUNCTATA (Schn.). Bahia and Surinam. Dr. Wucherer.
 HYLA LEVAILLANTII (D. & B.). Surinam. Hr. Kappler.
 HYLA CAPISTRATA (Reuss). Brazil. Purchased.
 HYLA MORELETII (Dum.). Guatemala. O. Salvin, Esq.
 HYLA CITROPUS (Péron & Les.). New South Wales. G. Krefft, Esq.
 HYLA LABIALIS (Ptrs.). Bogota. Purchased.
 *HYLA RUBICUNDULA (Rnh. & Ltk.). Brazil. Dr. Gardiner.
 *CALLULA GUTTULATA (Blyth). Pegu. Mr. Theobald.

II. *List of the new species acquired from 1859 to 1868.*

- MIXOPHYES FASCIOLATUS. Clarence River. G. Krefft, Esq.
 DICROGLOSSUS ADOLFI. Himalayas. Messrs. v. Schlagintweit.
 PYXICEPHALUS RUGOSUS. Pundo Andongo. Dr. Welwitsch.

† An = *Liuperus elegans*, Ptrs.?

RANA LIEBIGII. Nepal, Sikkim. B. H. Hodgson, Esq., and Messrs. v. Schlagintweit.

CYSTIGNATHUS ALBILABRIS. St. Thomas. Hr. Riise.

**CYSTIGNATHUS RHODONOTUS*. Chyavetas. Mr. Bartlett.

CRINIA TASMANIENSIS. Van Diemen's Land. Purchased.

CRINIA LÆVIS. Van Diemen's Land. Mr. Milligan.

CRINIA AFFINIS. West Australia. Hr. Dämel.

PLATYPLECTRUM MARMORATUM. Clarence River. G. Krefft, Esq.

LIMNODYNASTES PLATYCEPHALUS. Adelaide. G. Krefft, Esq.

LIMNODYNASTES KREFFTII. Sixteen examples from various sources.

LIMNODYNASTES AFFINIS. Clarence River. G. Krefft, Esq.

CHIROLEPTES ALBOGUTTATUS. North Australia. Hr. Dämel.

CRYPTOTIS BREVIS. Clarence River. G. Krefft, Esq.

XENOPHRYS MONTICOLA. Himalayas and Pegu. Three examples.

**NANNOPHRYS CEYLONENSIS*. Ceylon. Mr. Higgins.

**CACOTUS MACULATUS*. Chili. Purchased.

**GLYPHOGLOSSUS MOLOSSUS*. Pegu. Mr. Theobald.

CACOPUS GLOBULOSUS. Russelconda. Dr. Trail.

**BUFO GLABERRIMUS*. Bogota. Purchased.

BUFO CÆRULEOSTICTUS. West Ecuador. Mr. Fraser.

BUFO GALEATUS. Gamboja. M. Mouhot.

HYLORANA TEMPORALIS. Ceylon. Purchased.

IXALUS FEMORALIS. Ceylon. Purchased.

IXALUS TEMPORALIS. Ceylon. Purchased.

**IXALUS MACROPUS*. Ceylon. Purchased.

**IXALUS NASUTUS*. Ceylon. Purchased.

**IXALUS OPISTHORHODUS*. Nilgherries. Mr. Theobald.

**MEGALIXALUS INFRARUFUS*. —? Dr. Günther.

**POLYPEDATES NANUS*. South Ceylon. Purchased.

POLYPEDATES PLEUROSTICTUS. Madras. Zoological Society.

POLYPEDATES RETICULATUS. Ceylon. Purchased.

**POLYPEDATES NASUTUS*. Ceylon. Purchased.

**POLYPEDATES CAVIROSTRIS*. Ceylon. Purchased.

**POLYPEDATES RUFESCENS*. West Africa. Purchased.

RAPPIA RETICULATA. —?

**RAPPIA LAGOENSIS*. Lagos. H. T. Ussher, Esq.

RAPPIA CITRINA. Senegal and Zambeze. Messrs. Whitfield and Livingstone.

RAPPIA FLAVOMACULATA. Rovuma Bay. Livingstone expedition.

RAPPIA MICROPS. Zambeze. Livingstone expedition.

RAPPIA NASUTA. Angola. Dr. Bocage.

**HYLAMBATES VIRIDIS*. West Africa. Purchased.

HYLODES UNISTRIGATUS. West Ecuador and Bolivia. Mr. Fraser.

**HYLODES SALLÆI*. Central America. Messrs. Sallé and Salvin.

PLATYMANTIS PLATYDACTYLA. Polynesia. 'Voyage of the Herald.'

LITORIA WILCOXII. Ten examples from various parts of East Australia.

LITORIA LATOPALMATA. Port Denison. G. Krefft, Esq.

HYLA INFRAFRENATA. Cape York. Hr. Dämel.

HYLA NIGROFRENATA. Cape York. Hr. Dämel.

HYLA PHYLLOCHROA. Sydney and Erumanga. Purchased.

HYLA KREFFTII. Nine examples from various parts of East Australia.

**HYLA DASYNOTUS*. Brazil. Dr. A. Günther.

**HYLA TRIANGULUM*. Brazil. Dr. A. Günther.

**HYLA RHODOPORUS*. Upper Amazons. Mr. Bartlett.

**HYLA LEUCOTÆNIA*. Rio Grande. Purchased.

CALLULA OBSCURA. Ceylon and Nilgherries. Sir A. Smith and Mr. Theobald.

Most of the species forming the second list have been already described in the 'Proceedings' of this Society, the Ann. & Mag. Nat. Hist., or the 'Reptiles of British India.' I subjoin descriptions of and remarks upon those marked with an asterisk (*).

CYSTIGNATHUS RHODONOTUS. (Plate XXXVII. fig. 1.)

This species is allied to *Cystignathus nodosus*, having likewise the subarticular enlargements on the fingers and particularly on the toes much developed and pointed. Rather stout in habit. Head broad; cleft of the mouth very much broader than long; snout obtusely rounded, a little longer than the eye, with the canthus rostralis obtuse. Tympanum very distinct, half as large as the eye. Vomerine teeth in two slightly arched series, the lateral portion of which is situated behind the choanæ. Limbs rather short; first finger considerably longer than second, but a little shorter than third. The length of the body is rather more than the distance of the vent from the two small metatarsal tubercles. The fourth toe half as long as the body; third toe a little longer than fifth.

Brown: a broad rose-coloured band occupies the whole back from

the nostril to the sacrum. Limbs with brownish-black cross bands; the interspaces tinged with pink. Lower parts greyish, with numerous small white specks.

Mr. E. Bartlett found a single specimen of this species at Chyvetas, Eastern Peru. It is 40 millims. long, hind limb 58, fourth toe 19 millims.

NANNOPHRYS, g. n. ASTEROPHRYS.

Fingers and toes tapering, free to the base; lower jaw with a pair of very slightly prominent apophyses in front and with a pointed symphyseal tubercle; the internal openings of the nostrils and eustachian tubes small; tympanum of moderate size, distinct. No parotoids. The transverse processes of the sacral vertebra dilated into a flat triangle. Vomer with two very inconspicuous prominences on which no teeth can be distinguished. Tongue deeply forked behind. Upper eyelid flaccid, without prominent edge.

NANNOPHRYS CEYLONENSIS.

Similar in habit to a young *Rana kuhlii*. Head broad, depressed, short, the snout being as long as the diameter of the eye: canthus rostralis distinct; loreal region sloping; nostril close to the end of the snout. Eye of moderate size, prominent. Tympanum half as large as the eye. A lineal fold runs from the hinder edge of the orbit, over the tympanum, towards the arm-pit. Cleft of the mouth broader than long; tongue rather narrow. The vomerine prominences are situated on a level with the hinder edge of the choanæ. Skin slightly tubercular; an indistinct fold across the crown of the head from one hinder angle of the orbit to the other. Limbs of moderate length, the length of the body being rather more than the distance of the vent from the heel. The third finger rather longer than the fourth, which is scarcely longer than the second. Metatarsus with one inconspicuous tubercle. The fourth toe is not quite half as long as the body; the third is a little longer than the fifth.

Upper parts brown, marbled with darker; limbs with dark cross bands. Upper lip with some small white spots; a pair of white spots below the vent. Lower parts whitish.

I have examined four examples from Ceylon, probably from the southern parts. They are 25 millims. long, the hind limb being 37 millims.; but I have reason to believe that the species grows to a larger size.

CACOTUS, g. n. BOMBINATORIN.

Fingers and toes tapering. Maxillary and vomerine teeth distinct. Tongue broad, slightly notched behind. Toes quite free; metatarsus with two tubercles. Tympanum absent; eustachian tubes reduced to a minute foramen. Transverse processes of sacral vertebra not dilated.

CACOTUS MACULATUS. (Plate XXXVIII. fig. 5.)

Similar in habit to *Pleurodema bibronii*. Head of moderate width.

Snout rather short, scarcely longer than the diameter of the eye; canthus rostralis rather obtuse, with the loreal region sloping. The slight vomerine prominences form two short transverse prominences between the choanæ, which are very small. Skin nearly smooth or with very small flat smooth tubercles. The length of the body equals the distance between the vent and the metatarsal tubercles. Sub-articular tubercles on the fingers and toes well developed; metatarsus with two tubercles. Length of the fourth toe two-fifths of that of the body; third and fifth toes equal in length.

Greenish olive above, marbled with brownish and sometimes with minute pink dots; an obsolete dark band across the forehead from one eye to the other, a black band along the canthus rostralis and from the eye to the arm-pit. Limbs with black cross bands. Throat and abdomen whitish, marbled with blackish.

I have examined two specimens purchased of Mr. Stevens, who states that they came from Chile. They are 33 millims. long, the hind limb being 48, and the fourth toe 14 millims. long.

GLYPHOGLOSSUS, g. n. RHINODERMAT.

This genus is closely allied to *Cacopus*, which it also greatly resembles in general appearance, differing, however, in the shape of the tongue and in the structure of the vomer.

Head very short, crown convex; mouth transverse, very narrow; limbs short; eye small. The space between and behind the inner nostrils is even, without papillæ; one papilla in the median line of the hinder part of the palate. Tongue long, free, and notched behind and in front, divided into two lateral halves by a deep groove. Tympanum hidden; openings of the eustachian tubes small. Toes broadly webbed; metatarsus with a large, compressed, cutting, shovel-like prominence.

GLYPHOGLOSSUS MOLOSSUS. (Plate XXXVIII. fig. 1.)

Snout very short, without canthus rostralis. The fleshy part of the lower jaw is swollen, truncated in front, forming a semicircular disk. The whole snout is covered by a leathery finely granular skin. Body short and thick; limbs very short; skin in the loins broad and loose. Pupil of the eye vertical. Skin smooth. There is another, very small tubercle behind the large one on the metatarsus. The web between the toes extends to their extremities. Uniform brownish olive above, sides and limbs finely marbled with brown, lower parts whitish.

A single specimen, 50 millims. long, has been obtained by Mr. Theobald in Pegu.

BUFO GLABERRIMUS. (Plate XXXVII. fig. 2.)

Body perfectly smooth, with very few slight tubercles on the side. Crown of the head flat, without ridges. Parotoid very distinct, ovate, its length being equal to its distance from that on the other side. Snout angular, the canthus rostralis being distinct. The

diameter of the eye equals the length of the snout. Edge of the upper eyelid very sharp. Tympanum distinct, one-third of the size of the eye. Mouth broader than long. Limbs moderately developed; first finger longer than the second, and as long as the fourth. The length of the body equals the distance between the vent and the metatarsal tubercle. Toes nearly half webbed; metatarsus with one tubercle; tarsus without longitudinal fold.

Upper parts brownish black; the sides black. Lower parts blackish, with white dots. A beautiful rose-coloured spot in the groin; smaller spots of the same colour on the hinder part of the thigh.

We have received a single example from Bogota; it is 45 millims. long, the fore limb measuring 30, the hind limb 60, and the fourth toe (from the metatarsal tubercle) 18 millims.

IXALUS MACROPUS. (Plate XXXIX. fig. 4.)

Snout as long as the eye, not obtuse in front, with angular canthus rostralis. Tympanum small, inconspicuous. Skin of the upper parts with a few small scattered tubercles and some short oblique glandular folds. The length of the body is somewhat less than the distance between vent and heel. No fold of the skin along the tarsus; metatarsus with a single tubercle; the interdigital web extends to the outer phalanx of the third and fifth toes; disks of the fingers and toes moderately broad. Upper parts brown, marbled with darker; a dark band from eye to eye, limbs with dark cross bands; hinder part of the thigh brown, lower parts white, a few spots across the chest.

We have received one example from Southern Ceylon; it is 37 millims. long, the hind limb being 67 millims.

IXALUS NASUTUS.

Snout pointed, rather longer than the eye, with angular canthus rostralis. Tympanum rather small, inconspicuous, skin of the upper parts with very small scattered tubercles. The length of the body equals the distance between vent and heel. No fold of the skin along the tarsus; metatarsus with a single tubercle; web between the toes rudimentary; digital disks moderately developed. Upper parts grey clouded with darker, loreal region darker; a blackish band above the tympanum. Throat brown, abdomen with brown spots. A very fine white line runs from the tip of the nose, along the median line of the back, to the vent.

A single specimen has been received from Ceylon; it is 18 millims. long, the hind limb being 23 millims. In spite of its diminutive size, the specimen, which is a male, appears to be adult.

IXALUS OPISTHORHODUS. (Plate XXXVII. fig. 3.)

Snout longer than the eye, rather pointed in front, with angular canthus rostralis. Tympanum hidden by the skin. Skin of the upper parts smooth, with a few short oblique glandular folds. The length of the body is a little more than the distance between the vent and heel. No fold of the skin along the tarsus; metatarsus

with a single tubercle; the interdigital web is rather deeply emarginate, scarcely extending to the outer phalanx of the third and fifth toes; disks of the fingers and toes small. Brownish olive above, indistinctly clouded with darker; limbs with brown cross bands; a black transverse triangular spot across the anal region. Throat and fore part of abdomen dotted with brown; hinder part of abdomen and lower side of leg beautifully rose-coloured.

A single example from the Nilgherries has been presented to the British Museum by Mr. Theobald; it is 25 millims. long, the hind limb being 36 millims.

MEGALIXALUS, g. n. POLYPEDATID.

Vomerine teeth none. Fingers and toes webbed; none of the fingers opposed to the others. Tympanum small; eustachian tubes and inner nostrils of moderate width; tongue free and deeply notched behind. Pupil of the eye vertical. Apophyses of the sacral vertebra styliiform. Three phalanges of the fifth toe free from the fourth.

MEGALIXALUS INFRARUFUS.

Head large, broad, depressed, snout longer than the eye, with the canthus rostralis angular, and the loreal region flat, sloping. Eye large, upper eyelid free and notched behind. Tympanum extremely small. Disks of the fingers and toes well developed; outer fingers half-webbed; toes three-fourths webbed. Skin entirely smooth. Upper parts uniform green, lower rufous. Lips and upper eyelids with a white margin.

The origin of the specimen is not known; it is 65 millims. long, the length of the hind limb being 96 millims.

POLYPEDATES NANUS. (Plate XXXIX. fig. 3.)

Similar in habit to *Polypedates maculatus*. Head broad, snout short, canthus rostralis angular, loreal region flattish. Eye large, tympanum very small and indistinct. The vomerine teeth stand in two oblique series between the choanæ; in young examples (25 millims.), the teeth as well as the tooth-bearing ridges are absent; and these specimens may easily be mistaken for *Ixalus*. Upper parts with rather numerous very small tubercles; the tubercular ridge between the eyes is crossed by a very fine longitudinal glandular fold running from the nose to the occiput. Young specimens nearly entirely smooth, limbs rather slender, the length of the body being equal to the distance between vent and heel. Disks large, fingers not webbed; second finger much shorter than the fourth, which is a little shorter than the third. Toes one-third webbed; third toe shorter than fifth. Tarsus without fold, metatarsus with a very small tubercle. Brownish or greyish olive, with symmetrical dark markings on the back; sides and hind part of the thighs with brown spots; limbs with brown cross bands. Lower parts whitish, throat with small brown spots.

We have received three examples from Southern Ceylon; the
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largest is only 35 millims. long, the length of the hind limb being 60 millims.

POLYPEDATES NASUTUS. (Plate XXXIX. fig. 2.)

This species will be readily recognized by its extremely prolonged and pointed snout, which is as long as the width between the anterior angles of the orbit; in other respects it is similar to *Polypedates eques*. The nose projects far beyond the mouth; canthus rostralis angular, loreal region grooved, eye large, tympanum more than half as large as the eye. A narrow glandular fold runs from the back edge of the eye, above the tympanum, to the shoulder; upper parts and throat quite smooth; abdomen finely granular; lower side of the thigh with large white tubercles, those in a series below the anu; being largest. Fingers not webbed; disks of fingers broad, of toes moderate; second finger much shorter than fourth, which is nearly as long as the third. The membrane between the toes reaches to half the length of the fourth, and does not extend to the disks of the four others. The third and fifth toes are nearly equal in length; at the base of the first is a small tubercle. Heel with a skinny spur-like appendage. Above greenish olive, with darker bands across the limbs; sides of the head and body blackish, with a yellow band commencing on the tip of the nose, narrower before the eye and broader behind it; lower parts nearly uniform yellow, with a black edge round the lower jaw. Vent black.

We have received a single female specimen from Southern Ceylon; it is 60 millims. long, the length of hind limb being 95 millims.

POLYPEDATES CAVIROSTRIS. (Plate XXXIX. fig. 1.)

Similar in habit to *Polypedates reticulatus*. Head large and broad, snout short, canthus rostralis angular and arched, loreal region deeply concave. Eye of moderate size; tympanum distinct, ovate, one-third the width of the eye. Limbs of moderate length, the length of the body being equal to the distance between vent and heel. Fingers scarcely webbed, disks moderately developed; toes broadly webbed, the interdigital membrane extending to the disks of the third and fifth toes. A small moveable tubercle at the base of the first toe. Heel without spur, but the hind margin of the tarsus is fringed; a patch of pointed tubercles below the vent. Upper parts with very minute tubercles or granules symmetrically arranged; vomerine teeth on a very short prominence, situated at the inner anterior angles of the choanæ. Upper parts reddish olive, finely marbled with black on the sides and caudal region. Lower parts whitish, throat speckled with brown. Limbs with a few indistinct dark cross bands; *the hinder side of the thighs is not coloured.*

We have received one example from Southern Ceylon; it is 45 millims. long, the length of the hind limb being 77 millims.

POLYPEDATES RUFESCENS.

Fingers broadly webbed, the web between the two outer fingers

extending to the terminal disk; toes completely webbed, the web leaving only the disks free. Vomerine teeth in two short oblique series commencing from the anterior angles of the choanæ. Snout of moderate length, nearly as long as the eye, with the canthus rostralis obtuse. Tympanum distinct, half as large as the eye; upper parts of the head and sides of the body with very small tubercles. The length of the body is more than the distance between vent and heel. Upper parts brownish. A dark cross band between the eyes. Lower parts whitish.

A single specimen, 55 millims. long, was in a collection from West Africa; the length of the hind limb is 85 millims.

RAPPIA LAGOENSIS. (Plate XL. fig. 2.)

Similar in habit to *R. marmorata*. Head broad, snout short, tongue heart-shaped, tympanum hidden, the two outer fingers half, the toes three-fourths webbed. Smooth above, granulated below, Yellowish olive, coarsely reticulated with black above; a deep-black streak along the canthus rostralis. Exposed parts of the upper surface of the limbs irregularly spotted with black. Lower parts uniform whitish.

We have received two examples, one from a dealer, the other from H. T. Ussher, Esq., who found it at Lagos.

Length of the body 28 millims., of hind limb 49 millims.

HYLAMBATES VIRIDIS.

Uniform green above, white below, a few small brown spots on the sides; upper lip and hind part of the limbs with a white margin. Vomerine teeth in two small patches between the nostrils; tongue deeply notched behind; snout rather obtuse, depressed. Tympanum distinct, half as long as the eye. Disks well developed, fingers slightly webbed, toes one-third webbed, metatarsus with one rather large tubercle. Fourth finger considerably longer than second; fifth toe longer than third.

We have received one specimen; it is 42 millims. long, the length of the hind limb being 60 millims.

HYLODES SALLÆI. (Plate XXXVIII. fig. 3.)

Similar in habit to a young *Rana temporaria*. Snout of moderate length, somewhat pointed; canthus rostralis angular, loreal region subvertical, flattish. Eyes of moderate size, one-third larger than the tympanum. Tongue ovate, much narrower than the mouth, very slightly notched behind. The vomerine prominences are short and small, situated behind the choanæ; choanæ and eustachian tubes small. Skin smooth, with several exceedingly fine linear glandular folds—one from the eye above the tympanum to the shoulder, another from the eye to the centre of the back, and one or two on each side of the hinder part of the back. Lower parts nearly entirely smooth. The second and fourth fingers nearly equal in length, shorter than the third. The length of the body is

a little more than the distance between the vent and heel. The third and fifth toes equal in length; metatarsus with two small tubercles, tarsus without fold. Greyish olive, a black band runs from the nostril through the eye to behind the tympanum; an indistinct blackish band between the eyes; anal region blackish, sometimes a black spot in the centre of the back.

We possess two specimens, of nearly the same size—one received from Mexico through M. Sallé, and the other from Mr. Salvin's Vera-Paz collection. Length of body 28 millims., of hind limb 46 millims., of fourth toe (from metatarsus) 13 millims.

HYLA DASYNOTUS. (Plate XXXVIII. fig. 2.)

Habit slender; snout very short, depressed, obtuse in front, without canthus rostralis; loreal region concave. Vomerine teeth in two small groups between the inner nostrils, which are small. Tongue slightly notched behind, with a median groove. Eye large, prominent. Tympanum very small, indistinct. Disks moderately developed; fingers half webbed; toes nearly entirely webbed. A narrow white fringe along the forearm, and along the tarsus. The skin from the occiput along the spine to the sacral vertebra is immoveable and covered with warty excrescences; otherwise the head and body are smooth. The length of the body is rather more than the distance of the vent from the metatarsus. Brownish above, the warty parts of a darker colour; sides of the abdomen marbled with black and white. A black streak along the canthus rostralis and above the tympanum, a black spot anteriorly below the eye; a dark cross band between the eyes. Femur deep black, with white ovate spots or cross bars; fore limbs and lower legs with brown cross bands. Lower parts whitish, throat and especially gular sacs brown.

One male specimen, with a pair of large gular sacs, from Brazil; it is 32 millims. long, the hind limb being 44 millims.

HYLA RHODOPORUS. (Plate XXXVII. fig. 4.)

This species belongs to that group in which the vomerine teeth are placed in two curved series, forming together an arch with the convexity towards the front; however, the series are less distinctly curved than in the other species, this species being less developed in size than its natural allies. It is very closely allied to *H. albomarginata* or *H. infulata*. The snout is much depressed, with the canthus rostralis very obtuse, and the loreal region concave. Eye of moderate size, shorter than the snout. Choanæ wide. Tongue scarcely notched behind; tympanum two-thirds the size of the eye. Fingers very slightly webbed; toes two-thirds webbed. The length of the body equals the distance between vent and heel, and is thrice the length of the foot. Skin smooth, with numerous minute pores on the upper parts. Light olive-coloured, each pore with a minute rose-coloured dot; the dots confluent into spots on the eyelids; no band along the canthus rostralis or on the legs, the exposed parts of which are coloured like the back. Uniform whitish below.

One specimen was found by Mr. Bartlett on the Upper Amazons; it is 38 millims. long, the length of the hind limb being 60 millims. Another example, from Surinam, appears to belong to the same species.

HYLA TRIANGULUM. (Plate XXXVIII. fig. 4.)

Similar in habit to *H. arborea*. Snout short, as long as the diameter of the eye, which is of moderate size. Canthus rostralis angular, loreal region flat. Vomerine teeth in two short groups between the choanæ, which are small. Tympanum hidden, pharyngeal tubes very narrow. Disks moderately developed; fingers half webbed; toes three-fourths webbed. Length of the body rather more than the distance between vent and heel. Back and exposed parts of the limbs brownish grey; a triangular isosceles deep-black spot, edged with white, on the head and nape, one angle being on each eyelid, and the third behind the nape. Side of the head and body brown, lower parts whitish.

One specimen, 27 millims. long, probably from Brazil; hind limb 42 millims.

HYLA RUBICUNDULA. (Plate XL. fig. 3.)

Hyla rubicundula, Rnhrdt. & Lütke. Vid. Medd. nat. Foren. Kjöbenh. 1862, p. 197; Hensel, Wiegman. Arch. 1867, p. 158.

Slender; snout moderately obtuse, with angular canthus rostralis, and with the loreal region subvertical. Eye of moderate size, nearly as long as the snout; tympanum very small, distinct. Vomerine teeth in two small groups, situated immediately behind the level of the narrow choanæ. Tongue not notched. Vocal sac of the male extending to the sternum. Upper parts smooth. Fingers slightly but distinctly webbed; toes half webbed. Disks of fingers and toes rather small. The length of the body is rather more than the distance between vent and heel. Light olive, with numerous parallel brown longitudinal bands on the body and limbs; these bands proceed from the snout, are unequal in width, and more or less distinctly edged with white; the broader of the bands are sometimes broken up in series of ovate spots. A blackish band, edged with white above and below, and longitudinally traversed by another white band, from the nostril to the loin.

Southern parts of Brazil.

HYLA LEUCOTÆNIA. (Plate XL. fig. 4.)

Moderately slender; snout rather obtuse, with angular canthus rostralis, and with the loreal region subvertical. Eye of moderate size, not quite so long as snout; tympanum very small, not very distinct. Vomerine teeth in two small groups, on a level with the hinder edge of the narrow choanæ. Tongue not notched. Male with a large vocal sac, extending backwards to the sternal region. Upper parts smooth. Fingers free, toes half webbed; disks of fingers and toes rather small. The length of the body is rather

more than the distance between vent and heel. Light olive, a *white* inferiorly greyish line runs along the canthus rostralis and upper part of the side of the body. Lower leg with a whitish outer margin.

A male specimen from Rio Grande, 38 millims. long; hind limb 60 millims.

Distinguished from *H. rubicundula* by the white lateral line and sloping loreal region.

CALLULA GUTTULATA. (Plate XL. fig. 1.)

Megalophrys guttulata (Blyth).

Snout very short, depressed, and obtusely rounded. Skin entirely smooth, without any tubercles. Limbs short, the length of the body being a little more than the distance of the vent from the metatarsal shovel. None of the toes are dilated into disks; hind toes one-fourth webbed; fingers rather long; metatarsus with a flat, compressed, sharpish tubercle or shovel.

The eye is small, not longer than the snout; a very prominent osseous ridge across the vomer behind the choanæ, interrupted in the middle. Tympanum hidden.

This species is most beautifully coloured, the ground-colour of the upper parts being a pink or yellowish olive, coarsely marbled with brown, the brown marks being edged by a black line. A long transverse black mark across the vent and hinder surface of thighs. Lower parts uniform yellowish.

Several specimens were collected by Mr. Theobald in Pegu. The largest is 50 millims. long; hind limb 63 millims.

EXPLANATION OF PLATES XXXVII., XXXVIII., XXXIX., XL.

PLATE XXXVII.

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| Fig. 1. <i>Cystignathus rhodonotus</i> , p. 481. | Fig. 3. <i>Ixalus opisthorrhodus</i> , p. 484. |
| 2. <i>Bufo glaberrimus</i> , p. 483. | 4. <i>Hyla rhodoporus</i> , p. 488. |

PLATE XXXVIII.

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| Fig. 1. <i>Glyphoglossus molossus</i> , p. 483. | Fig. 4. <i>Hyla triangulum</i> , p. 489. |
| 2. <i>Hyla dasynotus</i> , 488. | 5. <i>Cucotus maculatus</i> , p. 482. |
| 3. <i>Hylodes sallee</i> , p. 487. | |

PLATE XXXIX.

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| Fig. 1. <i>Polypedates cavirostris</i> , p. 486. | Fig. 3. <i>Polypedates nanus</i> , p. 485. |
| 2. <i>Polypedates nasutus</i> , p. 486. | 4. <i>Ixalus macropus</i> , p. 484. |

PLATE XL.

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| Fig. 1. <i>Callula guttulata</i> , p. 490. | Fig. 3. <i>Hyla rubicundula</i> , p. 489. |
| 2. <i>Rappia lagoensis</i> , p. 487. | 4. <i>Hyla leucotenaria</i> , p. 489. |

7. Notes on the Fœtus of an Elephant and of a Hippopotamus in the Collection of the British Museum. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

Among the specimens of animals in spirits that were in the British Museum when I was in the habit of studying in that establishment, now more than fifty years since, are the fœtuses of two large animals—the one that of an Indian Elephant, and the other of a Hippopotamus. They are remarkable, first, for their very small size, compared with the size of the adult animal, and, secondly, for the different parts of the animal being so much more nearly of the proportions of those of the adult than they generally are in fœtuses of such a small size. These specimens have attracted considerable public attention; and every now and then persons who have seen them many years ago are bringing visitors to see what they consider one of the most interesting curiosities in the Museum, viz. “an Elephant in a half-pint bottle.”

It has occurred to me that it would be interesting to have these figured, of their natural size, by the accurate pencil of Mr. Ford.

Fig. 1.



Fœtus of Indian Elephant.

Fig. 2.



Fœtus of Hippopotamus.

Mr. Flower informs me that in the Museum of the College of Surgeons there are several fœtuses of Indian Elephants; the smallest is about double the size of the one here figured. In the same collection is the fœtus of a *Rhinoceros oswellii* of Africa, presented by Messrs. Chapman and Bains, about 6 inches long.

8. Notes on the Skulls of the Species of Dogs, Wolves, and Foxes (*Canidæ*) in the Collection of the British Museum.
By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

The Dogs form a very natural group; and it was early divided by the community and naturalists into Dogs and Foxes, according to the length of the tail and the sharpness of the face. More lately, as more or less anomalous species have been discovered, as the Hyæna-like Dog of Africa, the Raccoon Dog of China and Japan, the Weasel-like Dog of Brazil, they and some other species have been separated into genera.

The Canidæ have been separated by general consent into three natural groups, according to the length and form of the tail,—the *Wolves* having a short and straight tail, the *Dogs* a more or less elongated tail bent to the left and more or less curled, the *Foxes* an elongated bushy tail. In South America there is found a group with skulls like Wolves but with long slender tail, which may be called long-tailed Wolves. There is no doubt that the form of the tail affords very permanent characters and has considerable influence on the habits of the animal.

Dr. Burmeister has studied the skulls of the group; and he divides the family, according to the form of the postorbital process, into two tribes, thus:—

I. LUPINÆ. Postorbital process of the frontal bone very convex, and curved downwards, without any depression in the upper surface. To this group he refers *Canis* with a short, *Lycalopex* and *Pseudalopex* with an elongated tail. The skull in this group is generally thick and solid.

II. VULPINÆ. Postorbital process of the frontal bone spread out, bent a little forward, the front edge turned up, with a longitudinal shallow pit or indentation on the upper surface at the base. This division includes the genera *Vulpes* and *Urocyon*. The skulls of this section are elongated, slender, thin, and light. The habit of the animal is generally nocturnal, and the pupil of the eye elliptical erect.

The form of the contracted pupil of the eye has yet to be observed in a large number of the species.

Mr. Bartlett, in reply to my inquiry, states that “the females of the Long-eared Fox, the Arctic, and the Common Fox have oblong erect pupils, the Black-backed and Common Jackals have round pupils like the Wolf and Dog.”—March 28, 1868.

Mr. Bryan Hodgson, in his collection of Drawings of Nepalese

Animals, represents the Buansu (*Cuon*), the Jackal or Shidar (*Sacalius indicus*), the Cabul Greyhound (*Canis cabulensis*), the Tibetan Terrier, Tibetan Mastiff (with four and five claws), *Vulpes ferrilatus*, *V. indicus*, and *V. subhimachalus*, as all having round pupils; but I doubt if in the three last-mentioned this is not a mistake of the artist.

Dr. Rüppell, in his 'Atlas,' figures the Fennec and the North-African Foxes with round pupils.

The dentition of the family is generally uniform. The normal number of teeth is 42, viz. cutting-teeth $\frac{6}{6}$, canines $\frac{1-1}{1-1}$, premolars $\frac{3-3}{4-4}$, sectorial teeth $\frac{1-1}{1-1}$, tubercular grinders $\frac{2-2}{2-2}$. The incisors, canines, first premolars, and the last lower molar have a single fang; the second and third upper premolars and all the premolars and molars below, but the last, have two fangs. The upper sectorial or fourth premolar and the last upper true molar have three fangs, the first upper premolar four fangs. (*De Blainville*.)

Some genera of the family present certain anomalies. Thus *Icticyon* has only 38 teeth, there being only one tubercular grinder on each side of each jaw; *Cuon* has 40 teeth—that is, has two tubercular grinders on each side of the upper, and only one on each side of the lower jaw. On the other hand, *Thous* and *Megalotis* have 44 teeth—that is, two tubercular grinders on each side of the upper, and three on each side of the lower jaw. Sometimes some anomalous specimens present an excess over the usual number of teeth: thus M. de Blainville has figured a Mastiff with three tubercular grinders on each side of each jaw, the hinder small, cylindrical. (*Ann. Franç. et Étrang. d'Anat. &c.* ii. p. 313, t. 1. f. 2.)

The sectorial teeth in the upper jaw, in all the typical *Canidæ*, are compressed, three-lobed, with a small internal lobe close to the front edge. In the aberrant *Otocyon*, on the contrary, the sectorial tooth is nearly triangular, almost as wide as long, very unlike those of the other Dogs.

- I. *Tubercular grinders in the upper and lower jaws; false grinders 2 or 3 in each jaw. Head elongate; nose more or less produced.*

Family 1. CANIDÆ.

Tubercular grinders two in each jaw; molars $\frac{6-6}{7-7}$ or more. Feet produced; toes 5/5, straight, free, with blunt, exposed, worn-tipped claws; the front inner toe high up, rarely wanting.

Canidæ, Baird, Mam. N. Amer. p. 103, 1859.

1. *Normal Canidæ.* The upper sectorial grinders compressed, three-lobed, with a small tubercle on the front of the inner edge.

Section I. LUPINÆ. The skull thick, solid; the postorbital process thick, convex above and bent down at the tip.

Lupinæ, Burmeister.

Subfam. 1. LYCAONINA. Head short, broad; nose short, broad. Teeth large, close together. Palate very broad, short. Tail short, straight.

1. LYCAON.

Subfam. 2. CANINA. Head more or less elongate; nose tapering. Teeth moderate. Palate elongate.

A. *Wolves*. Tail short, straight, bushy. Skull elongate. Old World and America.

* *Head short; teeth 38; tubercular grinders* $\frac{1-1}{1-1}$.

2. ICTICYON. South America.

** *Head short; teeth 40; tubercular grinders* $\frac{2-2}{1-1}$.

3. CUON. Old World—Asia.

*** *Head elongate; teeth 42; tubercular grinders* $\frac{2-2}{2-2}$. *Temporal muscles separated by a narrow linear central ridge.*

4. LUPUS. Head moderate; nose broad. Europe and North America.

5. SIMENIA. Head very long; nose slender. Premolars far apart, small. Africa.

6. CHRYSOCYON. Head very long; nose slender. Premolars approximate, large. South America.

B. *Dogs*. Tail elongate, bent or curled. Skull short or elongate.

7. CANIS. Domesticated.

C. *Fox-tailed Wolves*. Tail elongated, hairy. South American.

* *Teeth 42; tubercular grinders* $\frac{2-2}{2-2}$.

8. LYCALOPEX. Pupil circular. Upper tuberculars large.

9. PSEUDALOPEX. Pupil elongate. Upper tuberculars moderate.

** *Teeth 44; tubercular grinders* $\frac{2-2}{3-3}$.

10. THOUS.

Section II. VULPINÆ. Skull slight, thin, elongate; nose tapering, long. Postorbital process thin, concave above, and spread out horizontally at the tip.

Vulpina, Burmeister.

Subfam. 3. VULPINA.

D. *Foxes*. Tail elongate, bushy, with a gland covered with coloured hair on the upper part, near the base. Skull very long. Upper

sectorial grinders compressed, three-lobed, with a small tubercle on the front part of the inner side; tubercular grinders $\frac{2-2}{2-2}$. Pupil often elliptical, erect.

11. VULPES. Ears moderate; ear-bullæ moderate.
 12. FENNECUS. Ears very large; ear-bullæ large.
 13. LEUCOCYON. Skull broad in front of orbits.
 E. *Bristle-tailed Foxes*. Tail elongate, hairy, with a crest of bristles along the upper edge. Teeth like Foxes.
 14. UROCYON.
 F. *Raccoon Dog*. Tail short, straight, bushy. Upper sectorial grinders compressed, three-lobed, with a small anterior internal lobe; tubercular grinders $\frac{2-2}{2-2}$.
 15. NYCTEREUTES.
 II. *Aberrant Canidæ, or Viverrine Dogs*. Upper sectorial teeth small, triangular, as broad as long; tubercular grinders $\frac{3-3}{3-3}$, oblong transverse, subequal.

Subfam. 4. MEGALOTINA. Tail straight, short, bushy. Skull elongate. Ears large.

16. MEGALOTIS.

The subfamilies may be thus arranged:—

- | | | | | | | | | | | | | | |
|--|--|--------------------------------------|--------------------|--------------------------------|--|--------------------------|----------------------------------|--------------|----------------------|--------------------------------|--|------------------------|--------------------------------------|
| I. Skull solid; postorbital process thick, convex above. LUPINÆ | <table border="0"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="padding-left: 5px;">1. LYCAONINA</td> <td rowspan="4" style="vertical-align: middle;">} Tail short, straight, bushy.</td> </tr> <tr> <td></td> <td style="padding-left: 5px;">2. CANINA</td> </tr> <tr> <td></td> <td style="padding-left: 5px;">Wolves</td> </tr> <tr> <td></td> <td style="padding-left: 5px;"><i>Caninia</i> (Dogs)</td> </tr> <tr> <td></td> <td style="padding-left: 5px;">Fox-tailed Wolves...</td> <td style="vertical-align: middle;">} Tail elongate, curled to the left.</td> </tr> </table> | { | 1. LYCAONINA | } Tail short, straight, bushy. | | 2. CANINA | | Wolves | | <i>Caninia</i> (Dogs) | | Fox-tailed Wolves... | } Tail elongate, curled to the left. |
| { | 1. LYCAONINA | } Tail short, straight, bushy. | | | | | | | | | | | |
| | 2. CANINA | | | | | | | | | | | | |
| | Wolves | | | | | | | | | | | | |
| | <i>Caninia</i> (Dogs) | | | | | | | | | | | | |
| | Fox-tailed Wolves... | } Tail elongate, curled to the left. | | | | | | | | | | | |
| II. Skull thin; postorbital process thin, concave above. VULPINÆ | <table border="0"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="padding-left: 5px;">1. Foxes</td> <td style="vertical-align: middle;">} Tail elongate, soft, bushy.</td> </tr> <tr> <td></td> <td style="padding-left: 5px;">2. Bristle-tailed Foxes.</td> <td style="vertical-align: middle;">} Tail elongate, bristly, bushy.</td> </tr> <tr> <td></td> <td style="padding-left: 5px;">3. Raccoon Dog</td> <td rowspan="2" style="vertical-align: middle;">} Tail short, straight, bushy.</td> </tr> <tr> <td></td> <td style="padding-left: 5px;">4. Viverrine Dog</td> </tr> </table> | { | 1. Foxes | } Tail elongate, soft, bushy. | | 2. Bristle-tailed Foxes. | } Tail elongate, bristly, bushy. | | 3. Raccoon Dog | } Tail short, straight, bushy. | | 4. Viverrine Dog | |
| { | 1. Foxes | } Tail elongate, soft, bushy. | | | | | | | | | | | |
| | 2. Bristle-tailed Foxes. | } Tail elongate, bristly, bushy. | | | | | | | | | | | |
| | 3. Raccoon Dog | } Tail short, straight, bushy. | | | | | | | | | | | |
| | 4. Viverrine Dog | | | | | | | | | | | | |

I. Normal Canidæ. *The upper sectorial grinders compressed, three-lobed, with a small tubercle on the front of the inner edge.*

Section I. LUPINÆ. *Skull thick, solid; postorbital process thick, convex above, and bent down at the end.*

Lupinæ, part., Burmeister and Spencer Baird.

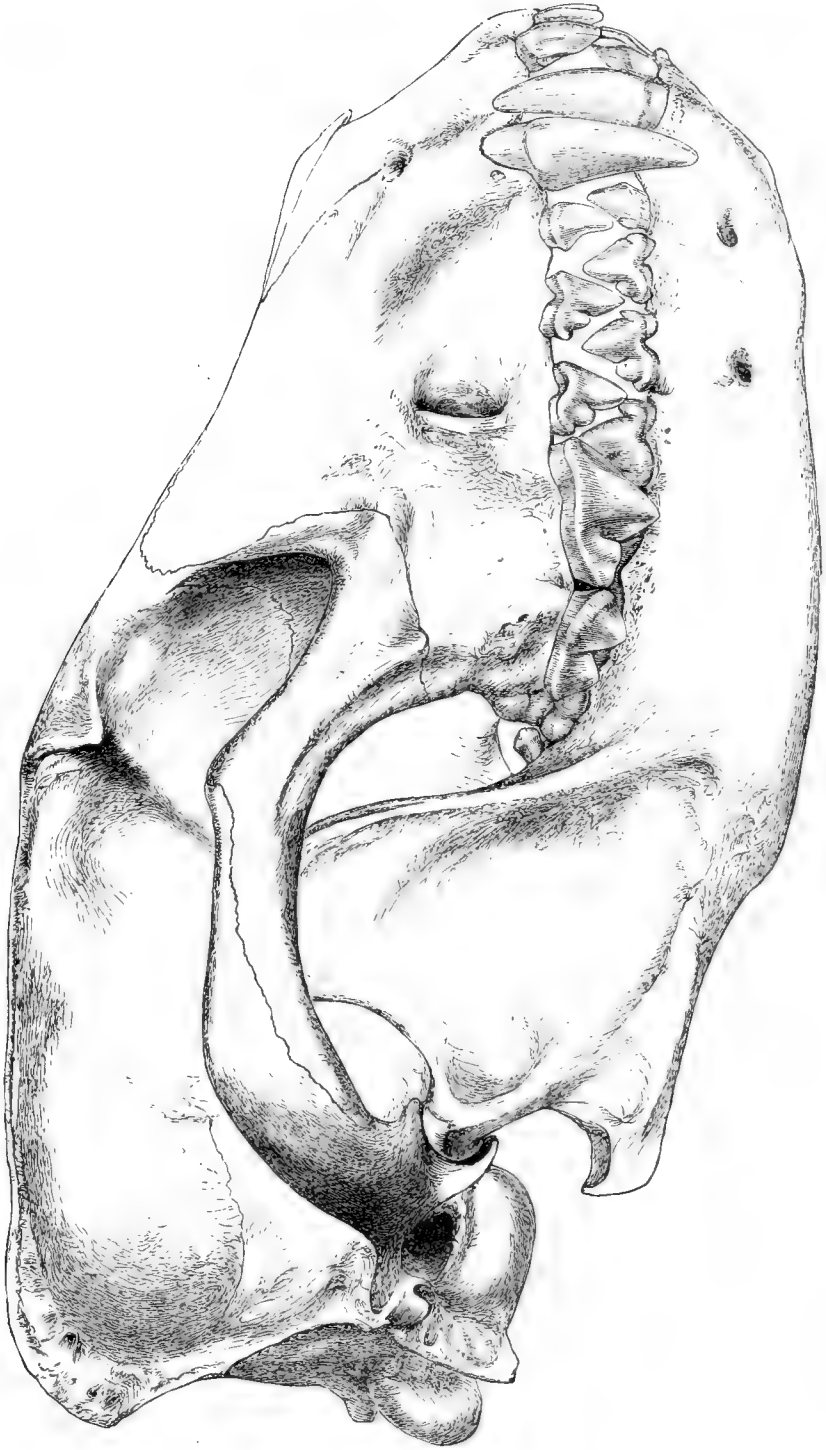
Subfam. 1. LYCAONINA.

Head short, broad; nose short, broad. Teeth large, close together. Palate very broad, short.

1. LYCAON. Hyæna Dog.

Skull short, broad; nose short, broad, swollen; palate short,

Fig. 1.



Skull of *Lycion venaticus*. (No. 1141.)

very broad; internal nasal opening broad. Postorbital process thick, convex above, bent down at the end. Teeth 42; false grinders $\frac{3-3}{3-3}$; sectorial $\frac{1-1}{1-1}$; molars $\frac{2-2}{2-2}$; the upper and lower premolars acutely dentated on the front and, especially, on the hinder edge; upper sectorial teeth strong, elongate, trigonal, broad, with a small but well-marked interior lobe in front. First upper tubercular tooth large, with a broad rounded internal lobe; the second upper tubercular oblong transverse, much smaller; lower hinder tubercular very small, cylindrical.

This group is intermediate between the Hyæna and the Dog. The manner of copulation is said to be different from the Dog's, and similar to that of the Hyæna.

1. LYCAON VENATICUS. Simur or Mebbra. (Fig. 1, p. 496.) B.M.

Kynos pictus, Rüppell.

Lycaon tricolor, Brooks.

L. typicus, A. Smith.

L. venaticus, Gray, Cat. Mamm. B. M. 67; Gerrard, Cat. of Bones in B. M. 90.

Canis aureus, Thunberg, Mém. Acad. Pétersb. iii. 302.

Hyæna picta, Temm. Ann. Gén. Sci. Phys. iii. 54, t. 35; Kuhl, Beitr. 75.

H. venatica, Burch. Travels, i. 456; fig. ii. 222, 232.

Chien hyénoïde, Cuv. Oss. Foss. iv. 386.

Hyæna Dog, Griffith, A. K.

Canis tricolor, Griffith, A. K. v. 288, t.

C. pictus, Desm. Mamm. Suppl. 338; Blainv. Ostéogr. t. 8 (skull), t. 9 (teeth).

Var. ? *Canis pictus*, Cretsch. in Rüppell's Atlas, 35, t. 12.

Hab. Africa: Cape of Good Hope (*Burchell*) (called *Mebbra*); East Africa, Cordofan (*Rüppell*) (called *Simur*).

Subfam. 2. CANINA.

Head more or less elongate; nose tapering. Teeth moderate. Palate elongate.

A. WOLVES. Tail short, straight, bushy, not reaching below the heel.

* Head short. Skull elongate. Teeth 38; tubercular grinders $\frac{2-2}{2-2}$, rarely $\frac{2-2}{1-1}$ or $\frac{1-1}{1-1}$.

2. ICTICYON.

Head short, broad. Teeth 38; false grinders 3.3 in each jaw; flesh-teeth large, three-lobed; upper with a small internal lobe on the front edge; the lower sharp-edged; tubercular grinders $\frac{1-1}{1-1}$; upper large, triangular, transverse; lower small, circular; false grinders $\frac{3-3}{3-3}$.

Icticyon, Lund, 1842; Burmeister, Fauna Bras. ii. 1.

Cynalicus, Gray, Ann. & Mag. N. H. 1846, p. 293.

Melictes, Schinz, 1849.

1. ICTICYON VENATICUS.

B.M.

Icticyon venaticus, Lund, Fauna Bras. 184; Wagner, Wieg. Arch. 1843, p. 355; Burmeister, Fauna Bras. i. t. 18-20; Gerrard, Cat. of Bones of Mamm. 89; Van der Hoeven, Kais. Ak. d. Wiss. u. Naturg. vii. (tubercular grinders $\frac{1-1}{1-1}$, trigonal).

Cynalicus melanogaster, Gray, Ann. & Mag. N. H. 1846, xvii. 293; Wieg. Arch. 1847, p. 15. (B.M.)

Cynogale venatica, Lund, K. D. V. Selsk. 1842.

Melictis beskii, Schinz, Wieg. Arch. 1849, p. 10.

Canis brachyotus, Blainv. Ostéogr. t. 9 (skull), t. 12 (teeth).

Hab. Brazil.

** *Teeth* 40; *tubercular grinders* $\frac{2-2}{1-1}$. *Temporal muscles separated by a narrow cranial ridge.*

3. CUON.

Skull short; nasals elongate. Teeth 40; tubercular grinders $\frac{2-2}{1-1}$, the lower hinder tubercular grinder deficient.—*Blainv. Ann. Franç. et Etrang. d'Anat.* i. t. 8. f. 4.

The small hinder tubercular grinders of the upper and lower jaw deficient. (See Blainv. Ostéogr. t. 9?)

1. CUON PRIMÆVUS. Buansuah.

B.M.

Skull—nose short, broad, swollen; forehead broad, convex, gradually shelving from the nose line; nasals produced behind the hinder upper edge of the maxillaries.

Canis primævus, Hodgson, P. Z. S. 1833, p. 111; Blainv. Ostéogr. *Canis*, 49, t. 8 (skull), t. 9 (teeth); Laur. & Bazin, Ann. d'Anat. et Phys. i. t. 8. f. 4 (skull); Hodgson, Trans. Asiat. Soc. , t.; Gray, Cat. Mamm. B. M. 57.

Cuon primævus, Gerrard, Cat. of Bones of Mamm. B. M. 81.

Canis himalayanus, Lesson.

Hab. Nepal (*Hodgson*, B. M.); Cashmere (*Abbott*).

2. CUON ALPINUS.

B.M.

Canis alpinus, Pallas, Zoogr. Rosso-Asiat. i. 34; Van der Hoeven, Kais. Akad. d. Wiss. vii. t. 17 (teeth); Gray, Cat. Mamm. B. M. 57; Schrenck, Amurlande, 48.

Cuon alpinus, Gray; Gerrard, Cat. of Bones of Mamm. B. M. 81.

Hab. Siberia, Altai Mountains (*Brandt*) (skull, B. M.).

Skull very like that of the preceding species, if different.

3. CUON SUMATRENSIS. (Fig. 2, p. 499.)

B.M.

Skull—nose short, broad, swollen, slightly raised above the nose-

Skull of *Cuon sumatrensis*. (Sumatra, No. 160 a.)

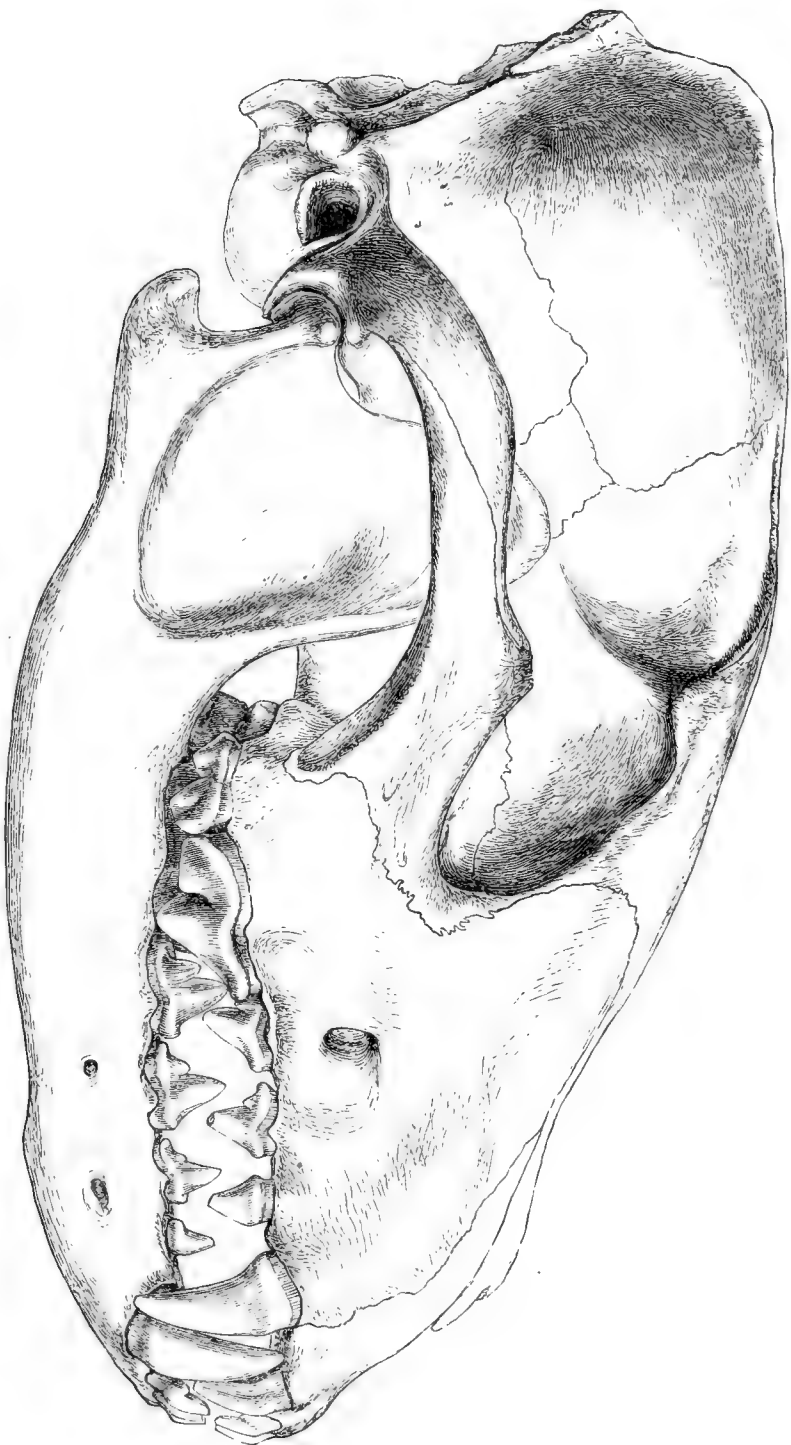


Fig. 2.

line; nasals produced behind the hinder upper edge of the maxillaries.

Canis (familiaris, var.) sumatrensis, Hardwicke, Linn. Trans. xiii. 235, t. 25; Raffles, Linn. Trans. xiii. 249.

Canis sumatrensis, F. Cuv. Dict. d'H. N. viii. 557.

Cuon sumatrensis, Gerrard, Cat. of Bones of Mamm. B. M. 81.

Hab. Sumatra (B. M.); Malacca (Carlton, B. M.); Java (*Leschenault*, B. M.).

The skull figured by De Blainville (*Ostéogr.* t. 8) is that of a domestic Dog, perhaps from Java. The skull in the British Museum is very like that of the *Cuon alpinus*. A skeleton sent from Paris, and marked "*Canis javanicus*" (160 e), is a *Cuon*; and the skull is so like that of *Cuon sumatrensis* that I cannot discover any difference between them. I suppose this is the animal named *Canis rutilans* by Boie, and *C. hodophylax*, *C. hodophilax*, and *C. hippophylax* by Temminck, in the 'Fauna Japonica' called *Jamainu*, said to have small, erect ears, and to be of the form and size of a Wolf.

4. CUON DUKHUNENSIS. Dhole.

B.M.

Skull—nose slender, elongate; nasal bones the same length. Forehead much raised above the nose-line.

Canis dukhunensis or *Kolsum*, Sykes, P. Z. S.

Cuon dukhunensis, Gray, Cat. Mamm. B. M. 37; Gerrard, Cat. of Bones of Mamm. 81.

Canis dhola, Gray, Griff. A. K.

Canis familiaris, var.; Elliot, Madras Journ. x. 100.

Wild Dog or *Dhole*, Williamson, Wild Sports.

?*Dhole*, Wooller.

Hab. India; Deccan (*Sykes*, B. M.).

The skull, in the British Museum, from Col. Sykes is of a young specimen changing its milk-teeth. There is a second skull in the Museum (158 b), received from the Zoological Society under the name of *Canis dukhunensis*; but it appears to be rather the skull of *C. primævus*.

| | <i>C. primævus.</i> | <i>C. alpinus.</i> | <i>C. sumatrensis.</i> | | <i>C. dukhunensis.</i> |
|---------------------------------------|---------------------|--------------------|------------------------|--------------------|------------------------|
| | 158 c. in. lin. | 161 a. in. lin. | 160 a. in. lin. | 160 c. in. lin. | 162 a. in. lin. |
| Length from nose to occipital condyle | 6 9 | 7 0 | 6 3 | 6 3 | 6 6 |
| — of nose from front of orbits... | 2 9 | 2 11 | 2 7 | 2 8 | 3 0 |
| — of lower jaw | 5 4 | 5 9 | 4 11 | 5 2 | 4 10 |
| Width of braincase, over ears | 2 6 | 2 7 | 2 4 | 2 4 | 2 2 |
| — of forehead between orbits ... | 1 4 | 1 6 | 1 3 | 1 2½ | 1 1 |
| — of nose at preorbital foramen. | 1 6 | 1 9 | 1 5½ | 1 5½ | 1 5 |
| — at back of zygomatic arches ... | 4 1 | 4 3 | 3 8 | 3 11 | 3 6 |
| Height of jaw at front of orbit.... | 3 3 | 3 3 | 2 11 | 3 3 | 2 11 |

All adult but 162 a.

4. LUPUS. Wolf.

Head moderate, elongate; nose moderate, tapering. Upper pre-molars slightly separated.

1. LUPUS VULGARIS. European Wolf. B.M.

Canis lupus, Linn. Fauna Suecica, 3; Syst. Nat. i. 58; Gerrard, Cat. of Bones of Mamm. 84.

Lupus vulgaris, Brisson, R. A. 235.

Lupus sylvestris, Aldrov. Digit. 173, fig.

Wolf, Pennant.

Loup, Buffon, H. N. vii. 39, t. 3 (skull).

Loup d'Europe (*C. lupus*), Blainv. Ostéogr. t. 3 (skeleton), t. 6 (skull).

Hab. Europe, France (*B. M.*).

Var. Black. Black Wolf.

Canis lycaon, Erxleben, Syst. 560; Schreber, Säugeth. 353, t. 89.

C. lupus niger, Herm. Obs. Zool. 32.

Loup noir, Buffon, H. N. ix. 362, t. 41; F. Cuv. Mamm. Lith. t.

Black Wolf, Shaw.

Hab. Europe, Pyrenees.

2. LUPUS CHANCO. The Chanco or Golden Wolf. B.M.

Fur fulvous, on the back longer, rigid, with intermixed black and grey hairs; the throat, chest, belly, and inside of the legs pure white. Head pale grey-brown; forehead grizzled with short black and grey hairs. Length of the body and head 42, tail 15 inches. Skull $8\frac{1}{4}$ inches long.

Canis chanco, Gray, P. Z. S. 1863, p. 94; Ann. & Mag. N. H. ser. 3. xii. p. 475.

? *Lupus laniger*, Hodgson, Blyth, Journ. Asiat. Soc. Beng. 1847.

Hab. Chinese Tartary (*Lieut. W. P. Hodnell*, B.M.).

The skull 1422 *a* is that of a normal European Wolf and about the same size (but the nose is longer, rather more slender); and the teeth, as well as the shape of the skull, are very similar to those of that animal. Two small grinders below behind the canines.

3. LUPUS OCCIDENTALIS. American Wolf. B.M.

Skull—forehead convex, rounded; internal nostrils broad in front and narrow behind.

Canis lupus griseus et albus, Sabine, Journ. 654; Aud. & Bachm. N. A. Quad. iii. 276, 1854.

Canis lupus occidentalis, var. *griseus et albus*, Richard. F. Bor.-Am. i. 66, 1829.

C. occidentalis, Dekay, Z. N. Y. i. 42, t. 27. f. 2; S. Baird, Mamm. N. A. 105; Gerrard, Cat. of Bones of Mamm. 84. (Skull 165 *e.*)

C. variabilis, Pr. Max. Reise N. A. ii. 95, 1841.

? *Lupus gigas*, Townsend, Journ. Acad. N. S. Phil. ii. 75, 1850.

Canis lupus canadensis, Blainv. Ostéogr. t. 7 (skull).

Hab. North America (B.M.).

Var. 1. *nubilus*. "Colour light sooty or plumbeous brown."

Canis nubilus, Say, Long's Exped. i. 168, 1822.

C. occidentalis, var. *nubilus*, Spencer Baird, Mamm. N. A. 111.

Var. 2. *mexicanus*. "Fur varied with grey and black; neck maned more than usual; a black or dusky band encircling the muzzle; a dusky slope down the fore leg."—*Baird*.

Canis mexicanus, Linn. S. N. i. 60.

C. occidentalis, var. *mexicanus*, S. Baird, Mamm. N. A. 113.

Xoloit cuintli, Hernand. Mex. 479, fig.

Lupus mexicanus, Brisson, R. A. 237.

Loup de Mexique, Buffon, N. H. xv. 149.

Mexican Wolf, Penn.

Cuetlachti, Fernand. N. Hisp. 7.

Hab. Mexico (*Hernand.*); Santa Cruz; Sonora.

Var. 3. *ater*. Black Wolf. B.M.

Forehead of skull concave in the central line; internal nostrils narrow, parallel.

Canis lycaon, Harlan, Fauna Amer. 126, 1828.

C. lupus ater, Rich. F. Bor.-Am. i. 70; Aud. & Bachm. N. A. Quad. 126, t. . f. 7, 1851.

C. occidentalis, var. *ater*, S. Baird, Mamm. N. A. 113. (Skull 165 c, B.M.)

Hab. Florida; Georgia.

Var. 4. *rufus*.

Mixed red and black above, lighter beneath.

Canis lupus, var. *rufus*, Aud. & Bachm. N. A. Quad. ii. 240, t. 82, 1851.

C. occidentalis, var. *rufus*, S. Baird, Mamm. N. A. 113.

Hab. Texas.

4. LUPUS ANTHUS. Dieb. (Fig. 3, p. 503.) B.M.

Skull (816 e)—forehead flattish, rather concave; pterygoid bones converging behind. Sectorial teeth prominent in the tooth-line and placed obliquely to the other teeth. Internal nostril narrow, sides parallel.

Canis anthus, F. Cuvier, Mamm. Lithogr. xxii. t.; Rüppell, Zool. Atlas, 44, t. 17; Gray, Cat. Mamm. B. M.; Gerrard, Cat. of Bones of Mamm. 85.

Hab. West Africa, Senegal (F. Cuvier); Algiers; Tunis (*Frazer*) North Africa; Egypt; Nubia (*Rüppell, Christie*).

Var. Head narrow. Skull (816 a) very like that of *L. anthus* (816 e), from the Zoological Gardens. The forehead and face very much narrower compared with its length; the whole length of the face, from the end of the palate to the front teeth, and the canines, is smaller.

Hab. Algiers and Tunis.

Skull of *Lepus arthus*. (Tunis, No. 816b.)

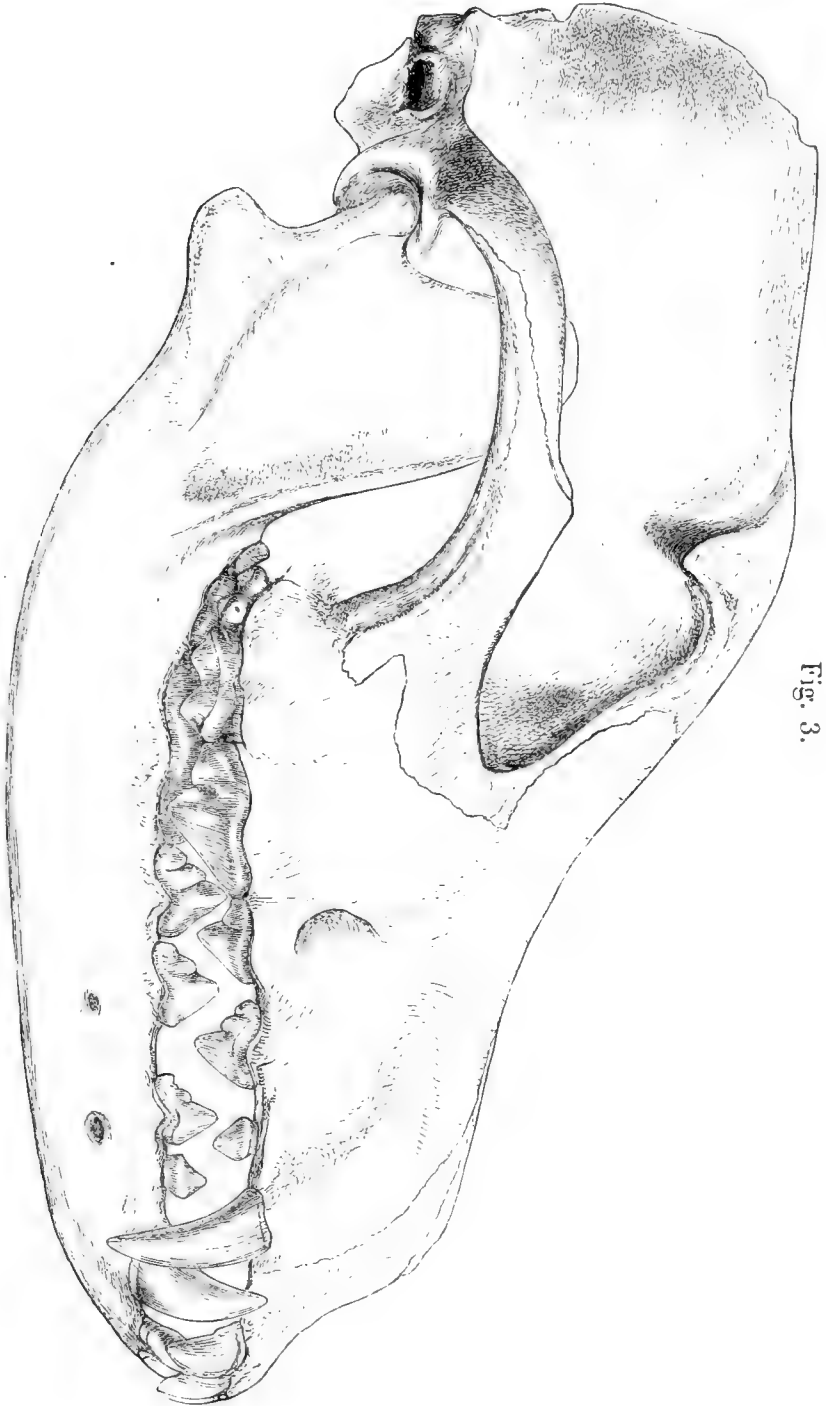


Fig. 3.

There is another skull, 816 *b* (fig. 3, p. 503), from Tunis, that is somewhat intermediate in width; it wants the occiput.

| | 816 <i>c</i> . | 816 <i>b</i> . | 816 <i>a</i> . |
|--|----------------|----------------|----------------|
| | in. lin. | in. lin. | in. lin. |
| Length of skull | 6 7 | 6 5? | 6 2 |
| Width at zygomata | 4 2 | 3 9 | 3 6 |
| —— at foramen | — | — | — |
| —— before orbits | 1 6 | 1 5 | 1 3 |
| —— of palate at outer hinder edge of sectorial teeth | 2 5 | 2 1 | 2 1 |

5. LUPUS AUREUS. Jackal.

B.M.

Skull—nose sloping on the sides, broad in front of orbits. The sectorial tooth is placed obliquely in respect to the line of the pre-molars and tubercular grinders.

Canis aureus, Linn. S. N. i. 59; Pallas, Zoogr. Rosso-Asiat. i. 39, t. 3; Gray, Cat. Mamm. B.M. 58; F. Cuv. Mamm. Lith. t.; Blainv. Ostéogr. t. 4 (skull, var. *barbarus*), t. 6 (var. *mareoticus*, skull rather wider).

Canis barbarus, Shaw, Zool. i. 54.

Barbary Jackal, Pennant, Quad. i. 260.

Lupus aureus, Kampf. Amœn. Exot. 413, t. 407. f. 3.

Canis micrurus, Reichenbach.

Thos, Pliny.

Le Chacal et l'Adive, Buffon, H. N. xiii. 255, Suppl. iii. 112, t. 16.

Schakall, S. G. Gmelin, Reise, iii. 80, t. 13; Gùldenst. in Nov. Com. Petrop. xx. 449, t. 10.

Jackal, Penn., Shaw.

Hab. India; Ceylon (*Reid*).

The several skulls in the British Museum differ from each other. 163 *c* is very wide at the zygomatic arches. Length 5 inches 4 lines, width 3 inches 3 lines. The aperture of the internal nostril is wide, 8 lines, much wider than in other skulls. The skull of a Jackal from Barbary, sent to the Zoological Gardens by E. W. Drummond Esq., 163 *d*:—length 5 inches 1 line, width 3 inches 1 line; aperture of internal nostril 6 lines.

163 *c*. Nepaul. Presented by B. Hodgson, Esq.

A skeleton with skull in the British Museum, 163 *k* (*Canis aureus*, part., Gerrard), from the Zoological Gardens is peculiar. Length 5 inches 4 lines, width 2 inches 2 lines, internal nostril 5 lines. The skull like that of *Lupus aureus*; but the coronal ridge is rather dilated or vase-shaped in the middle of the length; and the upper hinder tubercular grinders rather larger in comparison with the other grinders.

6. LUPUS PALLIPES. The Landgak.

B.M.

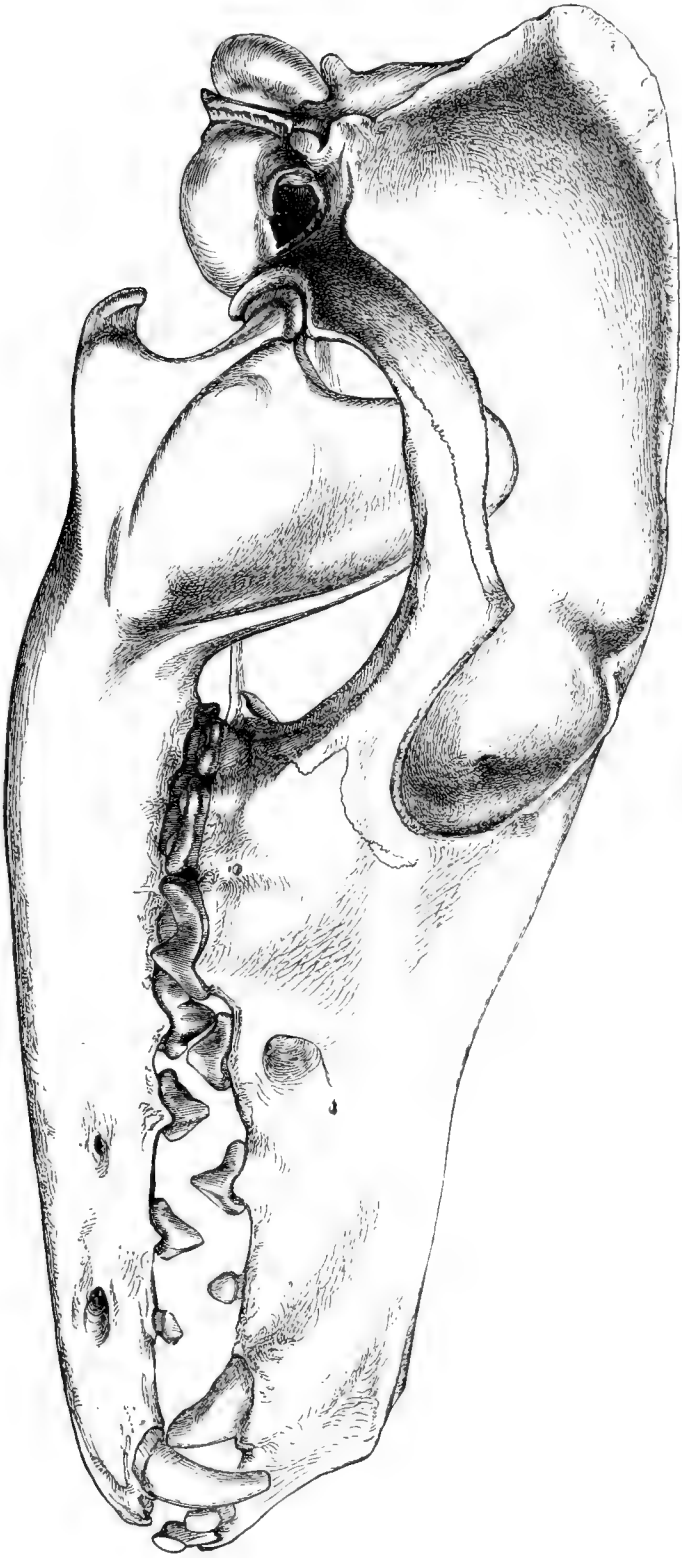
Coronal crest linear, high; upper sectorial teeth large, elongate.

Canis pallipes, Sykes, P. Z. S. 1831, p. 101; Gray, List Mamm. B.M. 58; Gerrard, Cat. of Bones of Mamm. 82.

Canis lupus, Hodgson; Elliot, Madras Journ. x. 101.

Saccalius indicus, Hodgson, MS.

Hab. Nepaul (*Hodgson*); India (*Oldham*, 163 *e*).



Skull of *Simenia simensis*. (Abyssinia, No. 126 a.)

Fig. 4.

5. SIMENIA.

Head elongate; nose very slender, elongate. Skull with a very slender elongate nose; the premolars small and very far apart.

1. SIMENIA SIMENSIS. Abyssinian Wolf. (Fig. 4, p. 505.) B.M.
Canis simensis, Rüppell, Abyss. Fauna, t. 14; Gray, Cat. Mamm. B.M. 58; Gerrard, Cat. of Bones of Mamm. 82.
Hab. Abyssinia (Rüppell, type in B. M.).
 Skull 162 *a* (fig. 4) Length 7 inches 9 lines. Coronal ridge linear.

6. CHRYSOCYON.

Head very long; nose slender. Pupils round. Tail short, reaching only to the hocks.

Skull elongate; nose very long, slender; coronal crest single, linear; postorbital process thick, convex above, bent down at the tip. Premolars approximate, large. Sectorial tooth in the same line as the other teeth. Internal palate narrow.

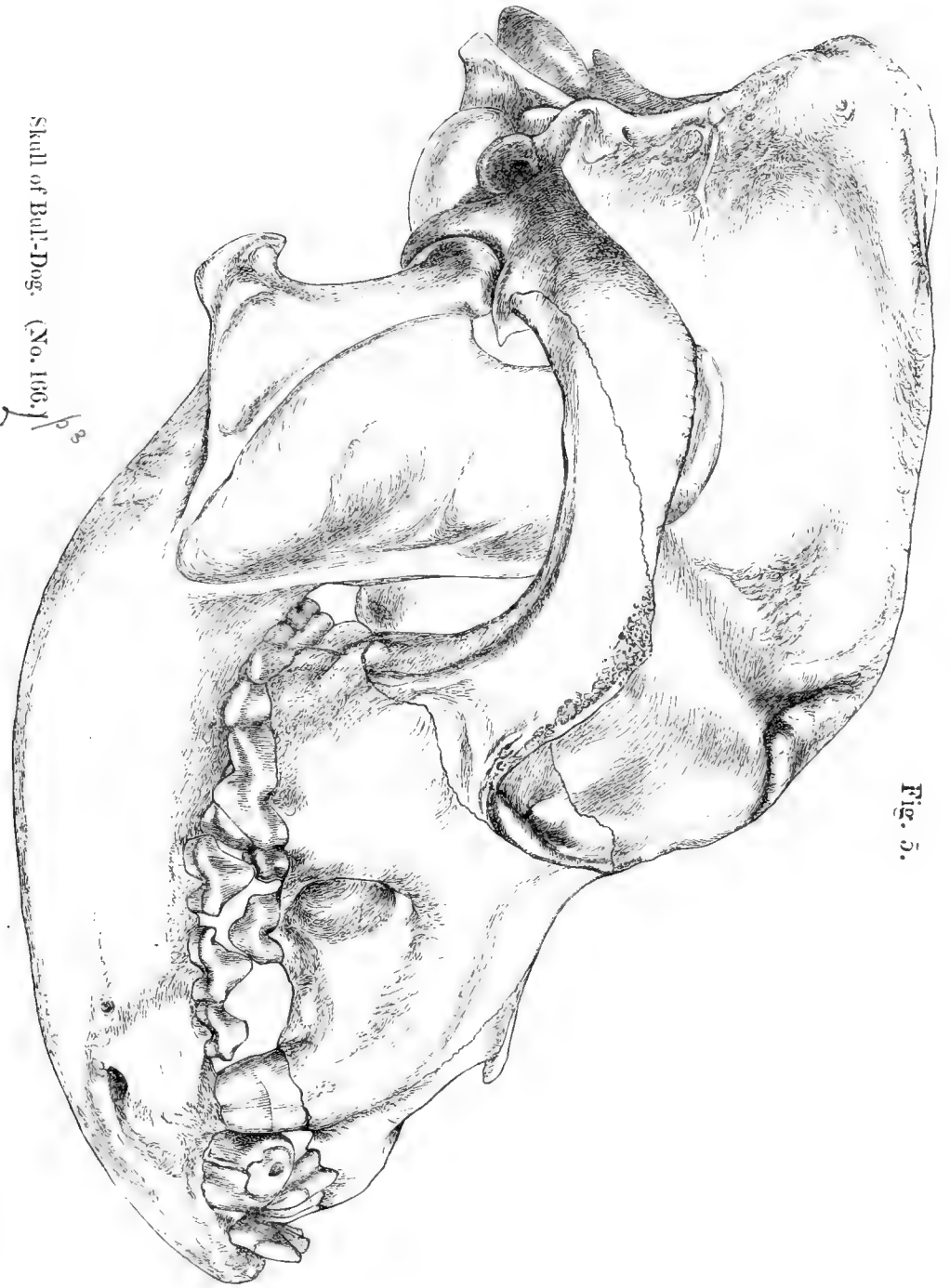
Chrysocyon, Ham. Smith, Dogs; Burmeister, Faun. Bras. 24.

* *Upper sectorial tooth moderate.* Chrysocyon.

1. CHRYSOCYON JUBATA. Guara. B.M.
Canis mexicanus, Sonn. Nouv. Dict. vi. 505 (not Linn.).
Canis jubatus, Desm. Mamm. 198; Burm. Faun. Brasil. t. 21, t. 26. f. 1.
Chrysocyon jubatus, Gerrard, Cat. of Bones of Mamm. 89.
Canis campestris, Pr. Max. Beitr. ii. 334, n. 1; Blainv. Ostéogr. t. 7 (skull).
Loup rouge, Cuv. R. A. i. 154, iv. t. 1.
Hab. South America (solitary); Paraguay (*Azara*); Brazil (*Pr. Max.*); Buenos Ayres.

** *Upper sectorial tooth transverse, very large.* Neocyon.

2. CHRYSOCYON LATRANS. Prairie-Wolf. Coyote. B.M.
 Muzzle short, like that of a Fox; tail short, like a Wolf's.
 Skull 171 *a* very like *Lupus anthus*; but nose longer and more slender.
Canis latrans, Say, in Long's Exped. i. 168; Aud. & Bachm. N. A. Quad. ii. 150, t. 71, 1829; Baird, Mamm. N. A. 113; Gerrard, Cat. of Bones of Mamm. 85; Gray, Cat. Mamm. B. M. 58; Blainv. Ostéogr. t. 7 (skull).
Fulpes velox, Gerrard, Cat. of Bones of Mamm. n. 1237 *a*.
 Var. Small. *C. frustror*, Woodhouse, Proc. Ac. N. S. Philad. v. 147 (1850), v. 157 (1851).
Small Wolves, Dupretz.
Burrowing Dog, Lewis & Clark.



Skull of Bull-Dog.

(No. 166.)

J. P. S.

Fig. 5.

Cased Wolves, Furrier's List.

Lyciscus cogotis, Ham. Smith, Nat. Lib. Dogs.

? *Canis ochropus*, Eschsch. Zool. Atlas, i. t. 11; Gray, List Mamm. B. M. 59; Zool. Sulph. 32, t. 10.

Hab. North America (in packs): Upper Missouri (*Long*); California (*B. M.*).

"Replaces the Jackal of the Old World. Brings forth its young in a burrow. Barks like a Domestic Dog."—*S. Baird*.

Skulls 171 *a, b, c*. Width at zygomata 3 inches 4 lines; length of palate 3 inches 5 lines, of the upper jaw at the hinder edge of the sectorial tooth 2 inches, at the base of the canines 1 inch 1 line.

1237 *a*. *Vulpes velox*, Rich.

Skull 171 *c*. Length 7 inches; width at zygomata 3 inches 10 lines, at preorbital foramen 1 inch 3 lines, at outer hinder end of the sectorial tooth 2 inches 1 line, of the upper jaw at the base of the canines 1 inch 1 line; length of palate 3 inches 9 lines.

B. DOGS. *Tail elongate, curved or curled; temporal muscle only separated by a line or coronal ridge.*

7. CANIS. Dog.

Head moderate or elongate. Ears often dependent or recurved. The small hinder tubercular grinder of the upper and lower jaws well developed.

1. CANIS FAMILIARIS. Dog. (Fig. 5, p. 507.) B.M.

Canis familiaris, Linn. S. N. i. 56; Gray, Cat. Mamm. B. M. 57; Gerrard, Cat. of Bones of Mamm. 82.

C. domesticus, Linn. Mus. Adolph. Frid. i. 6.

C. fam. terræ novæ, Blainv. Ostéogr. Canis, t. 8 (skull).

Chien, Buffon, H. N. v. 300, t. 15.

Chien domestique, Cuv. R. A. i. 152.

Dog, Penn.

Common Dog, Shaw.

Hab. The World where inhabited by man.

Skull 166 *f*. Bhotia Dog (black and tan). Nepaul (*Hodgson*). Length 8 inches 2 lines. Very like the skull of the Wolf of Europe. B.M.

Skull 166 *b*. Tibetan Mastiff. Nepaul (*Hodgson*). Length 9 inches. B.M.

Skull 166. Bull-Dog (fig. 5, p. 507). Utrecht Collection. B.M.

Canis familiaris nepalensis, Blainv. Ostéogr. t. 7 (teeth).

Canis familiaris japonicus, Temm. Fauna Japon. t. 10. f. 5, 6 (skull); Gerrard, Cat. of Bones of Mamm. 84.

Canis familiaris chinensis, Gray, P. Z. S. 1868, f. (skull). B.M.

C. fam. novæ hiberniæ, Fischer, Syn. 186.

Native Dog of New Zealand.

B.M.

2. CANIS CEYLANICUS, Shaw, Zool. i. 312.

Chien sauvage indien, Vossmar, Descript. 1775, t.*Ceylon Dog*, Penn.*Hab.* Ceylon.

3. CANIS TETRADACTYLA, Fischer, Syn. 292.

Chien sauvage de Cayenne, Actes de la Soc. d'H. N. de Paris, i. 115; Meyer, Zool. Am. i. 134.*?Canis familiaris cayanensis*, Blainv. Ostéogr. t. 7* (skull).*Hab.* Cayenne.

4. CANIS DINGO.

Ears erect. Tail elongate. Tubercular grinders $\frac{2}{2}$.—*Blainville*.*Canis dingo*, Blumenb. Handb. 103; Gray, List of Mamm. B. M. 57; Gerrard, Cat. of Bones of Mamm. 84.*C. familiaris australasiae*, Desm. Mamm. 190; Blainv. Ostéogr. t. 8 (skull).*Dingo* or *Australasian Dog*, Shaw, Gen. Zool. i. 277, f. 76.*Hab.* Australia.Var. *sumatrensis*. Skull short; face short, broad. Tubercular grinders $\frac{2}{2}$, well developed.*Canis familiaris sumatrensis*.*Hab.* Sumatra.

The Domestic Dog has been bred into various well-marked varieties, some of which have existed from the earliest historical period, and are to be found everywhere the companions of man. New varieties are very rarely if ever produced; and some of the old or well-known varieties have a great tendency to die out, at least for a time. Indeed all varieties are only to be retained by careful breeding and weeding—that is, by the destruction, or at least exclusion from breeding, of the examples that do not come up to the standard. If this is not done, they soon deteriorate into the common Cur or the Pariah Dog of India.

Most varieties occur of very different sizes—from very large to large, middle-sized, small, or very small.

The varieties always present the same general external appearance, and often have a peculiar colour. For example, the Poodles always have curly hair. Other varieties occur with long or short smooth hair, with bristling or rough hair, curly hair, or with a nearly naked skin; the latter generally also have imperfect teeth, or teeth that early decay or drop out.

Some varieties are malformations, as the Bull-Dog and the Pug Dog have a short, imperfect upper jaw and a broken nose; but this malformation occurs as a subvariety among Spaniels, as in the Japanese Sleeve-Dog; and other Dogs (continued by breeding) have the lips, on the sides of the mouth, very large and pendulous, as the Mastiff. Several varieties also occur presenting short-legged long-bodied breeds—as the Turnspit, the Scotch Terrier, and the Muff-Dogs or Short-legged Spaniels.

The Domestic Dog presents three distinct forms of ears. Some, as the Spitz Dog, have short ovate, erect, hairy ears; others, like the Greyhound, have elongated ears that are folded together, bent backward on the sides of the head; while the Hound and Spaniels have broad ears bent down on the sides of the head. When the varieties with different forms of ears are bred together, intermediate forms may be observed.

The tail, in most varieties, is elongated, tapering at the end; it is often more or less curved, and sometimes closely spirally bent. But the tails of many Domestic Dogs are cut; and some few breeds are said to be born tailless. But I have never seen any examples of the latter.

Varieties which are very distinct in their external form, length and kind of hair, and colour, have skulls so alike that they are not to be distinguished by any appreciable character. Thus it is impossible to distinguish the skull of a Terrier from that of a Spaniel, or either of these from that of the Pariah Dog of India, or the "Mongrel Cur" as it is called in England.

Some of the figured and named varieties, as the Lion-Dog (*Chien-lion*, Buffon, v. t. 40. f. 2; *Canis familiaris leoninus*, Gmelin), are described from Dogs that had been artificially prepared; and of some, as the Prick-Eared Dog, the ears had been artificially clipped; and the same is the case with some of the short-tailed Dogs.

If the varieties of Dog are stumbling-blocks to the systematic zoologist, which some say they are (for what reason I cannot conceive), they are never mistaken by their wild allies. It is true that a Wolf will breed with a female Dog, but so will a wild Pheasant with a domestic hen. The system of improving the breed of domestic animals by breeding and weeding seems to have been co-existent with human civilization; and to keep up the good breeds it is as necessary to be carefully attended to now as in the earliest period, showing that the varieties produced have no tendency to become perpetual.

The varieties of the Dog, like the varieties of Oxen, Sheep, Pigs, Poultry, and Pigeons, are limited; and the limits seem to have been early discovered, as most, if not all, of the varieties now existing seem to have been known in the earliest historical period, and even anterior to it.

How any one can think that the differences between varieties of domestic animals are such as zoologists would use to distinguish genera and species, is a mystery that I cannot understand; and the theory that the variation produced by breeding and weeding, or selection as it is called, is to be regarded as the origin of the difference between natural species, is more astonishing, and can only have arisen for want of careful study of the subject. There are some minds so constituted, even among the well educated, who believe in animal magnetism, metallic factors, table-turning, phrenology, spiritualism, mesmerism, the great pyramid, natural selection, and mimicry of animals—and some even two or more of these theories in succession, or at the same time.

- C. FOX-TAILED WOLVES. *Tail elongate, reaching below the heels, more or less curved, and covered with more or less elongated hair not forming a full brush.* South America.

8. LYCALOPEX.

Pupil circular. Tail reaching below the hocks. The upper tubercular teeth oblong, taken together much longer than the flesh-tooth. South American.

Cerdocyon, Ham. Smith, Dogs, i. 289, 1839.

Lycalopex, Burmeister, Fauna Brasil. 24, 31.

1. LYCALOPEX VETULUS.

B.M.

Tail very long, bushy; underside pale yellow. Snout reddish brown. Coronal ridge narrow linear.

Canis vetulus, Sund. Bras. 21, t. 40.

C. azaræ, Pr. Wied, Abild. t.

C. (Lycalopex) vetulus, Burmeister, Faun. Bras. 37, t. 23, t. 28. f. 1, t. 29. f. 1.

Hab. Brazil.

2. LYCALOPEX FULVICAUDUS.

B.M.

Underside of tail reddish yellow. Temporal muscles separated by a well-marked narrow lanceolate crown, which is linear for one-fourth of its length behind (see Burm. t. 28. f. 2). The upper sectorial tooth short, broad, thick; upper tubercular teeth large, nearly similar in size and form.

Canis fulvicaudatus, Sund. Bras. 20.

C. (Lycalopex) fulvicaudus, Burm. Faun. Bras. 40, t. 24, t. 28. f. 2, t. 29. f. 2.

Hab. South America.

Skull 820 *a* is very like those figured by Burmeister, t. 28. f. 2, t. 29. f. 2; but the lower edge of the lower jaw is not so much arched.

Skulls 821 *a* and *b* both differ from 820 *a* in the upper sectorial and the tubercular grinders being smaller than they are in that skull. In 820 *a* the upper sectorial tooth is thick, nearly triangular, broad, and with a well-marked lobe on the front of the inner edge. In 821 *a* it is nearly of the same form—if anything, rather more equilaterally triangular; but it is smaller than in 820 *a*.

| | in. | lin. |
|--------------------------|-----|---------|
| Skull 820 <i>a</i> | 4 | 3 long. |
| Skull 821 <i>a</i> | 4 | 0 „ |

It is evident that the teeth of these Dogs vary in size in the same species.

Var. 1. *chiloensis*.

B.M.

Upper sectorial tooth compressed, with inner front lobe rather in front of the front edge of the tooth; crown of skull flat, narrow,

sub-vaseshaped. Hinder opening of the palate broad, expanded. Skull 821 *b*, 4 inches 2 lines long.

Vulpes azaræ (Chiloe), Waterhouse, MS.

Vulpes vetulus (partly), Gerrard, Cat. Bones of Mamm. (821 *b*.)

Hab. Chiloe.

9. PSEUDALOPEX.

Tail elongate, reaching below the hocks. Pupil elliptical in the daylight. Skull with a linear coronal ridge; the upper tubercular teeth taken together scarcely so long as, or very little longer than the flesh-tooth.

Pseudalopex, Burmeister, Faun. Bras. 24, 44.

* *The fore legs grey externally; soles of the feet blackish brown.*

1. PSEUDALOPEX AZARÆ. Agoua rachay. B.M.

Tubercular grinders 3; front always largest.

Canis azaræ, Pr. Max. Beitr. ii. 338; Abbild. t.; Darwin, Zool. Beagle, xiv. t. 7; Blainville, Ostéogr. t. 4 (skull).

C. brasiliensis, Schinz, Cuv. Thierr. i. 222.

Vulpes azaræ, Gray, Cat. Mamm. B. M. 60; Gerrard, Cat. of Bones of Mamm. 87.

Agoua rachay, Azara, i. 317.

Canis melanostomus, Wagner, Wieg. Arch. 1843, i. 358.

C. (Pseudalopex) azaræ, Burm. Faun. Bras. 24, 44, t. 28. f. 3, t. 29. f. 3.

C. azaræ, Van der Hoeven, t. i. f. 8.

Hab. South America; Brasil (*Pr. Max.*); Paraguay (*Azara*); Patagonia (*Darwin*).

** *The fore legs entirely red-yellow; soles of the feet red-brown.*

2. PSEUDALOPEX GRISEUS. B.M.

Fur reddish-yellow-grey; legs red-yellow. Size small.

Canis griseus, Gray, P. Z. S. iv. 88, 123, t. 6; Mag. N. H. 1837, p. 578.

Vulpes griseus, Gerrard, Cat. of Bones of Mamm. 88.

Canis (Pseudalopex) griseus, Burmeister, Faun. Bras. 28, 48, t. 25.

Hab. Patagonia (*King*).

3. PSEUDALOPEX MAGELLANICUS. Colpeo. B.M.

Fur fox-red; back blackish. Large-sized.

Canis magellanicus, Gray, P. Z. S. 1836, p. 88; Mag. N. H. 1837, p. 578; Darwin, Zool. Beagle, x. t. 5; Burmeister, Fauna Bras. t. 6. f. 3.

C. (Pseudalopex) magellanicus, Burm. Fauna Bras. 24, 51; Reise La Plata, ii. 405; Wieg. Arch. 1862, p. 329.

C. cancrivorus americanus, Burmeister, Fauna Bras. t. 27 (skull).
Vulpes magellanicus, Gray, Mag. N. H. 1836, p. 578; List
 Mamm. B. M. 61; Gerrard, Cat. Bones of Mamm. 87.

? *Canis azaræ*, Waterhouse.

? *Colpeo*, *Canis colpaceus*, Molina.

? *Canis tetradactyla*, Meyer.

Chile Fox, Shaw, Zool. 329.

Hab. Chili and Bolivia (*Bridges*); Strait of Magellan (*Darwin*).

In the British Museum there are skulls from Chili, marked 184 *a, c*, and 184 *f*, *Vulpes magellanicus*, which are those of adult animals, and have a linear crest extending the whole length of the crown.

There is another skull, evidently from the same series, no. 184 *e*, also without any skin belonging to it, which has its adult teeth, but is not so large or aged as the others. It has a broad flat crown (separating the temporal muscles), which is wide in front and tapering to the occiput; and the side margins are rather curved in, giving it a slightly vase-like form. Length 5 inches 7 lines, width 2 inches 11 lines.

There are also a skull and skeleton (no. 184 *b*) from Chili, of which the skull is intermediate in size between the larger skulls and the small one. The coronal crest is linear; but there is an indication of the vase-shaped crown-plate on each side of the central ridge.

Nos. 817 *a, b, c, d, e* are five smaller skulls, named *Vulpes azaræ*, sent from Bolivia by Mr. Bridges. They are very similar externally, but they vary considerably in the size of the upper tubercular grinders as compared with the other teeth, and slightly in the form of the lobes of the upper sectorial tooth. The hinder upper tubercular is always of the same form as the penultimate, but smaller. The internal lobe of the sectorial tooth of *V. magellanicus* from Chili, 184 *e*, is rather larger, with the front edge on a level with the front edge of the body of the tooth; in the small skulls from Bolivia the lobe is very slightly in front of the line of the fore edge of the tooth.

I believe these all belong to one species; and they are very like the skulls figured as *Canis cancrivorus*, var. *brasiliensis*, by Burmeister, Fauna Bras. t. 27. They are very different in the form of the crown and other details from the skull figured as *C. azaræ* by Blainville, Ostéogr. t. 4, and by Burmeister, Fauna Bras. t. 28, f. 4.

4. PSEUDALOPEX ANTARCTICUS.

B.M.

Canis antarcticus, Shaw, Zool. i. 331; Desm. Mamm. 199; Gray, List Mamm. B. M. 59; Darwin, Zool. Beagle, ii. t. 4.

Antarctic Fox, Penn.

Hab. Falkland Islands.

5. PSEUDALOPEX GRACILIS.

Canis (Pseudalopex) gracilis, Burm. Reise La Plata, ii. 406; Arch. Naturg. 1862, p. 130.

Hab. Pampas of Mendoza.

10. THOUS.

Skull elongate; nose tapering, moderate. Temporal muscles separated by a vase-shaped crown. Teeth $44 = \frac{20}{24}$; two tubercular grinders in each side of the upper, and three in each side of the lower jaw, the two hinder circular, the hindmost very minute.

Lycalopex, § 1, Burmeister.

There are three skulls in the British Museum, all showing the additional hinder lower grinders. One, 1033 *b*, has a group of four small hinder tubercular grinders on one side of the lower jaw, which displaces and throws out of the regular line the larger penultimate tubercular lower grinder.

1. THOUS CRANCRIVORUS. Crab-eating Dog. B.M.

Tail moderately long. Snout blackish.

Canis cancrivorus, Desm. Mamm. 199; Blainv. Ostéogr. t. 9 (skull), t. 12 (teeth), t.

Viverra cancrivora, Meyer, Zool. Ann. i. 135; Actes de la Soc. d'H. N. à Paris, i. 115.

Canis brasiliensis, Lund, Bras. 1842, t.

C. melampus, Wagner.

Vulpes brasiliensis, Gerrard, Cat. of Bones of Mamm. 88.

Canis (Lycalopex) cancrivorus, Burm. Fauna Bras. 24, t. 22, t. 27. f. 1, 4.

Lycalopex cancrivorus, Gerrard, Cat. of Bones of Mamm. 89.

Chien des bois, Buffon, H. N. Supp. vii. 146, t. 38.

Chien sauvage, Fermin in Holl. Equin. 10.

? *Canis thous*, Linn. S. N. i. 60.

Surinam Dog, Penn.

Hab. French Guiana, in small packs.

2. THOUS FULVIPES. B.M.

Canis fulvipes, Martin, P. Z. S. 1837, p. 11; Waterhouse, Zool. Beagle, t. 6 (1839) (type in B. M.).

Vulpes fulvipes, Gerrard, Cat. of Bones of Mamm. 88.

? *C. (Lycalopex) entrerianus*, Burmeister, Uebersicht der Säugeth. von La Plata, ii. 400, 1861; Arch. Naturg. 1862, p. 130.

Hab. Chili (*Bridges*).

Section II. VULPINÆ. *Skull thin, elongate. Pectoral process of the frontal bones bent but little downward, the anterior edge turned up; a longitudinal shallow pit or indentation at its base. Pupil of eye often elliptical, erect. Head slender. Upper incisors scarcely lobed.*

Subfam. 3. VULPINA.

Vulpinae, Baird, Mamm. N. A. 121.

- D. THE FOXES. *The tail elongated, reaching to the ground, covered with abundance of soft hair forming a brush, with a gland above the base. Eyes often nocturnal, with oblong erect pupils.*

11. VULPES.

Muzzle long. Temporal crests of the skull linear or nearly linear. Ears moderate, erect, acute. Tail with soft fur and long hairs uniformly mixed. Bullæ of the ear-bones moderate, oblong, strongly keeled, angular.

Vulpes, Baird, Mamm. N. A. 121.

* *Large. European.*

1. VULPES VULGARIS. FOX.

B.M.

Canis vulpes, Linn. S. N. i. 59; Blainv. Ostéogr. t. 4 (skull); Gray, Cat. Mamm. B. M. 59.

Vulpes vulgaris, Brisson, R. A. 239; Gerrard, Cat. of Bones of Mamm. 86.

Var. Tail-end black.

Canis alopec, Linn. S. N. i. 59.

B.M.

Renard charbonnier, Buffon, H. N. vii. 82.

Brant Fox, Penn.

Var. crucigera. Fulvous, with a black dorsal cross.

Vulpes crucigera, Brisson, R. A. 240; Gesner, Quad. f. at p. 90; Aldrov. Quad. Digit. 221, f. at p. 222.

Cross Fox, Penn.

Hab. Europe.

Var. melanogaster.

B.M.

Vulpes melanogaster, Pr. Bonap., Gerrard, Cat. of Bones of Mamm. 86.

Hab. Italy.

** *Large. African.*

2. VULPES NILOTICA. Sebora or Tahaleb.

B.M.

Skull—crown-line narrow behind, elongate triangular in front half.

Canis niloticus, Geoff. Cat. Mus. Paris; Desm. Mamm. 204; Lechl. Doubl. 4; Rüppell, Zool. Atlas, 41, t. 15; Gray, Cat. Mamm. B. M. 60.

C. ægyptiacus, Sonnini, Nouv. Dict. d'H. N. vi. 524; Rüppell, Zool. Atlas, t. 15; Ehrenb. Symb. Phys. t. 19.

Vulpes niloticus, Gerrard, Cat. of Bones of Mamm. 85.

Hab. North Africa; Egypt. Called "Tahaleb" by the Egyptians, "Sobora" by the Arabs.

Skulls 172 *a, b, c, d.* Length 5, width $2\frac{1}{4}$ inches.

3. VULPES ADUSTA. The Burnt Dog.

Canis adusta, Sundevall, Gerrard, Cat. of Bones of Mamm. 85.

Hab. South Africa. Caffraria (*Sundevall*).

4. VULPES VARIEGATA. Schom or Aba. B.M.
Canis variegatus, Rüppell, Zool. Atlas, 31, t. 10; Ehrenb. Symb. Phys. t.; Gray, List Mamm. B. M. 59.
C. mesomelas, var., Rüppell, Cat. Mus.
Hab. Upper Egypt and Nubia, called "Abu Schom" by the Arabs (Rüppell).
5. VULPES MESOMELAS. Tenlie. B.M.
Canis mesomelas, Ehrenb. Säugeth. 370, t. 95; Gray, List Mamm. B. M. 58.
C. variegatus, A. Smith, S. Afr. Quart. Journ. 30.
Jackal, Kolbe, Besch. des Vorgeb. d. g. Hoffn. 150.
Cape Jackal, Shaw.
Renard du Cap, Cuv. R. A. i. 158.
Hab. South and East Africa: Cape of Good Hope (Kolbe); Abyssinia (Rüppell).

*** *Large. Asiatic.*

6. VULPES FLAVESCENS. The Persian Fox. B.M.
 Skull—crown-line of adult narrow linear, of young tapering backwards to occiput.
Vulpes flavescens, Gray, Ann. & Mag. N. H. 1843, xi. 118; List of Mamm. B. M. 60; Gerrard, Cat. of Bones of Mamm. 86.
Hab. India, Salt Range (Oldham).
 Skulls 1175 *a, b, c.* Length 5 inches, width 2½.
7. VULPES MONTANA. Hill-Fox. B.M.
Vulpes montanus, Pearson, J. A. Soc. Beng. 1836, p. 313; Gray, List Mamm. B. M. 195; Gerrard, Cat. of Bones of Mamm. 86.
V. nepaulensis, Gray, Mag. N. H. 1837.
Canis himalaicus, Ogilby, P. Z. S. 1836, p. 183; Royle, Illust. Cashmere, t. (B. M.).
Hab. Nepal (Rev. R. Ewing); Thibet.
 Skull 176 *a.*

8. VULPES GRIFFITHSII.

Vulpes griffithsii, Blyth, J. A. Soc. Beng. 1854, p. 729.
Hab. Afghanistan.

**** *Small. Asiatic.*

9. VULPES FERRILATUS. B.M.
Vulpes ferrilatus, Hodgson.
Hab. Thibet.
10. VULPES LEUCOPUS. B.M.
Vulpes leucopus, Blyth, J. A. Soc. Beng. 1854, p. 729.
Hab. North-west India; Moultan.

11. VULPES JAPONICA.

B.M.

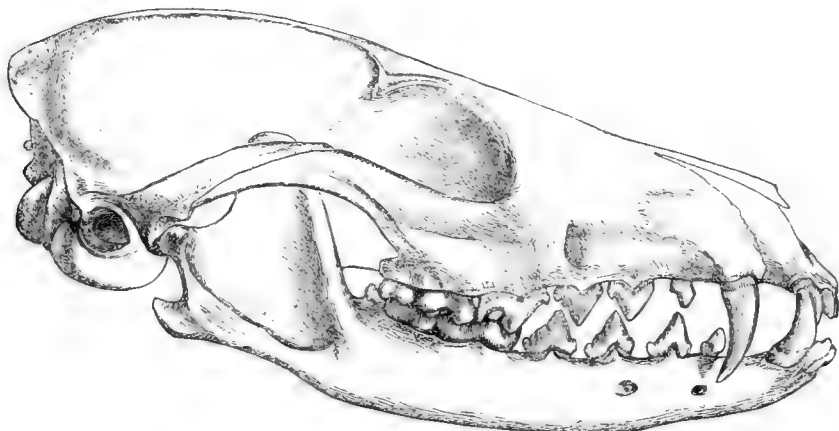
Skull—crown-plate elongate, slender, tapering behind to the occiput (adult).

Vulpes japonicus, Gerrard, Cat. of Bones of Mamm. 86.

Hab. Japan.

Skull 180 a. Length 5 inches, width $2\frac{1}{2}$.

Fig. 6.



Skull of *Vulpes bengalensis*. (India, No. 174b.)

12. VULPES BENGALENSIS. Kokree. (Fig. 6.)

B.M.

Skull—crown-plate wide towards the occiput, vase-shaped.

Canis bengalensis, Shaw, Zool. i. 230.

C. rufescens, Gray, Ill. Ind. Zool. ii. t. 3.

C. kokree, Sykes, P. Z. S. i. 101.

C. corsac, Blyth.

Vulpes corsac, Ogilby, P. Z. S.

V. indicus, Hodgson.

V. bengalensis, Gray, Ill. Ind. Zool. ii. t. 2; Gerrard, Cat. of Bones of Mamm. 86.

Bengal Dog, Penn. Quad. i. 160.

Var. *Canis xanthurus*, Gray, P. Z. S. 1837, p. 68.

C. chrysurus, Gray, Mag. N. H. 1836, p. 577.

Hab. India, Bengal.

Skulls 174 a-f. Length $4\frac{1}{4}$ inches, width $2\frac{1}{2}$.

13. VULPES PUSILLA. Small Fox.

Vulpes pusilla, Blyth, Journ. Asiat. Soc. Beng. xxiii. p. 729.

Hab. Punjab.

14. VULPES KARAGAN. Karagan.

“Larger than the Corsac.”

Canis karagan, Erxl. Syst. 556.

C. melanotus, Pallas, Zoog. Rosso-Asiat. i. 44.
Karagan, Schreb. Säugeth. 359.
Karagan Fox, Shaw.
Hab. Ural and Tartary.

15. VULPES CORSAC. Corsac. B.M.

Canis corsac, Linn. S. N. i. 223; Tiles. Nov. Acta Acad. Nat. Cur. xi. 400, t. 49; Pallas, Zoog. Rosso-Asiat. i. 41, t. 4; Blainv. Ostéogr. t. 5 (skull).

Vulpes corsac, Gray, List Mamm. B. M. 62.

?*Isatis* or *Adive*, Buffon, H. N. Suppl. iii. t. 17.

Corsac Fox, Penn.

Corsac, Cuv. Règne Anim. i. 155.

Hab. Tartary, in deserts; Siberia.

***** *Large. American.*

16. VULPES PENNSYLVANICA. B.M.

Hair long, silky and soft; tail very full, composed of an under-fur with long hair distributed uniformly among it. Tail with a white tip; feet and ears black. Ears with both sides covered with hair.

Canis fulvus, Rich. Fauna B.-Amer. 93, 1829; Aud. & Bachm. N. A. Quadr. ii. 263, 414, t. 87, 116, iii. 70; Desm. Mamm. 203.

C. argentatus, Shaw, Zool. i. 328.

C. vulpes, var. *δ. pennsylvanicus*, Bodd. Elench. i. 96, 1784.

C. decussatus, Geoff. Mus. Par.; Desm. Mamm. 203.

C. cruciger, Schreb. Säugeth. t. 91 a.

Renard argenté, Charlerois, N. France, i. 196; Cuv. R. A. i. 155; Geoff. Mamm. Lithogr.

Renard de Virginie, Palisot de Beauvois, Bull. Soc. Philom.

Pennsylvanian Brant Fox, Penn.

Vulpes fulvus, S. Baird, N. A. Mam. 123; Gerrard, Cat. of Bones of Mamm. 85.

Canis vulpes nigra americana, Blainv. Ostéogr. t. 2 (skeleton).

Hab. North America.

Var. 1. *fulva*. "Reddish yellow; back behind grizzly; throat greenish; a narrow line on the belly white; ears behind, and tips of caudal hairs, except terminal brush, black." Skulls 173 a, b, c, d.

Var. 2. *decussata*. "Muzzle and underparts, with the legs, black; tail blacker than in var. 1; a dark band between the shoulders, crossed by another over the shoulders."

Canis decussata, Desm.

B.M.

C. fulvus decussatus, Rich., Baird.

Vulpes fulvus decussatus, Aud. & Bach.

Cross Fox.

Var. 3. *argentata*. "Entirely black, except on the posterior part of the back, where the hairs are annulated with grey; tail-tip white;" foot-pads often covered with hair.

Canis argentatus, Shaw.

C. fulvus argentatus, Rich., Baird.

Vulpes fulvus argentatus, Aud. & Bachm.

Renard noir d'Amérique, Blainv. Ostéogr. t. 12 (skeleton).

Silver or black Fox.

Var. 4. *macrura*. Larger, varies in colour like the smaller varieties; foot-pads covered with hair.

Skulls 1402 a, b. Length $5\frac{1}{4}$ inches; width $2\frac{1}{2}$.

Vulpes macrourus, Baird in Stansbury's Explor. Great Salt Lake, 309, 1852; Mamm. N. A. 130.

V. utah, Aud. & Bach. Proc. A. N. S. Philad. v. 114; N. A. Quad. iii. 255, t. 151.

?*V. fulvus*, Pr. Max. Reise, ii. 98, 1841.

Hab. Great Salt Lake.

17. VULPES VELOX. Burrowing Fox.

B.M.

Canis velox, Say in Long's Exped. i. 486, 1823.

Vulpes velox, Aud. & Bachm. N. A. Quadr. ii. 13, t. 52, 1851; S. Baird, Mamm. N. A. 133; Gerrard, Cat. of Bones of Mamm. 88.

Burrowing Fox, Lewis & Clarke's Travels, ii. 351.

Kit-Fox, Lewis & Clarke, *ibid.*

Canis cinereo-argentatus, Sabine, Franklin's Jour. 658; Blainv. Ostéogr. t. 4 (skull).

C. vulpes cinereo-argentatus, Rich. F. B. A. 98, 1827.

Vulpes cinereo-argentatus, Gray, List Mamm. B. M. 60; Gerrard, Cat. of Bones of Mamm. 87.

Canis microtis (or *Kit Fox*), Reichenb. Règne Anim. i. 10, f. 72, 73.

Hab. North America, Missouri, burrowing in the earth.

12. FENNECUS.

Ears large, elongate, hairy, spreading. Tail elongate, bushy, covered with soft hairs. Pupil roundish?

Skull elongate; braincase ovate. Temporal muscles separated from each other by a very wide urn-shaped crown to the occiput. Upper premolars compressed; flesh-tooth compressed, with a small internal process in front; tubercular grinder much wider than long. Bullæ of ears very large, thin, swollen and rounded below. Africa.

1. FENNECUS DORSALIS. Sabora.

B.M.

Canis dorsalis, Gray, P. Z. S. 1837, p. 132. (B. M.)

?*C. famelicus*, Rüppell, Zool. Atlas, 15, t. 56.

C. rüppellii, Schinz, Cuv. Thierr. iv. 508.

Hab. Sandy deserts of Nubia and Kordofan (called "Sabora" by the Arabs); West Africa, Senegal (B. M.).

2. FENNECUS ZAARENSIS. Fennecc.

B.M.

Canis zerda, Zimmerm. Geogr. Gesch. ii. 242; Leuckart, Isis, 1825, p. 211; Rüppell, Zool. Atlas, 5, t. 2.

C. cerdo, Gmelin, S. N. i. 75.

- C. fennecus*, Lesson, Man. 168.
Megalotis cerdo, Teng. Prod. 131.
Fennecus cerdo, Gray, Denham's Travels, i. 85.
F. arabicus, Sonnini & Desm. N. Dict. d'H. N. xi. 342.
F. brucei, Desm. Mamm. 235; Enc. Méth. t. 108. f. 9.
Viverra aurita, Blumenb. Handb. 95.
Vulpes minimus zaarensis, Skjöldebrand in K. Vetens. Akad. Hand. 1777, p. 265, t. 6.
V. zaarensis, Gray, List Mamm. B. M. 62; Gerrard, Cat. of Bones of Mamm. 87.
Fennec, Bruce, Travels, v. 128, t. 28.
Animal anonyme, Buffon, H. N. Suppl. iii. 148, t. 19.
Whitish Dog, Shaw from Bruce.
Hab. Northern Africa (*Bruce, Rüppell*), Algiers.
 Skull 182 c.

3. FENNECUS PALLIDUS. Hosseen.

B.M.

Skull 814 a. Orbits very large.

Canis pallidus, Rüppell, Zool. Atlas, 33, t. 11.

Vulpes pallidus, Gerrard, Cat. of Bones of Mamm. 87.

Hab. Darfur and Cordofan (*Rüppell*) (called "Abu Hosseen" by the Arabs).

Skull 814 b, described by M. de Blainville, in Museum of the Zool. Soc.

Fig. 7.



Skull of *Fennecus caama*. (South Africa, No. 815 a.)

4. FENNECUS CAAMA. The Asse. (Fig. 7.)

B.M.

Skull—the crown broad, vase-shaped, rather contracted behind, and linear near the occiput.

Canis caama, A. Smith, South-African Quart. Journ.

Vulpes caama, Gerrard, Cat. of Bones of Mamm. 87.

Hab. South Africa (*Dr. A. Smith*).

The skull 815 *a* in the British Museum, out of this skin, is very like that of *Urocyon virginianus* in the form of the crown-plate, but it differs from that skull in the bullæ of the ear-bones being longer, more ventricose and rounded, and in the last upper tubercular grinder being small and more triangular, narrower on the inner edge.

13. LEUCOCYON.

Tail very full and bushy; soles of feet densely furred. Fur, of the adult, white; of the young, greyish lead-colour.

Skull short; nose broad before the orbits.

LEUCOCYON LAGOPUS.

B.M.

Canis lagopus, Linn. Fauna Suec. 4; S. N. i. 59; Pallas, Zoogr. Rosso-Asiat. i. 51, t. 5; Tilesius, Nov. Acta Acad. Nat. Cur. xi. 375, t. 47; Blainv. Ostéogr. t. 5 (skull).

C. (Vulpes) lagopus, Rich. F. Bor.-Amer. i. 83, 1829.

Vulpes lagopus, Aud. & Bachm. N. A. Quadr. ii. 89, t. 121, 1829; Gray, List Mamm. B. M. 60; Gerrard, Cat. of Bones of Mamm. 88.

Renard blanc, Buffon, II. N. Suppl. vii. t. 51.

Arctic Eox, Pennant, Shaw. (Skulls 780 *a, c, d.*)

Junior? Sooty black. Skull shorter and broader.

Canis fuliginosus, Shaw, Zool. i. 351. (Skulls 1316 *a, b, c.*)

Sooty Fox, Pennant.

Isatis gris, F. Cuv. Mamm. Lithog.

Vulpes fuliginosus, Gerrard, Cat. of Bones of Mamm. 88.

V. lagopus (Arctic Fox), Aud. & Bachm. N. A. Quadr. iii. t. 122; Baird, Mamm. N. A. 137.

Canis isatis, Gmelin, Nov. Comm. Petrop. v. 358.

Hab. Arctic region: Newfoundland (*Audubon*).

Var. smaller? *Pessez* or *Golubri*.

Canis isatis, Gmelin, Nov. Com. Petrop. v. 358; Thienem.

C. lagopus, Pallas, Zoogr. R.-Asiat. i. 51, t. 5; Tiles. N. Act. Nat. Cur. xi. 375, t. 47.

C. isatis, Gmelin, Nov. Comm. v. 358; Buffon, H. N. xiii. 372 (partly).

Hab. North Asia.

- E. BRISTLE-TAILED FOXES. Tail elongate, covered with soft elongated hair and with a central concealed crest of stiff hairs un-mixed with soft fur. Skull—temporal muscles separated by a wide flat crown, narrow at the occiput.

14. UROCYON.

Muzzle short. Temporal crests of the skull always widely separated. Postorbital process thin, spread out, concave above. A supplementary tubercle on the lower sectorial. The under jaw with an angular emargination below. Pupil — ? Bullæ of ear-bones

moderate, ovate, swollen. Upper tubercular grinders large, long and broad.

Urocyon, Baird, Mamm. N. A. 121.

1. UROCYON VIRGINIANUS. Grey Fox. B.M.

Skulls 179 *a, b, c, d, e*, female adult.

Canis virginianus, Erxl. S. R. A. 567, 1777 (from Catesby).

C. vulpes virginianus, Rich. F. B. A. i. 96, 1827.

Vulpes virginianus, Dekay, N. Y. Zool. i. 45, t. 7. f. 2, 1842; Aud. & Bachm. N. A. Quad. i. 162, t. 21.

Canis cinereo-argenteus, Erxl. S. R. A. 576, 1777; Schreber, Säugeth. 360, t. 92, 1778.

C. griseus, Bodd. Elench. Anim. i. 97, 1784.

Grey Fox, Catesby, Carol. ii. 78, t. 78, 1731; Pennant.

Corsak Fox, Penn. Quadr. 235, 1781 (not Linn.).

Vulpes (Urocyon) virginianus, Baird, Mamm. N. A. 138.

Fulvous-necked Fox, Shaw.

Renard tricolore, Cuv. R. A. i. 155.

Hab. North America.

2. UROCYON LITTORALIS. Coast-Fox, or Short-tailed Fox.

Tail one-third the length of the body, with a concealed mane of stiff hairs and with a black stripe above. Fur above hairy and black; sides of neck, fore legs, and lower part of sides dull cinnamon; chin and sides of muzzle black.

Vulpes (Urocyon) littoralis, Baird, Mamm. N. A. 143, t. 1 (animal), t. 35. f. 2 (skull).

Hab. California, Island of San Miguel.

Scarcely more than half the size of the Grey Fox (*U. virginianus*).

F. RACCOON DOG. *Tail short, bushy; upper sectorial tooth compressed, three-lobed, with a small internal tubercle. Temporal muscles separated by a vase-shaped crown.*

15. NYCTEREUTES.

Tail short, bushy, straight. Teeth 42; premolars $\frac{4-4}{4-4}$; molars $\frac{2-2}{2-2}$; sectorial tooth compressed, with a small internal tubercle rather in front of the fore edge of the body of the tooth.

Skull broad; nose moderate, tapering; postorbital process thin, rather concave above, bent down at the tip. Crown of the head broad, vase-like, separating the temporal muscles nearly to the occiput. Lower edge of lower jaw straight.

Nyctereutes, Temm., Gray, List of Mamm.

NYCTEREUTES PROCYONOIDES. Tanate, or Raccoon Dog. B.M.

Canis procyonoides, Gray, Illust. Ind. Zool. ii. t.; Mag. N. H. 1837, p. 578; Schrenck, Amurland, 53, t. 5.

C. (Nyctereutes) viverrinus, Temm. Fauna Japon. t. 8; Schrenck, Reisen, figs. 2-6.

Nyctereutes procyonoides, Gray, List of Mamm. B. M. 62; Gerrard, Cat. of Bones of Mamm. 89.

Hab. China? Japan (*Reeve*); Amoorland.

II. Aberrant Canidæ, or Viverrine Dogs. *Upper sectorial grinder short, triangular, as wide as long; tubercular grinders $\frac{2-2}{3-3}$. Tail short, straight, bushy, not reaching to the heels.*

Subfam. 4. MEGALOTINA.

Teeth 46: molars $\frac{7-7}{8-8}$; premolars $\frac{3-3}{4-4}$. Sectorial grinders $\frac{1-1}{1-1}$, small; upper triangular, with a broad internal lobe; lower compressed. Tubercular molars $\frac{3-3}{3-3}$; upper oblong transverse; lower four-sided, front lower largest, last lower least, the rest subequal.

Skull elongate; nose slender, elongate. Temporal muscles separated by a broad flat crown to the occiput, which is formed with a raised edge. The three first upper grinders are compressed; the front one in the middle of a wide space, very small; the hinder premolar triangular, about as long as broad, and the three following oblong transverse, the two front subequal, and the hinder smaller; the lower premolars compressed; the flesh-tooth small, with a fine tubercle; these teeth become worn down with a flat crown.

16. MEGALOTIS.

Forehead and crown flat, broad, with a raised margin, and separating the temporal muscles to the occiput. Skull elongate; face very long, tapering. Teeth 48. Grinders $\frac{8-8}{8-8}$. Premolars $\frac{3-3}{3-3}$. Sectorial $\frac{1-1}{1-1}$, small; upper triangular, with a broad internal lobe; lower compressed. Tubercular molars $\frac{3-3}{3-3}$; front lower largest, last lower least, the rest subequal.

Megalotis, Blainv. Ann. Franç. et Etrang. d'Anat. i. t. 8. f. 1, 1 *a*, *b* (skull and teeth).

Agrodius, H. Smith, 1839.

Otocyon, Licht.

MEGALOTIS LALANDII.

B.M.

Canis megalotis, Desm. Mamm. Suppl. 538; Blainv. Ostéog. t. 1 (skeleton), t. 4 (skull).

C. lalandii, Desm. Dict. Class. d'H. N. iv. 18, t.

Megalotis lalandii, Gray, Griff. An. Kingd. t. 54.

Otocyon caffer, Licht.

O. lalandii, Gerrard, Cat. of B. of Mamm. 90.

The Fennec of Delalande, Griffith, A. K. ii. p. 372, t. 54 (from Mus. Paris.).

Hab. South Africa; Cape of Good Hope (*Lalande*).

Family 2. HYÆNADÆ.

Head rather elongate; nose rounded. Tubercular grinders single, only in the upper jaw, wanting in *Proteles*. Feet produced; toes straight, free, with blunt, exposed, worn claws. Tail short, bushy.

SYNOPSIS OF THE GENERA.

* *Teeth large, well-developed, 34; muzzle narrowed in front.*

1. HYÆNA. With a large, deep subcaudal gland. The tubercular grinders of upper jaw elongate, with three roots. The flesh-tooth with three equal-sized lobes, the front lobe large.
2. CROCUTA. No subcaudal gland. The tubercular grinders of upper jaw small, with two roots. Flesh-tooth with unequal lobes, the front one small, and the hinder elongate.

** *Teeth all small, rudimentary, 32; upper tubercular grinders absent; muzzle of skull broad, rounded in front.*

3. PROTELES.

Section I. *Teeth large, well-developed, 34; muzzle narrowed in front.*

1. HYÆNA.

A large, deep subanal gland. The tubercular grinders of the upper jaw elongate, transverse, with three roots. The flesh-tooth with equal-sized lobes; the front lobe large, broad.

Hyæna, Linn., Gray, Kaup.

* *The braincase of the skull compressed. Fur clouded; hair very long.*

1. HYÆNA BRUNNEA.

B.M.

Hyæna brunnea, Thunb. Vetensk. A. H. 1820, p. 59; F. Cuv. Dict. Sc. Nat. xxii. 294; Busk, Journ. Proc. Linn. Soc. 1866, p. 59, t. 1. f. 1-4.

H. fusca, Geoff. Dict. Class. H. N. vii. 444, t. 2. f. 1; Fischer, Syn. 195.

H. villosa, A. Smith, Linn. Trans. xlv. 462.

Hyène, Buffon, H. N. Suppl. iii. 234, t. 46.

Hab. South Africa.

** *Skull with the braincase swollen behind. The fur banded.*

2. HYÆNA STRIATA.

B.M.

Canis hyæna, Linn. S. N. i. 58.

Hyæna striata, Zimmerm. Geogr. ii. 256; Busk, Proc. Linn. Soc. 1866, p. 59, t. 1. f. 5.

H. vulgaris, Desm. Mamm. 215.

H. orientalis, Tiedem. Zool. i. 500.

H. antiquorum, Temm. Ann. Gén. Sci. Phys. iii. 51.

Striped Hyæna, Penn.

Hyæna virgata, Hodgs. MS., P. Z. S. 1856, p. 397.

H. fasciata, Thunb.

Hab. North, West, and South Africa.

2. CROCUTA.

Subanal gland none. Tubercular grinders of the upper jaw small, with two roots. Flesh-tooth of the under (?) jaw with unequal lobes; the front lobe small, and the hinder one broad. Fur spotted. The hinder legs short.

Crocuta, Kaup, Gray.

CROCUTA MACULATA.

B.M.

Canis crocuta, Erxl. Syst. 575.

Hyæna crocuta, Zimmerm. Geogr. ii. 256; Busk, Proc. Linn. Soc. 1866, p. 71.

H. capensis, Desm. Mamm. 216.

H. maculata, Thunb. Acad. de St. Pétersb. iii. 303.

?*H. rufa*, Cuv. Oss. Foss.

Spotted Hyæna, Penn. Syn. 162, t. 17.

Tyger wolf, Kolbe, Vorgeb. 171, t. 8. f. 5.

Crocuta maculata, Kaup, Isis, 1829, p. 1144.

Hab. South Africa.

Section II. *Teeth rudimentary, far apart.*

3. PROTELES.

Grinders $\frac{4-4}{4-4}$, far apart, rudimentary; no hinder upper tubercular grinder.

G. and F. Cuvier arranged this genus with the *Viverræ*, Blainville with the Dogs. It has the external form and colours of the *Hyæna*.

PROTELES LALANDII. Aard Wolf.

B.M.

Grey, black-banded.

Proteles lalandii, I. Geoff. Mém. Mus. xi. 370, t. 20; Blainville, Ostéog. (*Canis*) t. 4 (skeleton).

Viverra hyænoïdes, Desm. Mamm. 538.

Genette hyénoïde, Cuv. Os. Foss. iv. 388.

Civette hyénoïde, F. Cuv. Dict. Sc. Nat. xii. 300.

Proteles cristatus, I. Geoffr. Mag. de Zool. 1841, i. t. 30 (skull); Gerrard, Cat. of Bones of Mamm. 70.

Hab. South Africa: Cape of Good Hope.

November 12, 1868.

Professor Alfred Newton, F.Z.S., in the Chair.

Mr. P. L. Sclater read notices of the more important additions made to the Society's Menagerie during the months of June, July, August, September, and October, amongst which were:—

1. A pair of the beautiful Green Hunting-Crow of Northern India (*Cissa venatoria*), purchased June 2nd, and believed to be the first two examples of this form received alive in Europe.

2. An Australian Fruit-Bat (*Pteropus poliocephalus*, Temminck), from New South Wales, presented by H.R.H. the Duke of Edinburgh, July 4th.

3. A young male Koodoo Antelope (*Strepsiceros kudu*), purchased July 16th out of a large collection of living animals made by M. Casanova in the vicinity of Casala, Lower Nubia.

4. A young female of the Spanish Ibex (*Capra pyrenaica*, Schimper), presented by Major Howard Irby, August 10th, being the specimen alluded to *antea*, p. 403. Another correspondent of the Society had promised to supply a male of this interesting species.

5. A very fine young female of the Hoolock Gibbon (*Hylobates hoolock*), presented by Mr. A. Grote, F.Z.S., August 14th, who had communicated the following note respecting this animal:—

“This Hoolock was sent to me early in 1867, by Mrs. Driver, of Gowalpara, a civil station on the western border of the Assam province. The animal is common in the jungles of the Gowalpara district, on the left bank of the Barhampooter; and its young are frequently captured by the natives and brought into the station, though, being impatient of confinement, they are not usually, so far as I can learn, kept alive for any time. Those which are sent down to Calcutta seem very sensitive to the change of climate, and are generally carried off by pulmonary disease. The individual which I brought home was attacked within a week of her reaching me at Alipore, and would probably have succumbed but for the unremitting attention of Dr. John Anderson, the Society's agent in Calcutta, to whom I had made her over. She was for more than a year in the Botanic Gardens, and, being allowed a good deal of liberty there, kept her health very well. She has grown considerably since she was first sent down to me.

“Both this species and the *Hylobates lar* of Tenasserim are exceedingly gentle, and rarely, if ever, bite in anger. There is a good account of an individual of the latter species by Mr. H. Blanford in a recent number of the ‘Journal of the Asiatic Society of Bengal.’ It differs in external appearance from the Gibbon in having a whitish-grey fringe round the face, and is incapable of shouting. The Hoolock owes its native name to its loud and peculiar voice.”

6. A specimen of the Large White Crane of Upper India (*Grus leucogeranos*), presented by the Babu Rajendra Mullick, of Calcutta, C.M.Z.S., August 14th.

7. A young female Sea-Lion (*Otaria jubata*), from the Falkland Islands, received August 24th.

This individual was the only survivor of eight examples of this animal captured in various spots on the coast of the Falklands by Adolphe Alexandre Lecomte, the Society's keeper, who had been sent out there by the Council of the Society for the purpose of obtaining living specimens of it.

Lecomte left Swansea on the 1st of June, 1867, in the coal-ship 'Epsilon' (Capt. Williams), and arrived at Port Stanley on the 11th of August. The first fortnight after his arrival he devoted to excursions along the shores in the vicinity of Port Stanley, but found little of interest here except Upland Geese (*Chloëphaga magellanica*), Kelp Geese (*C. antarctica*), and other birds, and a single Sea-Leopard (*Stenorhynchus leptonyx*) shot in a remote part of Stanley Harbour, being the only specimen of this animal met with during his stay in the Falklands. In the middle of September Lecomte went to Capt. Packe's establishment at Island Harbour, and stayed there a month, searching the creeks and shores diligently in that vicinity. "Elephant Island," in this neighbourhood, so called from the former abundance there of the Sea-Elephant (*Morunga proboscidea*), was found to be quite deserted by this animal, which is said to be now entirely extinct in the Falklands, though its former abundance in certain spots is well known, and is further testified by remains of its bones and teeth met with on the shores, specimens of which were obtained and brought home. In December Lecomte returned to Port Stanley, where Governor Robinson most kindly gave him a room in Government House whilst engaged in preparing specimens and prosecuting researches for the Society. His Excellency likewise allowed him the use of a schooner of eight tons burden, in which he made several voyages to Volunteer Lagoon and the adjoining shores of East Falkland. This was in the month of December, when the various species of Penguins are most easily captured. On the north shore of East Falkland, to which he crossed from Volunteer Lagoon, Lecomte found a large "rookery" of Gentoo Penguins (*Pygosceles wagleri*); amongst them were about twenty King-Penguins (*Apterydytes pennantii*). Lecomte captured about a dozen individuals of each of these species, and about the same number of the Rock-hopper Penguin (*Eudyptes nigrivestis*, Gould), Macaroni-Penguin (*E. chrysolophus*), and Jackass Penguin (*Spheniscus magellanicus*), all of which were assembled together at Port Stanley at the end of December 1867. Lecomte remarked that the Macaroni-Penguin does not constitute rookeries of its own, but is found sparingly mixed up among the Rock-hoppers in certain localities. But at Eagle Point, where there is a large rookery of Rock-hoppers (consisting of, perhaps, 40,000 birds), not a single Macaroni was found. He likewise noted that the Jackass Penguin differs entirely from the other species in its method of breeding, as it lays its egg at the end of a deep burrow (sometimes 20 feet from the orifice) which it excavates near the sea-shore*.

* Cf. Capt. Abbott's notes in 'The Ibis,' 1860, p. 336, et 1861, p. 163.

About the 9th of January last, Lecomte again left Port Stanley in the Governor's schooner for Port Salvador, at the northern extremity of East Falkland. On this as on other occasions, on passing the "Volunteer Rocks," the Fur-Seal of the Falklands (*Otaria falklandica*) was seen in considerable numbers. On a fine day, by the aid of a glass, some 100 or 150 of this Seal may be distinguished lying on these rocks; but the violence of the surf renders it impossible to approach them in a small schooner. On reaching Port Salvador the numerous inlets were diligently searched for Sea-Lions, but here, where these animals were formerly so abundant, not one was met with. Lecomte next tried the vicinity of Island Harbour, on the east coast, but was again unsuccessful, only meeting with a single example of this species. Returning to Port Stanley he found the stock of Penguins required replenishing, and made another visit to Volunteer Lagoon for this purpose.

About the beginning of March, Lecomte left Port Stanley again in the Governor's schooner for "Sea-Lion Island," off the south shore of East Falkland, with the expectation of here, at least, meeting with the animal whence the island has received its name. But he was again disappointed, not a single Sea-Lion having been found in this locality. But on the southernmost of the Kelp Islands, lying further north, which were visited on the return voyage, a herd of about thirty individuals of this animal was discovered; an old male (of which the skull was preserved) was shot, and four young ones (two males and two females) were captured. The female Sea-Lion produces her young (rarely more than one at a birth) about Christmas-day; so that these animals were between three and four months old when captured. Lecomte returned at once to Port Stanley with his captives, but found much difficulty in rearing them. The supply of milk was limited; and small fishes, such as they could eat, were with difficulty to be had. The last of the four died upon Good Friday (April 10th), whereupon he immediately determined to set about getting a fresh supply.

The Governor's schooner being now employed upon other service, Lecomte hired for this purpose the schooner 'Felis' (Capt. Hansen), a vessel of about 20 tons, usually engaged in the Penguin and Seal fishery*, and left Port Stanley on May 23rd. At Kelp Island, the first spot visited, they could not land, from bad weather, but Sea-Lions were observed with the glass. On the 30th of May they were on Great Island in Adventure Bay, and here succeeded in capturing the only two Sea-Lions met with, both of which were young females. On the 8th of June two others (one male and one female) were taken at North Point Island, off the same coast, the female being that which is now in the Society's Gardens; and Lecomte immediately returned with all four of them to Port Stanley.

From Port Stanley Lecomte proceeded home by the packet 'Fawn,'

* Four vessels engaged in this trade at Port Stanley last year are stated to have made altogether 50,700 gallons of Penguin oil. The destruction thus caused amongst these birds may be realized when it is considered that eight Penguins are estimated to make one gallon of oil.





which meets the mail-steamer at Monte Video, with the following living animals:—

- 4 Sea-Lions (*Otaria jubata*).
- 1 Gentoo Penguin (*Pygosceles wagleri*).
- 4 Rock-hopper Penguins (*Eudyptes nigrivestis*).
- 6 Kelp Geese (*Chloëphaga magellanica* and *C. antarctica*).
- 9 Logger-headed Geese (*Micropterus cinereus*).
- 8 Johnny Rooks (*Milvago australis*).
- 7 Cormorants (*Phalacrocorax magellanicus* and *P. carunculatus*).
- 12 Gulls (*Larus dominicanus*, *L. scoresbii*, &c.).
- 6 Starlings (*Sturnella militaris*).
- 22 Finches (*Phrygilus melanoderus*).
- 2 Sea-hens (*Hæmatopus niger*).
- 2 Foxes (*Canis antarcticus*).

But the weather was very unfavourable between Port Stanley and Monte Video, and seventy-one of the animals died *en route*. For some time longer the four Sea-Lions remained in good health and condition; but a passenger having died of yellow fever, the stock of fish shipped for feeding them was condemned on account of its smell and ordered to be thrown overboard. The consequence was the loss of three out of the four Sea-Lions—the survivor having been kept alive as far as Lisbon, when a fresh supply was obtained, mainly by the Flying-fishes (*Exoceti*), which fell on the deck at night and were purchased from the sailors who picked them up.

Besides the Sea-Lion, Lecomte succeeded in bringing to the Gardens only the following animals:—

- 1 Antarctic Wolf (*Canis antarcticus*).
- 2 Forster's Milvago (*Milvago leucurus*).
- 1 Kelp Goose (*Chloëphaga antarctica*).
- 2 Upland Geese (*Chloëphaga magellanica*).
- 1 Dominican Gull (*Larus dominicanus*).

8. A young male African Two-horned Rhinoceros (*Rhinoceros bicornis*), purchased September 11th (see Plate XLI.). This animal, which was believed to be the first individual of the species which had reached Europe alive since the days of the Romans, was purchased for the Society of Mr. Carl Hagenbeck, the well-known dealer of Hamburg. It had been originally captured, on the 12th of February 1868, by the Arabs of the Beni-Ammer tribe, in the vicinity of Casalá, in Upper Nubia, and sold by them to Herr Casanova, an enterprising traveller of Vienna. Pending the completion of the new house for Rhinoceros and Elephants, now in process of erection, this Rhinoceros had been temporarily lodged in the Giraffe House.

9. Two specimens of the Dotted-jawed Cayman (*Jacare punctulata*), obtained in the Island of Tobago and presented to the Society by Capt. Spicer, of the ship 'Mary,' on the 18th of September.

10. On the 14th of October, a selection had been obtained from a series of Chilian and La-Platan animals sent to Europe by the newly established Zoological Society of Santiago, to be disposed of

for the augmentation of their living collection. Amongst these were a Pampas Cat (*Felis pajeros*) from La Plata, four specimens of Cuming's Octodon (*Octodon cumingii*), a Patagonian Parrot (*Conurus patagonicus*), and a young Darwin's Rhea (*Rhea darwini*) from Chili. The three first-mentioned species were novelties to the Society's collection. Of the Darwin's Rhea only one specimen had been previously exhibited in the Society's Menagerie.

11. Two Black-billed Sheath-bills (*Chionis minor*, Hartl.) from the Crozette Islands, presented by E. L. Layard, Esq., F.Z.S., on the 26th of October.

12. A fine specimen of the Aard-Wolf of the Cape of Good Hope (*Proteles lalandii*), purchased by the Society, October 26th, of Capt. W. R. Dixon, of the Cape Mail Company's service, and believed to be the first example of this rare mammal ever brought to Europe alive.

13. An example of the Tuatera Lizard of New Zealand (*Hatteria punctata*), deposited in the Gardens by Sir George Grey, K.C.B., F.Z.S., October 28th. Two living specimens of this most singular of existing Saurians, which had been believed to be nearly extinct*, had been obtained in the province of Wellington by Dr. Hector, F.R.S., C.M.Z.S., and delivered to Sir George Grey for transmission to this country. One of these had arrived alive, and appeared to be doing well, feeding readily on meal-worms and insect food.

Letters were read, addressed to the Secretary by H.E. Sir Rutherford Alcock, C.M.Z.S., H.B.M. Minister at Pekin, giving an account of the progress made in his endeavours to obtain for the Society living specimens of *Elaphurus davidianus*. Two pairs of young ones had been obtained from one of the ministers of Yamên, who was the chief custodian of the parks; but, in spite of the care lavished upon them by Mr. R. Swinhoe, three of these had been already lost. Sir Rutherford was now endeavouring to get older animals to replace them.

Letters were also read, addressed to the Secretary by Mr. R. Swinhoe, now temporarily attached to the embassy at Pekin, upon the same subject. Mr. Swinhoe stated:—

“The *Elaphurus* is known only from the Nan-hai-tsze, a large hunting-park belonging to the Emperor about two miles south of Pekin. They run wild there, and are said to be numerous. No one is allowed to enter the park. The Chinese call this animal the *Sze-poo-seang*, i. e. ‘like none of the four’—to wit, the Horse, the Cow, the Deer, and the Goat.”

Mr. Swinhoe likewise spoke of a journey he had recently made to the little-known island of Hainan, where he had got together a considerable zoological collection. No Pheasant was met with in the island, but only a Jungle-fowl, which, however, was quite new to him. He had also seen there in confinement the Black-winged Pea-

* Cf. Günther, Phil. Trans. Roy. Soc. vol. clvii. p. 595.

fowl (*Pavo nigripennis*, Sclater*), and had subsequently ascertained that this was the ordinary species of Cochin-China.

In reference to the *Elaphurus*, the Secretary announced that the two adult specimens of *Elaphurus davidianus*, which had been presented to the Society at Peking by Mons. H. de Bellonnet, had died at Peking before they could be sent to this country; but that the skin and skeleton of one of them had been sent home and safely received. The Council had presented the complete skeleton of this rare mammal, being the first specimen of it that had ever been received in this country, to the Royal College of Surgeons, and the skin to the British Museum. Two pairs of shed horns had been likewise received along with the skeleton, and were exhibited at the Meeting.

A letter was read, addressed to the Secretary by Mr. Gerard Krefft, C.M.Z.S., dated Australian Museum, Sydney, April 1st, and enclosing some photographs of a large specimen of a Skate of the genus *Cephaloptera*, recently captured near Sydney. The body of this fish, from the snout to the anus, was stated to measure 4 feet 10 inches, and the tail 2 feet 8 inches. The species was believed to be undescribed, and further particulars were promised.

Mr. Sclater read an extract from a letter addressed to him by Dr. W. Peters, F.M.Z.S., in reference to a Pteropine Bat acquired by the Society on the 29th April, 1867, and subsequently deceased. This Bat had been entered in the Society's register as *Pteropus argentatus*, Gray (see P. Z. S. 1867, Appendix, p. 1037). Dr. Peters, to whom the specimen, when dead, had been sent for more accurate examination, had determined it to be *Pteropus hypomelanus*, Temm. (cf. Peters, Monatsb. Berl. Ac. 1867, p. 320), of Ternate. It had been recently ascertained that the true locality of this specimen was not "China" (as given in the Society's Report for 1868, p. 25), but that it had been captured at sea by a vessel coming from China.

Mr. Sclater read extracts from letters received from Dr. R. A. Philippi, C.M.Z.S., dated Santiago, May 30th and July 16th, and containing some remarks upon Mr. Sclater's article upon the "Birds of Chili," published in the Society's 'Proceedings' for 1867, p. 319. Of his *Anas iopareia* Dr. Philippi had procured but one specimen, and believed now that it was probably a bastard between the common *Anas* and *Anas moschata*. *Erismatura vittata* he acknowledged was merely the young of *E. ferruginea*, as already suggested by Mr. Sclater (*l. c.* p. 336). Some of the birds mentioned in Mr. Sclater's list were considered by Dr. Philippi to be not Chilian, such as *Progne*

* P. Z. S. 1860, p. 221, et 1863, p. 123. See Mr. Darwin's remarks on the interest attached to this species, 'Animals and Plants under Domestication,' vol. i. p. 290.

furcata and *Gallinula galeata*, *Sarcidiornis regia*, &c. ; while others were thought by himself and Mr. Landbeck to be mere varieties, such as *Rhynchotus punctulatus*, *Thinocorus ingæ*, *Bubo crassirostris*. Dr. Philippi likewise stated that he was engaged in preparing a Catalogue of the Birds of Chili, copies of which, when complete, would be forwarded.

The following letter, addressed to the Secretary by Dr. J. E. Gray, F.R.S., was read:—

“ British Museum,
October 26, 1868.

“ MY DEAR SIR,—In Dr. Bowerbank’s Notes on my paper on Sponges in the ‘Proceedings of the Zoological Society’ for 1868, p. 133, I find, among other observations of a like kind, the following passage, which may fairly be cited as a sample of the value of the remainder:—

“ ‘If it is to be tolerated that any naturalist shall get sight surreptitiously of the specimens belonging to another, and then describe, name, and publish them, as in the case of the genus *Astrostoma*, page 514, unknown to the owner, and without permission so to use them,’ &c.

“ It is only necessary to state very simply the facts of the case to show how utterly baseless is this attack on my honour and honesty.

“ In the ‘Philosophical Transactions’ for 1862 Dr. Bowerbank described ‘a specimen of a *branched** sponge from the East Indies, presented to me by my friend Mr. S. P. Pratt,’ and on plate 55, figs. 3, 4, 5, 6, he figures the sponge and its oscula. The peculiarities of this sponge and of its oscula having been referred to in the discussion on the structure of *Hyalonema*, I happened one day to be showing the figure to Mr. Tyler at the British Museum, when he informed me that he had part of the original specimen of it, Dr. Bowerbank (as he often did) having given it to him to mount portions of it. Some time afterwards he brought me specimens for examination; and as I found the oscula to be unlike those of any other sponge, I described it as a new genus, under the name of *Astrostoma*, in the ‘Proceedings of the Zoological Society’ for 1867, p. 514, referring to Dr. Bowerbank’s paper and figures in the ‘Philosophical Transactions.’

“ Dr. Bowerbank, with singular inconsistency, denies that I had seen the original specimen, ‘as that had never passed out of his hands.’ On which statement Mr. Tyler observed to me, when we met, in nearly the same terms as before, ‘that the sponge was given to him to mount, that he made from it several preparations, both in balsam and dry, and that with Dr. Bowerbank’s full knowledge and permission he had, as was his usual custom, kept those which he had shown to me.’

* “ In a former page of this communication to the Zoological Society, Dr. Bowerbank attacks me in his usual vehement manner for describing this sponge as ‘branched,’ and says that ‘it is a simple unbranched cylinder.’ So loose, inaccurate, and contradictory are his statements in regard to the simplest matter of fact.”

“One of these preparations is so exactly like one of Dr. Bowerbank’s figures, that it seems certain they must have represented contiguous slices, merely separated from each other by the knife in cutting them.

“Thus it will be seen that the sponge which I am accused of ‘describing without permission’ was described and figured in 1862, now six years ago, and had been the subject of discussion by Dr. Oscar Schmidt and others in scientific papers—moreover that, instead of ‘surreptitiously getting sight of it,’ it was not in any way sought out by me, but that the specimen which I examined was brought to me by its owner, with a view to the elucidation of a subject in which we had a common scientific interest. It is shown also that the sponge which I described *was* part of the *original* specimen, which Dr. Bowerbank in one place denies; while it *was not* surreptitiously got sight of, which, without apparently noticing the contradictory nature of the charge, he asserts in another.

“I should be the last person to object to the utmost possible freedom of discussion; but, nevertheless, I cannot but feel that it should be conducted with decorum and with attention to the feelings and habits of society, and, at all events, with the most careful attention to accuracy of statement. I know well that Dr. Bowerbank is in the habit of using very strong language; but I do not consider it creditable to the scientific character of the Zoological Society that such an attack on one of the oldest and certainly not the least industrious of its scientific Members should have been allowed to appear in its ‘Proceedings,’ without first informing him of it in order that he might be allowed to show, as I have now done, that the charge is without the shadow of a foundation. I think, too, that such a paper should, at all events, be brought under the special consideration of the Publication Committee before printing; and I am certain that in such cases the authors would be requested, in consideration of the dignity of science, to reconsider many of their statements. Societies very properly decline responsibility for the facts or reasonings of the papers they publish; but the tone and temper of the communications is certainly within their province to decide on.

“I am, my dear Sir,

“Yours sincerely,

“P. L. Sclater, Esq.”

“JOHN EDWARD GRAY.”

The following papers were read:—

1. Notes on the History and Geographical Relations of the Cetacea frequenting Davis Strait and Baffin’s Bay.
By ROBERT BROWN, F.R.G.S.

[Communicated by Dr. James Murie.]

I conclude these papers on the Mammalia of Greenland and adjoining seas by a few notes on the order more intimately associated
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in popular imagination with the Arctic regions than any other, viz. the Cetacea. Though much more imperfectly known than any other group, yet my observations on them will be more brief than on the other mammals, and for the same reason which has conduced to the present state of cetology, viz. the want of opportunities of examining the species. These remarks will therefore necessarily consist of a statement of the geographical range and migrations and a description of the habits of the better known, and a list of the species, and whatever information can be collected on these points regarding the others only known by skeletons or remains in museums. These I have examined carefully; and the synonymy given is the result of that study, coupled with investigations made in Greenland. With the exception of a few of the more common, such as *Phocæna communis*, *Beluga catodon*, &c., I have not had an opportunity of examining, otherwise than in the manner indicated, most of the species. I have, however, examined at different times above thirty specimens of *Balæna mysticetus*, and many of *Monodon monoceros*; and to these I have appended various descriptive observations derived from my own examination and without reference to any other published descriptions, which have in nearly every case been only derived from an examination of foetal specimens or isolated individuals, conveying but an imperfect idea of the species. What I said in another memoir equally applies here, viz. that the descriptions are not given as complete, but merely appended as fragments of a *mémoire pour servir*. Those who have attempted the examination of any member of the group Cetacea, and still more those whose lot has been to examine with frozen fingers (plunged every now and again into the warm blood of his *subject*) such an unwieldy object on a swaying ice-floe, will appreciate the difficulty of drawing up such descriptions; and to them no apology is necessary for their imperfection. The absolute necessity of recording every description of the members of this order, however apparently well known, must be my excuse for presenting these notes in such a disjointed state. In the original draft of them I had mentioned various particulars now omitted—the recent reproduction by the Ray Society of the admirable memoirs of Professors Eschricht, Reinhardt, and Lilljeborg rendering the publication of these unnecessary.

1. BALÆNA MYSTICETUS, Linn.

(α) Popular names.—*Greenland Whale*, *Right Whale*, *Common Whale* (English authors); *Whale*, *Whale-fish*, and “*Fish*” (English whalers). The young are denominated *suckers*, and are also sometimes known by the following names:—*Shortheads* (as long as they continue suckling); *Stunts* (two years); *Skull-fish* (after this stage or until they become *Size-fish*, when the longest splint of whalebone reaches the length of six feet); *Tueval?* (Norse); *Rhetval* (Danish); *Arbek*, *Arbawik*, *Sokalik* (Greenland); *Akbek*, *Akbeelik* pl. (Eskimo of western shores of Davis Strait); I have also heard both the Greenlanders and western Eskimo call it *puma*, but I cannot learn what is the origin of this word, and suspect it to be *whaler*,—a cor-

rupted jargon of Scotch, English, Danish, and Eskimo, joined with some words which seem to belong to no language at all, but to have originated in a misconception on either side, and to have retained their place under the notion that each party was speaking the other's language, something of the nature of the *Lingua Franca* of the Mediterranean, the *Pigeon English* of China, and the *Chinook jargon* of North-west America.

(*β*) *Descriptive Remarks.*—The lower surface of the head is of a cream-colour, with about half a foot of blackish or ash-colour at the tip (or what corresponds in the higher orders of mammals to the symphysis) of the lower jaw; further back the colour shades into the general dark blue colour of the body. This colour is generally almost black in adults, but in young ones (or “suckers”) it is lightish blue; hence the whalers sometimes call these “blueskins.” The whiskers consist of nine or ten short rows of bristles, the longest bristles anteriorly. There are also a few bristles on the apices of both jaws, and a few hairs stretching all along the side of the head for a few feet backwards. On the tip of the nose are two or three rows of very short white hairs, with fewer hairs in the anterior rows, more in the posterior. I have reason to believe that some of these hairs are deciduous, as I have often found them wanting in old individuals. In older Whales the darker colour of the body impinges on the under surface of the head, leaving the ordinary white of the suckers merely in the form of several irregular blotches, but with two (regular?) spots, one on each side of the jaw immediately posterior to the eye, composed of a hard cartilaginous material. There is also a little white on the eyelids, and some irregular white markings on the root of the tail. There is likewise a white colour all around the vulva and mammæ. Some individuals may be found quite white on the belly, others piebald, and others with white spots on various portions of the body not mentioned. The presence or absence of a particular white marking on a specimen of a Cetacean under examination ought by no means to be received (as has been done) as a proof that the species is different, or that because such is mentioned in a former description such description is erroneous, because this is one of the most varying characters possessed by the order*. The inside of the mouth inferiorly, where the tongue is not attached, is of a pale blue colour. The tongue is broader posteriorly, and narrowed anteriorly, paler blue than the rest of the mouth, and pale blue all round the edges and where not carnation, which colour prevails in the form of a streak down the mouth of a deep sulcus on the middle and anterior portion of the tongue, terminating irregularly about two feet from the root of the tongue. The contour of the tongue is entire throughout. The substance of the tongue is a fibrous blubber containing very little oil. There are numerous small linear muscles interspersed through the lower part. The roof of the mouth, on

* The colour also varies with the age, the back of some being black, of others black and white, and some are all white. Some old Whales are said to have a broad white stripe over their back down to the belly (Laing's ‘*Voyage to Spitzbergen*,’ p. 126: 1815). I cannot confirm this from my own observation.

each side of the gum, is a continuous curve, broadest anteriorly, pale blue, sides pale blue and carnation mixed. The upper lip is very much smaller than the under. The lips are furrowed immediately behind the edge and bevelled, and are all deep black and speckled. No traces exist of either eyebrows or eyelashes. The eye is very small and hollow, measuring from canthus to canthus $3\frac{1}{2}$ inches (in adult), and $1\frac{1}{2}$ inch deep, with a deep furrow superiorly and inferiorly immediately above and below the eye. The inside of the eyelid is red. The aperture of the auricular canal is difficult to find, and is not larger than the diameter of a goose-quill. The laminae or "splits" of whalebone are longest in the middle, but grow much shorter posteriorly to this "size-split." The number of laminae is about 360 on each side. The whalers have a notion that there is a lamina for each day in the year; but this, like the idea that Jonah's face can be seen on the nose of the Whale, is, I am afraid, a rather hasty generalization. Each lamina ends in a tuft of hair, this tuft being continuous with the hair on the inside of the bone, this "hair" again being composed of identically the same substance as the whalebone itself. The outside of the bone is smooth, pale blue-coloured, with the edges overlapping, the free edges pointing posteriorly, but with an interval (varying according to the age of the animal) between the laminae of so very regular a character that each lamina can be seen and even counted from the outside. Where the bone is placed in the gum it is of a greyish-white colour, and on exposure to air becomes black; all of the portions of the bone most exposed are of a blackish colour. On the outside of the laminae, a few inches from the end, is a transverse wave or ridge, continuous in a slightly elevated ridge across the whole of the laminae; and in old Whales there are several of these wavy transverse ridges, which are apparently in some way connected with its growth. The best whalebone has several of these ridges. Interiorly, in front of the place where each lamina is inserted into the gum, are several rows of short stumps of whalebone terminated by a tuft, and before these again short white hair laminae graduating into a velvet-like substance in the mouth. It is said that the laminae, after once being produced, do not increase in number, but that the interspaces of the laminae increase in width. This interspace in adult Whales is from about half an inch to one inch in width. Occasionally two splits are found growing together in the gum, but separate below. The length of the whalebone depends, it is said, on the size of the head, and bears no ratio to the length of the body. Occasionally a long Whale has small and short whalebone, whilst a short dumpy individual (for there are individual differences in these as in all other animals, not referable to specific difference) may have much longer. The longest lamina of whalebone which I have heard of being obtained was 14 feet. I have personally known of another 13 feet 3 inches long; but the average length is 12 feet and under. This is the middle split already spoken of, known to the whalers as the "size-split;" but in the measurement of this the tuft of "hair," which sometimes reaches six or seven inches in length, is not included—a very important matter, as much depends upon the

size of this split. The breadth and thickness of the laminæ depend upon the age of the animal. It is a common belief that the laminæ of whalebone in the female Whale are broader but shorter than in the male. The colour of the whalebone likewise varies: in the young the laminæ are frequently striped green and black, but in the old animal they are frequently altogether black; often some of the laminæ are striped in alternate streaks of black and white, whilst others want this variegation. Whalebone is said to be occasionally found white, without the animal differing in the slightest degree. That brought from the western Eskimo in the spring is often whitish, because they have kept it lying about or steeped in water all the winter. It also does not necessarily follow that because one whalebone brings a different price from another, the animals that produce them are of different species. For instance, the whalebone brought by the American whalers from Kemisoak (Cumberland Sound, or Hogarth's Sound of Penny) used to bring a less price in the market than that of the English whalers from Davis Strait, Baffin's Bay, and Spitzbergen, because it had lain exposed during the winter and was accordingly worse prepared; therefore, without at all underrating the importance of pressing every point into our service in discriminating the different species of *Balænidæ*, as the whalebone is subject to so much variation, and undergoes so many artificial changes before coming into the hands of the zoologist, I think that we must proceed with the utmost caution in forming species on the mere differences presented by isolated laminæ of whalebone*.

The *pectoral fins* (or, more properly, swimming-paws†) are of a darkish grey at the axilla, rounded superiorly and bevelled off inferiorly. The upper edge is arcuate in form, with a slight angularity medially; the inferior edge with the outline in a gentle sigmoid curve, with the greater convexity of the curve anteriorly. The *caudal extremity*, if not the homologue, is undoubtedly the analogue of the posterior extremities in other mammals. It is almost unnecessary to say that the substance of the tail is non-muscular, though it has been described as such in various publications, the only power which it possesses being derived from the attachment of some of the lumbar and other muscles in the extremity of the vertebral column. A transverse section of the root of the tail shows:—1, the epidermis; 2, the soft skin; 3, the blubber, or a cellular substance containing fat-cells; 4, cartilage enveloping the tendinous cells; 5, strong muscular fasciæ, through which the tendons play; 6, spinal canal and vessels; 7, spinal cartilages; 8, blood-vessels; and, 9, synovial glands. A transverse section of the tail shows skin, blubber, tendinous envelope, blood-vessels, and a central cartilaginous

* Of late years whalebone has been bringing a better price than formerly, new uses for it having been discovered. A large amount is now used to stiffen silks by being woven into the fabric. By an old feudal law the *tail* of all Whales belonged to the Queen, as a perquisite to furnish Her Majesty's wardrobe with whalebone (Blackstone's Commentaries, vol. i. p. 233, ed. 1783).

† Fleming, 'Philosophy of Zoology.'

mass*. Though, *per se*, the tail has no power, yet as the instrument through which the lumbar muscles (the tendinous attachments of which seem to be prolonged into the cartilaginous substance of the tail) work it exerts enormous force. The figure usually engraved in boys' books of sea adventures, and copied from Scoresby's 'Account of the Arctic Regions,' of a Whale tossing a boat and its crew up into the air, is generally looked upon by all the whalers to whom I have shown it as an artistic exaggeration. Accidents of this nature are very rare, and never proceed to such an extent; and I have no doubt that Dr. Scoresby's artist has taken liberties with his description, that worthy navigator being himself above any suspicion of exaggeration for the sake of effect. Capt. Alexander Deuchars, who has now made upwards of fifty voyages into the Arctic regions, informed me that he had known a Whale toss a boat nearly 3 feet into the air, and itself rise so high out of the water that you could see beneath it, but that, if Scoresby's figure was correct, the Whale must have tossed the boat very many feet into the air—a feat which he did not think was within the bounds of, if not possibility, yet of probability.

The *teats* are hardly the size of a cow's, are placed about the middle, and one inch from the edge of the sulcus, but in the dead animal are almost universally retracted within the white-coloured or spotted sulcus, in the middle of which they are situated. The *milk* is thick, rich, and rather sweet-tasted. The *faecal* evacuations of the Whale are red-coloured, most probably due to the red *Cetochili* and other animals which form the bulk of its food. The *skin* (including the cuticle) is about $1\frac{1}{2}$ inch in thickness all over the body, but is rather thicker on the tail, on which organ, however, it is of a uniform thickness. The *blubber* varies from about a foot to eighteen inches in thickness, tolerably uniformly throughout, except on the head, &c.; the colour is like lard or pork fat in young animals, but in the older ones rosy-coloured, from the quantity of nutrient blood-vessels in it. The *flesh* is dark and coarse-fibred, but when properly cooked tastes not unlike tough beef. When the French had whalers in Davis Strait, the sailors, with the usual aptitude of their nation for *cuisine*, made dainty dishes of it; but our seamen, imbued with the virulent dietetic conservatism of the Saxon, prefer to grow scurvy-riddled rather than partake of this coarse though perfectly wholesome food.

The best figure of the Right Whale is that of Scoresby; but in Harris's 'Collection of Voyages' there is a very good figure of the animal (almost as good as Scoresby's), accompanied by a very tolerable description. I think Scoresby's figure is erroneous, in so far as I have never been able to see the prominence behind the head which he figures; and the notch shown in the outline figure of the genus in the first edition of the 'British Museum Catalogue of Whales' does not exist in nature; but as Dr. Gray does not mention

* A tolerably good account of these and other points in the economy of the Cetacea, mixed up with a heterogeneous mass of errors, is to be found in the (deservedly?) neglected 'Natural History of the Cetacea,' &c., by H. W. Dewhurst (1834).

it in his description, I presume that it is placed there through an error of the draughtsman or lithographer.

The size of the Greenland Whale has, I think, been a little underrated. The late Dr. Scoresby, from abundant data, considered that we have no record of the Whale to be relied upon which gives a greater length than 60 feet. While agreeing with him so far, that I believe that to be the general extreme average, I am very doubtful whether they did not at one time, before they were so ruthlessly slaughtered, attain a greater size, or that individuals are not even now found of a greater size. The position in which a Whale is measured alongside the ship when slightly doubled is apt to introduce an error into the measurement and make it smaller than it really is. The late Chevalier Charles Louis Giesecke mentions one which was killed at Godhavn in Greenland in 1813 which measured 65 feet, and I shall presently give the measurements of one equally large. The largest one, however, which is known to have been killed in the Arctic seas was one which Capt. Alexander Deuchars (whom I have already had occasion to mention as a most trustworthy and experienced whaler, and who is personally acquainted with the killing of upwards of 500 Whales) obtained in Davis Strait in the year 1849. It measured 80 feet in length, the breadth of the tail, from tip to tip, being 29 feet; the longest lamina of whalebone measured 14 feet; the amount of whalebone in its mouth was large; but the blubber was only about 6 inches in thickness, and only yielded 27 tuns of oil*. The Whales killed in the Spitzbergen sea are said, as a rule, to be generally less and "lighter-boned" (*i. e.* less whalebone) than those of Davis Strait, which may possibly account for the less size of those seen by Scoresby, whose whaling-experience was almost wholly confined to the former region. The females are larger and fatter than the males. I append the measurements of one of the largest Whales recently killed in Davis Strait, for which we are indebted to Dr. Robert Goodsir.

Measurements of a specimen of Balæna mysticetus killed in Pond's Bay, Davis Strait (♀).

| | | |
|--|-----|-----|
| Length from the fork of the tail, along the abdomen, to tip of lower jaw | ft. | in. |
| | 65 | 0 |
| Girth behind swimming-paws | 30 | 0 |
| Breadth of tail, from tip to tip | 24 | 0 |
| Greatest breadth between lower jaws | 10 | 0 |
| Length of head, measured in a line from articulation of lower jaw | 21 | 0 |
| Length of vulva | 1 | 2 |
| From posterior end of vulva to anus | 0 | 6 |
| From anterior end of vulva to umbilicus | 8 | 0 |
| Mammæ placed opposite the anterior third of vulva, and 6 inches from tip of it. | | |

* The tun of oil is 252 gallons wine measure; at a temperature of 60° Fahr. it weighs 1933 lbs. 12 oz. 14 dr. avoirdupois.

| | ft. | in. |
|---|-----|---------------|
| Length of sulcus of mammæ | 0 | 3 |
| Breadth of sulcus, on each side of it | 0 | 2 |
| From tuberosity of humerus to point of pectoral fin | 8 | 0 |
| Greatest breadth of fin | 3 | 11 |
| Depth of lip (interior of lower) | 4 | 7 |
| From the inner canthus of eye to extreme angle of fold of mouth | 1 | 5 |
| From inner to outer canthus | 0 | 6 |
| Length of block of laminæ of baleen, measuring round the curve of the gum, after being removed from the head .. | 16 | 6 |
| Length of longest lamina on each side | 10 | 6 |
| Distance between the lamina at the gum | 0 | $\frac{7}{8}$ |
| Breadth of pulp-cavity of largest lamina | 1 | 0 |
| Average length of pulp when extracted from some of the largest laminæ | 0 | 5 |
| Number of laminæ on either side, about 360. | | |

The length along the curve of the back and other measurements desirable to have been taken were not able to be made out, from the position of the Whale, as it was suspended in the water alongside.

(γ) *Habits &c.*—The Right Whale is a gregarious animal, being generally found in small “schools” of three and four, but when travelling from one part of the ocean to another they will sometimes collect in large parties. I am told by my friend Dr. James M^cBain, R.N., that about thirty years ago he witnessed an extraordinary migration of this nature a little to the south of Pond’s Bay. The Whales to the number of several hundreds passed north in a continuous flock, and a few days afterwards were succeeded by an even still more numerous herd of Walruses. The numbers of the latter were beyond all computation; hour after hour did they travel to the northward, never pausing to feed, but all seemingly intent on reaching the opening of Lancaster Sound. A few days subsequently not one was to be seen, as previously there had been no signs of their presence. This was undoubtedly a very rare scene; and the question which must suggest itself is, where could such a number of these huge animals have come from? The Whale is capable of travelling at a very fast rate when irritated by wounds or impelled by fear of its enemies. I was told by the late Capt. Graville, of the screw whaler ‘Diana,’ a proverbially experienced and truthful man, that a Whale was struck near the entrance of Scoresby’s Sound, on the east coast of Greenland, by the father of the late Dr. Scoresby (with whom Mr. Graville was a fellow apprentice); but being lost, it was killed next day near the entrance of Omenak fjord, on the west coast, with the harpoons freshly imbedded in its body. This was adduced in proof of the existence of an inlet in former times (as, indeed, represented on the old maps) across Greenland between these two points. Unless the whole story was founded on a misconception (an event less likely from the searching investigation which took place at the time), we can scarcely believe that the Whale

could have reached the west coast by any other means; for, even allowing the greatest credible speed, it comes scarcely within the limits of possibility that it could have doubled Cape Farewell and reached 70° N. latitude within the interval mentioned. The rate at which a Whale travels from place to place whilst feeding, or under other ordinary circumstances, may be stated as being about four miles an hour. Like most of the Cetacea, it generally travels in a course contrary to that of the wind. Its food consists, for the most part, of Entomostraca and Pteropoda, but chiefly of the former, and especially of *Cetochilus arcticus*, Baird, and *Cetochilus septrionalis*, H. Goodsir, *Arpacticus kronii*, Kröy., &c., which are chiefly found in those portions of the sea of the olive-green colour described by Scoresby. This appearance has been shown* to be produced by vast quantities of *Diatomaceæ*, chiefly *Melosia arctica*, on which the "Whales' food" subsists. It is not, I am of opinion, compatible with facts to suppose that the 'Right Whale's food is composed in any part of fishes proper, except, perhaps, a minute individual which may now and then accidentally find its way into its stomach with the mass of *maidre* (as the Whale's food is called). Many of the old whalers contend otherwise, and will adduce measurements of the diameter of the gullet in proof that much larger animals than *Acalephæ*, Pteropoda, or Entomostraca could be received in the stomach. I have never measured the orifice of any œsophagus which exceeded 2½ inches in diameter, though as these observations were generally made on young Whales, it is not improbable that this size may be exceeded in some individuals. Most of the slimy-looking substances found floating in the Arctic seas are generally masses of *Diatomaceæ* combined with Protozoa, &c.; but in some cases it is the mucous lining of the bronchial passages which has been discharged when the animal was "blowing." This "blowing," so familiar a feature of the Cetacea, but especially of the Mysticete, is quite analogous to the breathing of the higher mammals, and the "blow-holes" are the perfect homologues of the nostrils. It is most erroneously stated that the Whale ejects water from the "blow-holes." I have been many times only a few feet from the Whale when "blowing," and, though purposely observing it, could never see that it ejected from its nostrils anything but the ordinary breath—a fact which might almost have been deduced from analogy. In the cold Arctic air this breath is generally condensed, and falls upon those close at hand in the form of a dense spray, which may have led seamen to suppose that this vapour was originally ejected in the form of water. Occasionally when the Whale blows just as it is rising out of or sinking in the sea, a little of the superincumbent water may be ejected upward by the column of breath. When the Whale is wounded in the lungs, or in any of the blood-vessels immediately supplying them, blood, as might be expected, is ejected in the death-throes

* On the Nature of the Discoloration of the Arctic Seas (Seemann's Journal of Botany, February 1868; Transactions of the Botanical Society of Edinburgh, vol. ix.; Quart. Journ. Mic. Science, October 1868; Das Ausland, February 27th, 1868).

along with the breath. When the whaleman sees his prey "spouting red," he concludes that its end is not far distant; it is then mortally wounded. The Whale carries its young nine or ten months, and produces in March or April. In the latter month a Hull ship obtained a *sucker* with the umbilical cord still attached. It rarely produces more than one at a birth, though it is said that in a few instances two have been seen following the female. It couples during the months of June, July, or August, and, as in most, if not all, of the Cetacea, this operation is performed in an upright and not in a recumbent position, as stated in some works, the authors of which might be supposed to speak from personal observation*. Equally erroneous, as far as I can learn, is the idea that it only produces once in two years; but on this subject, as on many others concerning the Cetacea, it would be difficult to pronounce an opinion founded on any decided knowledge. In the month of August I have seen them in the position described, with the pectoral fins adpressed against each other's body, and the male lashing the water with his tail. The young suckles to a considerable age (probably one year), and in order to allow of its getting convenient access to the mammæ the mother lies on its side for a time. Their love of their offspring is so strong, that though the cubs are of very little value, yet the whalers often make a point of killing them in order to render the mother more accessible. During the period of procreation the mother is much fiercer and more dangerous to approach than at other seasons, when it is a timid, harmless animal. I once saw a Whale, when the boats were approaching it, take the young under one pectoral and swim off by aid of the other. When the mother was killed, the cub could not be made to leave the dead body of its mother, though lances were continually run into it by the seamen who were flensing the animal. When the carcass was let go, the young one instantly dived down after it, nor did we see it again. The *sight*, *hearing*, and *smell* of the Whale are all very acute in the water, but are very dull out of it. The power of the Cetacea for remaining beneath the surface of the sea seems to bear a direct ratio to their size. Under ordinary circumstances, the Right Whale will generally remain no longer than half an hour without rising again to breathe; the cubs are, however, more stubborn, and will often remain more than three-quarters of an hour. Whalers and Eskimo have many stories of Whales lying torpid at the bottom of shallow inlets and bays for several days at a time; though I have heard these tales repeated by most credible men, yet I am inclined to hesitate at receiving as facts anything so contrary to physiological laws, and so incapable of receiving any explanation of a reasonable nature†. I have frequently known Whales dive and not come up for hours; but, unfortunately for the acceptance of these wonderful tales of subaquatic being, these universally came up dead! In nearly every case it appears that, diving with tremendous impetus under the torments of the harpoon, they had struck their heads on the bottom

* Dewhurst, 'Natural History of the Cetacea,' p. 20.

† *Vide* also Dewhurst, *l. c.* p. 36.

with such force as to stun them for the time being, and before they recovered were drowned; the Whale's nose was in nearly every instance covered with the mud of the bottom. This diving to the bottom is a favourite feat of young Whales; and accordingly these frisky individuals are more difficult to capture than the adult ones of a more staid temperament. All species of Cetacea seem to pass a considerable portion of their time asleep on the surface of the water, and in this position they are often struck. The Right Whale always keeps near the land-floes of ice; and its migrations north and west seem to be due to this habit*.

After man, the chief enemy of the Whale is *Orca gladiator*, the most savage of all the Cetacea, and the only one which feeds upon other animals belonging to the order. The Thresher Shark (*Carcharias vulpes*), the very existence of which Scoresby seemed to doubt, but which is now so comparatively well-known to naturalists and seamen, is also an enemy of the Whale. It is doubtful, however, whether it attacks it in life, or only preys upon it after death. The 'Advice' (Capt. A. Deuchars) once took a dead Whale alongside which this Shark was attacking in dozens, the belly being perfectly riddled by them†.

The Greenland Shark (*Scymnus borealis*, Flem.), though it gorges itself with the dead Whale, does not appear to trouble it during life. Martens's most circumstantial account of the fight between the Whale and Swordfish seems to have originated in a misconception, this name being applied by seamen not only to the Scombroid fish (*Xiphias*), but also to the *Orca*, which, it is well-known, fights furiously with the Right Whale. The Whale must attain a great age, nor does it seem to be troubled with many diseases. Whales which are found floating dead are almost always found to have been wounded. They are often killed with harpoon-blades imbedded deep in the blubber; and some of them, from the marks on them, have been proved to be the remains of fights of a very ancient date in which the Whale has come off victor.

(δ) *Geographical distribution and migrations.*—The geographical distribution and migration of the Whale on the coast of Danish Greenland has been fully discussed by Eschricht and Reinhardt‡, and in the Spitzbergen sea by Scoresby§; so that I confine what few remarks I have to make on this subject to its range along the northern shores of Greenland and the western shores of Davis Strait and Baffin's Bay, where the whalers chase it. They appear on the coast of Danish Greenland early in May, but are not nearly so plentiful as formerly, when the Davis-Strait whaler generally pur-

* Capt. Wells in the Dundee whaling steamer 'Arctic' ran, in the summer of 1867, high up into Smith's Sound in search of Whales. He found *open water and no Whales*—a case of cause and effect (Sherard Osborn, Proc. Roy. Geogr. Soc. vol. xii. p. 103, Feb. 10th, 1868).

† The sailors have a notion that the Shark does not bite out the pieces, but cuts them by means of its curved dorsal fin, and seizes them as they drop into the water! This belief is widely and firmly received.

‡ Ray Soc. Mem. Cet.

§ 'Arctic Regions,' 'Voyage to Greenland,' and 'Memoirs of the Wernerian Society of Edinburgh' (1811), vol. i. p. 578.

sued his business on this portion of the coast; but they are now so few that they have generally gone north before the arrival of those ships which have first proceeded to the Spitzbergen sealing. It is rarely found on the Greenland coast south of 65° , or north of 73° ; indeed I have only heard of one instance in which it has been seen as far north as the Duck Islands near the entrance of Melville Bay, and even for a considerable distance south of that it can only be looked upon as an occasional straggler. However, after crossing to the western shores of Davis Strait, it occasionally wanders as far north as the upper reaches of Baffin's Bay. The great body, however, leave the coast of Greenland in June, crossing by the "middle ice," in the latitude of Svarte Huk (Black Hook), in about lat. $71^{\circ} 30'$ N. The whaler presses with all speed north through Melville Bay to the upper waters of Baffin's Bay, and across to the vicinity of Lancaster Sound. If there is land-ice in Baffin's Bay at the time they arrive (about the end of July), there are generally some Whales up that Sound and Barrow's Inlet; but they accumulate in greatest numbers in the neighbourhood of Pond's Bay, and even up Eclipse Sound, the continuation of the so-called Pond's Bay, which is in reality an extensive unexplored sound opening away into the intricacies of the Arctic archipelago. The Whales continue "running" here until the end of June, and remain until about the end of August or beginning of September. The whalers think that if they can reach Pond's Bay by the beginning of August they are sure of a "full" ship. The Whales now commence going south, and the whalers continue to pursue them on their austral migration, halting for that purpose in Home Bay, Scott's Inlet, Clyde River, &c. As the season gets more tempestuous and the nights dark, most of them towards the end of September, to avoid the icebergs dashing about in this region at that time of the year, anchor in a snug cove, or *cul de sac*, lying off an extensive unexplored sound, not laid down on any map, in the vicinity of Cape Hooper; others go into a place known by the euphonious name of "Hangman's Cove"*; whilst others go south to *Kemisoak* (Hogarth's Sound of Penny), Northumberland Inlet, or other places in the vicinity of Cumberland Sound and the *Meta Incognita* of Frobisher,—localities intimately known to many of these hardy seamen, but by name only to geographers. Whilst the good ship lies secure in these unsurveyed and unauthorized harbours (each master mariner according to his predilection), the boats go outside to watch for Whales. If they succeed in capturing one, frequently, if possible, the vessel goes out and assists in securing it. Though they are supposed to return to the ship every night, yet at this time the men are often subjected to great hardship and danger. This is known as the "autumn" or "fall fishing," and this method of pursuing it as "rock-nosing."

M. Guérin, the surgeon of a whaler, has described† what he considers a marked variety of the Right Whale under the name of the "Rock-nosed Whale." The characters which he gives (such as the head being considerably more than one-third the size of the animal,

* From an Eskimo being found here hung by an *allunak* over a cliff.

† Edinb. New Phil. Journ. 1845, p. 267.

or as 16 to 51) vary in almost every individual. The size of the head, for instance, differs a little in almost all individuals; and Scoresby merely gave one-third the size of the body as the average, not as the unvarying proportion. Whales of different ages keep a good deal together: hence young Whales frequent the bays; the old ones roam in the vicinity of the "middle ice" of Davis Strait, and afterwards come into the bays; and those killed early in the year at Pond's Bay are chiefly young animals. Hence the whaler uses the terms "middle-icers," "rock-nosers," and "Pond's-Bay fish" to designate not a separate species or even variety, but to express a geographical fact and a zoological habit. According to the state of their cargo, the industry of the captain, or the state of the weather, the Whalers leave for home from the 1st to the 20th of October, but rarely delay their departure beyond the latter date.

Where the Whale goes to in the winter is still unknown. It is said that it leaves Davis Strait about the month of November, and produces young in the St. Lawrence River, between Quebec and Camaroa, returning again in the spring to Davis Strait. At all events, early in the year they are found on the coast of Labrador, where the English whalers occasionally attack them; but the ships arrive generally too late, and the weather at that season is too tempestuous to render the "South-west Fishing" very attractive. Later in the year the ships enter Cumberland Sound in great numbers; and many of them (especially American and Peterhead vessels) now make a regular practice of wintering there in order to attack the Whales in early spring. It is said that early in September they enter Cumberland (Hogarth's) Sound in great numbers and remain until it is completely frozen up, which, according to Eskimo account, is not until the month of January. It is also affirmed by the natives that when they undertake long journeys over the ice in spring, when hunting for young Seals, they see Whales in great numbers at the edge of the ice-floe. They enter the Sound again in the spring and remain until the heat of summer has entirely melted off the land-floes in these comparatively southern latitudes. It thus appears that they winter (and produce their young) all along the broken water off the coast of the southern portions of Davis Strait, Hudson's Strait, and Labrador. The ice remaining longer on the western than on the eastern shore of Davis Strait, and thus impeding their northern progress, they cross to the Greenland coast; but as at that season there is little land-ice south of 65° , they are rarely found south of that latitude. They then remain here until the land-floes have broken up, when they cross to the western shores of the Strait, where we find them in July. I am strongly of belief that the Whales of the Spitzbergen sea never, as a body, visit Davis Strait, but winter somewhere in the open water at the southern edge of the northern ice-fields. The Whales are being gradually driven further north, and are now rarely found, even by their traces*, so far south

* The recent visit of Whales to a particular locality can frequently be known by a peculiar oiliness floating on the water, and (the whalers say, though I confess I was never sensible of it) an unmistakeable odour characteristic of this Cetacean.

as the Island of Jan Mayen (71° N. lat.), round which they were so numerous in the palmy days of the Dutch whaling trade. I am not quite sure, after all that has been said on this subject, that the Whale is getting extinct, and am beginning to entertain convictions that its supposed scarcity in recent times is a great deal owing to its escaping to remote, less known, and less visited localities. It is said to be coming back again to the coast of Greenland, now that the hot pursuit of it has slackened in that portion of Davis Strait. The varying success of the trade is owing not so much to the want of Whales as to the ill luck of the vessels in coming across their haunts. Every now and again cargoes equal to anything that was obtained in the best days of the trade are obtained. Only seven years ago I came home to England "shipmates" (as the phrase goes) with no less than thirty Right Whales, in addition to a miscellaneous menagerie of Arctic animals dead and alive, and a motley human crew—a company so *outré* that I question if ever naturalist, or even whaler, sailed with the like before.

(ε) *Economic value.*—After the very excellent account of Scoresby, it would be mere pleonasm on my part to say one word regarding the commercial importance of the Whale. The introduction of steam, the almost universal use of the gun-harpoon, and the discoveries of Ross and Parry on the western shores of Davis Strait have greatly altered the nature of the "Strait fishery" since Scoresby's time. For this reason I have given the outline of a whaler's summer cruise, more especially as it illustrates, according to my observation, the range and migrations of the Right Whale.

(ζ) *Varieties of Balæna mysticetus.*—The whalers do not recognize any varieties of the Right Whale by specific names, nor do I of my own knowledge know of any entitled to that rank. Professors Eschricht and Reinhardt* consider that there is a second species of Right Whale found in the Greenland and northern seas, the "Nordcaper" (*Balæna nordcaper*, Bonnat.; *Balæna islandica*, Briss., &c.), the "Sletbag" of the Icelanders, and that the following facts have been ascertained regarding it:—1st, that it is much more active than the Greenland Whale, much quicker and more violent in its movements, and accordingly both more difficult and dangerous to capture; 2nd, that it is smaller (it being, however, impossible to give an exact statement of its length) and has much less blubber; 3rd, that its head is shorter, and that its whalebone is comparatively small and scarcely more than half the length of that of the *B. mysticetus*; 4th, that it is regularly infested with a cirriped belonging to the genus *Coronula*, and that it belongs to the temperate North Atlantic as exclusively as the *B. mysticetus* belongs to the icy sea, so that it must be considered exceptional when either of them strays into the range of the other. Moreover they considered that in its native seas it was to be found further towards the south in the winter (viz. in the Bay of Biscay, and near the coast of North America down to Cape Cod), while in the summer it roved about in the sea around Iceland and between this island and the most northerly

* *Loc. cit.*

part of Norway. Dr. Eschricht considered that this was the Whale captured by the Basque whaler in the seventeenth century; hence he has called it *Balæna biscayensis*. A considerable portion of this description corresponds with what I have said regarding the Spitzbergen Whales as a race.

I have heard that "barnacles" had been got on Whales; but these were looked upon as a sign of age in the Whale. It is now a question to what species the Right Whales now and then stranded on the European coasts are to be referred. What the "Scrag Whale" of Dudley* (*Balæna gibbosa*, Erxl.) is I cannot imagine. It is not now known to the whalers; and as neither of the species referred to have as yet been found in Davis Strait or Baffin's Bay†, they do not come within the limits which I have assigned to myself.

2. *PHYSALUS ANTIQUORUM*, Gray.

Balænoptera musculus, Flem. Brit. An. p. 30.

Rorqualus musculus, F. Cuv. Cétacés, p. 334.

Balæna physalus, Fab. Fauna Grœnl. p. 35.

Popular names.—*Big Finner*, *Razorback* (English whalers); *Silhval* (Swedish); *Sildrör*, *Rören* (Norse); *Sildreki* (Icelandic); *Tunnolik* (Greenlanders).

This species, in common with most of the family *Balænopteriðæ*, does not go far north as a rule, but keeps about the Cod-banks of Rifkol, Hólsteensborg, and other localities in South Greenland‡. They feed upon Cod and other fish, which they devour in immense quantities. Desmoulins§ mentions 600 being taken out of the stomach of one; I know an instance in which 800 were found. They often, in common with *Balænoptera gigas* and *B. rostrata*, wander into the European seas in pursuit of Cod and Herrings, and are quite abundant in the vicinity of Rockal. A few years ago much excitement was got up about the number of "Whales" found in that locality, and companies were started to kill them, supposing them to be the Right Whale of commerce. As might have been expected, they proved only to be "Finners," which prey on the immense quantities of Cod which are found there. This Whale is accounted almost worthless by the whalers; and, on account of the small quantity of oil which it yields and the difficulty of capture, it is never attacked unless by mistake or through ignorance. I remember seeing one floating dead in Davis Strait, to which the men rowed, taking it for a Right Whale; but on discovering their mistake they immediately abandoned it. They had apparently not been the first; for on its sides were cut the names of several vessels which had paid it a visit

* Phil. Trans. vol. xxxiii. p. 259.

† Crantz's description of the *Knotenfisch*, or *Knobbelfisch* (Greenland, vol. i. p. 146), is not derived from his own knowledge, but, like most of his descriptions, is copied from previous authors.

‡ I am aware that this statement is somewhat at variance with Dr. Eschricht's, as contained in his paper on the "Geographical Distribution of some of the Northern Whales" (Forh. Skand. Naturf. Kjöb. 1847, p. 103); nevertheless I think that it will be found to be substantially correct.

§ Hamilton on Whales (Jardine's Nat. Lib.).

and did not consider it worth the carriage and fire to try out the oil. The blubber is hard and cartilaginous, not unlike soft glue. Its "blowing" can be distinguished at a distance, by being whiter and lower than that of *Balæna mysticetus*.

3. BALÆNOPTERA GIGAS, Eschr.

Sibbaldius borealis, Gray, Cat. Seals and Whales, p. 175.

Popular names.—This is popularly confounded with the last, and the same names are applied to it by the whalers and Eskimo. It is probably also the *Kepokarnak* of the Greenlanders.

It visits the coast of Greenland only in the summer months, from March to November; and its range may be given as the same as the last. In common with the former, it is rarely killed by the natives.

4. BALÆNOPTERA ROSTRATA, O. Fab.

Popular names.—*Little Finner*, *Pike Whale* (English whalers and authors); *Waagehval* (Norse); *Tikagulik* (Greenlanders); *Tschikagleuch* (Kamschatkdales).

This Whale only comes in the summer months to Davis Strait and Baffin's Bay, or very seldom during the winter to the southern portion of Greenland. It is not killed by the natives; and its range is that of its congeners. The natives of the western shores of Davis Strait seldom recognized the figure of this and allied species of Whales, though the Greenlanders instantly did so*.

5. MEGAPTERA LONGIMANA, Gray.

Balænoptera boops, O. Fab. Faun. Grænl. p. 36 (non Linn.?).

Popular names.—*Humpback* (English whalers); *Rörqval*, *Stor Rörhval* (Norse); *Keporkak* (Greenlanders and Danes in Greenland).

This Whale is only found on the Greenland coast in the summer months. For many years it has been regularly caught at the settlement of Frederikshaab, in South Greenland. In North Greenland it is not much troubled. Whilst dredging in the harbour of Egedesminde one snowy June day a large *Keporkak* swam into the bay; but though there were plenty of boats at the settlement, and the natives were very short of food, yet they stood on the shore staring at it without attempting to kill it. The natives of this settlement are, no doubt, the poorest hunters and fishers in all North Greenland (if we except Godhavn, the next most civilized place); but there were at that time at the settlement natives from outlying places. Capt. John Walker, in the 'Jane' of Bo'ness, one year, in default of better game, killed fifteen Humpbacks in Disco Bay. He got blubber from them sufficient, according to ordinary calculation, to yield seventy tuns of oil; but on coming home it only yielded eighteen. The bone

* In a Greenland skeleton at Copenhagen, according to Eschricht, the lateral processes of the fifth and sixth cervical vertebræ are united, which is not the case with one from Norway. We cannot be too cautious in separating species on such distinctions.

is short and of little value. Though one of the most common Whales on the Greenland coast, yet, on this account and being difficult to capture, it is rarely troubled.

6. CATODON MACROCEPHALUS, Lacép.

Physeter macrocephalus, Linn. Syst. N. i. p. 107; O. Fab. Fauna Grœnl. p. 41.

Popular names.—*Sperm-Whale* (English); *Kegutilik* (Greenlanders). It is probably also the *Potvisch* (Norse), and *Tweld-Hval* (Icelandic).

Though currently reported in all compilations as one of the most common animals of the Arctic seas, and especially of Davis Strait and Baffin's Bay, it can only be ranked as a very rare, and possibly accidental, straggler. Whatever it was formerly, it is now only known to Davis-Strait whalers by name; many will even ridicule the notion of its being an inhabitant of those seas. I found very few Eskimo who knew it even by tradition; and I could only hear of one recent instance of its being killed on the coast of Greenland, viz. near Proven (72° N. lat.) in 1857.

7. DELPHINUS EUPHROSYNE, Gray.

Delphinus holböllii, Eschricht, Skand. Naturf. Møde i Kjöbenhavn, 1847, p. 611.

This species is only known as a member of the Greenland fauna by a skeleton from South Greenland. It is apparently unknown to the natives, for they have no popular names for it.

8. LAGENORHYNCHUS ALBIROSTRIS, Gray.

Delphinus ibsenii, Eschricht, Unders. over Hvald. 5^{te} Afh. i Vid. Selsk. Nat. Math. Afh. xii. 297.

This is only known as a Cetacean of Davis Strait by a skeleton from Greenland in the Copenhagen Museum. It is found also in the Faroe Islands, and in various portions of the North Sea.

9. LAGENORHYNCHUS LEUCOPLEURUS (Rasch), Gray.

Dr. Gray* has referred a skeleton from Greenland in Mr. Brandt's collection to this species, and on his authority solely I claim it as a member of the Greenland fauna. We possess no particulars of its history as an Arctic animal. The Norwegians know it as the *Qwitskjœving*.

10. ORCA GLADIATOR (Bonn.), Sund.

Delphinus orca (L.); O. Fab. Fauna Grœnl. p. 46.

Physeter microps, Fab. F. G. no. 27; Reinhardt, Naturh. Tillæg til en Geog. og Stat. Breskrev. af Grönl. p. 12.

Popular names.—*Grampus*, *Killer*, *Swordfish* (English seamen);

* Zool. Erebus and Terror, p. 34, t. 3; Cat. Seals and Whales (1866), p. 273.

Späckhuggare, *Svärdfisk* (Swedes); *Stourvagn*, *Staurhyning* (Norse); *Ardluik* or *Ardluk* ♀, *Ardlurksoak* ♂ (Greenlanders). In all probability the "*Pernak*," or *Parnak* (*Physeter catodon*, O. Fab.), is also to be referred to *Orca gladiator*. Hr. Fleischer assured me that it was an *Orca*, but only known to him by name. Curiously enough, the Kamschatdales and Aleutians have very similar names (*Agluck*, fide Pallas, Zool. Rosso-Asiat. p. 305; and *Aguluck*, fide Chamisso, Nov. Act. Acad. Nat. Cur. vol. xii. p. 262) for animals closely allied to, if not identical with, this species.

The *Ardluk* is only seen in the summer time along the whole coast of Greenland. Wherever the White Whale, the Right Whale, or the Seals are found, there is also their ruthless enemy the Killer. The White Whale and Seals often run ashore in terror of this Cetacean; and I have seen Seals spring out of the water when pursued by it. The whalers hate to see it, for its arrival is the signal for every Whale to leave that portion of the sea. It is said that it will not go among ice, and that the Right Whale, when attacked by it, keeps among ice to escape its persecution. Occasionally the ends of the laminæ of whalebone are found bitten off, apparently by the Killer; and probably this is the origin of the story that it preys on the tongue of the Whale. Linné* very happily styles it—"Balænarum phocarumque tyrannus † quas turmatim aggreditur." Though subsisting chiefly on large fishes, they will not hesitate to attack the largest Whalebone Whales, and are able to swallow whole large Porpoises and Seals. Dr. Eschricht took out of the stomach of one thirteen Porpoises and fourteen Seals, the voracious animal having been choked by the skin of a fifteenth. It has been known to swallow four Seals at least immediately one after the other, and in the course of a few days as many as twenty-seven individuals ‡. I know of a case in which they attacked a white-painted herring-boat in the western islands, probably mistaking it for a *Beluga*!

11. PHOCÆNA COMMUNIS, Brookes.

Popular names.—*Purpess*, *Sea-pig* (English seamen); *Marsuin* §, *Herring-hogs*, *Pellock*, *Bucker*, *Puffy-dunter*, *Neesock* § (fishermen of Northern Islands and coasts of Scotland); *Nisa* and, more rarely, *Piglertok* (Greenlanders).

The Porpoise arrives in the spring in Davis Strait, and stops there until November, but does not go further north than from lat. 67° to lat. 69° N. They are now and then caught off the coast during

* Mant. Plant. vol. ii. p. 523.

† Gunnerus (Throndh. Selsk. Skriv. iv. p. 99) styles it *Kobbeherre*—Lord of the Seals.

‡ Nilsson, Skand. Fauna. (Däggdjuren), p. 607.

§ The old Norsemen as they poured forth from Scandinavia on their predatory or colonizing expeditions leavened not only the habits but the language of the conquered. *Marsuin* is the Swedish word for the Porpoise, hence the French *Marsouin* and the same Shetland word. *Nise* is the Norse term for it; hence we have *Nisa* in Greenland and *Neesock* in Shetland (the *ock* being used there, as in many other words, as a diminutive). *Porpoise* is only a corruption of the French *porc poisson*, which we have almost literally translated into *Sea-pig*.

this period. Through the kindness of Hr. Bolbroe, Colonibestyryer of Egedesminde, we obtained the skeleton of a *Nisa*, which had been procured in this vicinity some years ago by his predecessor Hr. Zimmer; but I could see no difference in it, so far as it could be examined in the roughly prepared state, from the one usually found on the British coast. Whether the *Phocæna tuberculifera*, Gray*, is different from the ordinary Porpoise, I am inclined to doubt. I have examined several Porpoises caught on the British coast, and have invariably found these tubercles on the upper edge of the dorsal fin more or less developed. Independently of this, it is questionable whether such variable characters (and we know that there are many such characters in Cetacea which give no specific distinction) warrant the separation of *Phocæna tuberculifera* from *P. communis*. The flesh of the Porpoise is far from contemptible as an article of food, and is much relished by sailors†.

12. BELUGA CATODON (L.), Gray.

Popular names.—*White Whale* (English whalers); *Hvitfisk*, *Hvidfisk* (white fish) (Scandinavian seamen, and Danish colonists in Greenland); *Keல்லuak* (Greenlanders and Eskimo generally).

This is, beyond all comparison, so far as its importance to the Greenlanders and Eskimo is concerned, *the Whale of Greenland*. Like the Narwhal it is indigenious, but is only seen on the coast of Danish Greenland during the winter months, leaving the coast south of 72° N. lat. in June, and roaming about at the head of Baffin's Bay and the western shores of Davis Strait during the summer. In October it is seen to go west, not south, but in winter can be seen, in company with the Narwhal, at the broken places in the ice. Its range may be said to be the same as the Narwhal's, and during the summer months corresponds with that of the Right Whale, of which it is looked upon as the precursor. It, however, wanders further south than the Narwhal, being found as a regular denizen as far south as 63° N. lat., though on the opposite coast it reaches much further south, being quite common in the St. Lawrence river. The Greenlanders during the summer kill great numbers of them, and preserve their oil, and dry their flesh for winter use. Of this animal and the Narwhal, about 500 are yearly caught; but the majority of this number consists of the White Whale. It feeds on Crustacea, fish, and Cephalopoda; but in the stomach is generally found some sand. The Greenlanders often jocularly remark, in reference to this, that the *Keல்லuak* takes in ballast.

* Proc. Zool. Soc. 1865, p. 320.

† The flesh of the Porpoise and Grampus was eaten in the fourteenth century in Lent time as fish; and it is lamentable to think how much sin was committed until they were discovered to be mammals. I have heard of the monks of a Carthusian convent roasting an Otter under a similar zoologico-theological error. A MS. in the British Museum (Harl. MSS. no. 279) contains a receipt for making "puddyng of Porpoise;" and we find it served at table as late as the time of Henry VIII., and in Scotland even still later. In the accounts of Holyrood Palace we find frequent entries of monies paid for "Porpess" for the royal table.

Great numbers are caught by means of nets at the entrance of fjords and inlets, or in the sounds between islands. The young are darker-coloured than the adult, and can at once be distinguished among the herds of the ordinary waxy white colour. It is said to be rarely seen far from land. The males and females are together in the drove, and not separate as has been stated. Their blast is not unmusical; and when under the water they emit a peculiar whistling sound which might be mistaken for the whistle of a bird, and on this account the seamen often call them sea-canaries! It is rarely that the whalers kill a white Whale, their swiftness and activity giving them more trouble than the oil is worth*. They are sometimes also called "Sea-pigs," from their resemblance to that animal when tumbling about in the water.

13. MONODON† MONOCEROS, Linn.

(α) Popular names.—*Narwhal*, *Unicorn*, *Unie* (English whalers); *Narhval* (Scandinavians); *Tugalik* (Greenlanders); *Kelelluak-tuak* (Eskimo at Pond's Bay).

(β) *Descriptive remarks*.—The female Narwhal is more spotted than the male. The young is again much darker; and I have seen individuals which were almost white, like the one Anderson describes as having come ashore at the mouth of the Elbe. In a female killed in Pond's Bay, in August 1861, the stomach was corrugated in complicated folds, as were also the small intestines. It contained crustaceans, bones of fish, and an immense quantity of the horny mandibles of some species of Cephalopod (probably *Sepia loligo*) firmly packed one within the other. In its stomach was a long *Lumbricus*-like worm; and the cavities behind the palate were filled with froth and an innumerable number of little worms, such as Scoresby describes in his account of the animal. In some animals which I examined the bone was quite eaten away by them, and that portion of the lining membrane which remained was red or inflamed. There is a curious anastomosis of reticulating arterial blood-vessels inside the lining membrane of the thorax and abdomen and around the spinal cord, which has doubtless a relation to its amphibious life. The blow-holes are placed directly on the top of the head, large, semilunar, opening on either side into two sacs lined with a dark serous membrane, these openings, again, leading to the bronchia and the lungs. The blow-hole has but one opening externally, but about an inch down is divided into two by a cartilaginous septum, continuous a little further down with the bony partition seen in the skull. The rima glottidis is exactly described by the late Prof. Fleming, in the 'Wernerian Trans.' (vol. i. p. 146). The female has no "horns;" but inside the intermaxillary bone are two undeveloped tusks, each about 10 inches long, rough, and with no inclination to a spiral—in fact not unlike a miniature piece of pig-

* One of the whalers this summer killed several hundreds, but this is an almost isolated case.

† Lamarck subsequently usurped this name for a genus of Pectinobranchiate Mollusca.

iron. On the other hand, the undeveloped tusk in the male is smooth and tapering, and "wrinkled" longitudinally. Double-horned ones are not uncommon; I have seen them swimming about among the herd, and several such skulls have been preserved. Among others, there is a fine specimen, presented by Capt. Graville, in the Trinity House, Hull. One of the teeth is 3 feet long, and the other 4 feet. Of course there is no whalebone in its jaw; but it is interesting to notice the laws of homology of structure (as I think) kept up. On the sides of each gum are transverse markings, either corresponding to the alveoli of the teeth or to the position of the laminæ of the whalebone in the *Balænidæ*. The under jaws are very light and quite hollow for half their length, as in most species of Cetacea; this cavity is filled with a very fine blubber. The *tongue* is regularly concentrically grooved and attached its whole length, so as scarcely to be recognized as it lies flat on the base of the mouth; the roof of the mouth is correspondingly marked. The *lungs* are each about $1\frac{1}{2}$ foot long; the *kidney* 9 inches long and about $4\frac{1}{2}$ inches broad; the *lacteals* were very distinct and distended; the large intestine at broadest about 4 inches in diameter, at thinnest about $1\frac{1}{2}$ inch, and about 60 feet in length.

The *pectoral fin* is not notched below (as would seem from the plate in Hamilton's book "On Whales"), but smooth and entire, curved below, the greatest curve pointing posteriorly, but with the thickest part of the fin anteriorly. The animal was greyish or velvet-black, with white spots, sometimes roundish, but more frequently irregular blotches of no certain outline running into one another. There were no spots on the tail or fin; waxy-looking streaks shaded off on each side of the indentation of the tail, which is white at the line of indentation. The *ridge* along its back corresponding to the dorsal fin is of a uniform height of 1 inch throughout, irregularly notched on the top, like the embrasures of a castle-wall, and is formed of blubber covered with the common integument of the body, of which it is merely a raised fold.

(γ) *Habits &c.*—The Narwhal is gregarious, generally travelling in great herds. I have seen a herd of many thousands travelling north on their summer migrations, tusk to tusk and tail to tail, like a regiment of cavalry, so regularly did they seem to rise and sink into the water in their undulatory movements in swimming. It is very active and will often dive with the rapidity of the *B. mysticetes*, taking out 30 or 40 fathoms of line. These "schools" are not all of one sex, as stated by Scoresby, but males and females mixed. It copulates in an upright position, and seems to produce at about the same time as the Right Whale. The use of the tusk has long been a matter of dispute: it has been supposed to use it to stir up its food from the bottom; but in such a case the female would be sadly at a loss. They seem to fight with them; for it is rarely that an unbroken one is got, and occasionally one may be found with the point of another jammed into the broken place where the tusk is young enough to be hollow or is broken near enough to the skull. Fabricius thought that it was to keep the holes open in the ice during the

winter; and the following occurrence seems to support this view. In April, 1860, a Greenlander was travelling along the ice in the vicinity of Christianshaab, and discovered one of these open spaces in the ice, which, even in the most severe winters, remain open. In this hole hundreds of Narwhals and white Whales were protruding their heads to breathe, no other place presenting itself for miles around. It was described to me as akin to an Arctic Black Hole of Calcutta, in the eagerness of the animals to keep at the place. Hundreds of Eskimo and Danes resorted thither with their dogs and sledges, and while one shot the animal, another harpooned it to prevent its being pushed aside by the anxious crowd of breathers. Dozens of both Narwhals and white Whales were killed, but many were lost before they were got home, the ice breaking up soon after. In the ensuing summer the natives found many washed up in the bays and inlets around. Fabricius describes a similar scene. Neither the Narwhal nor the White Whale are timid animals, but will approach close to, and gambol for hours in the immediate vicinity of, the ship.

(*δ*) *Geographical distribution*.—The range and migration of the Narwhal is much the same as that of the White Whale. It is only found on the coast of Danish Greenland during the spring and winter, migrating northward and westward in the summer. It is rarely seen south of 65° N. lat.

(*ε*) *Economic value*.—In early times the tusk of the Narwhal was highly valued as a medicine; and Master Pommet, in his 'Compleat Historie of Drugges,' gives special directions regarding the selection of them. To this day the Chinese esteem them for their medicinal properties. In 1861 the price of Narwhals' ivory was 1s. 6d. per lb., but of late years it has risen prodigiously in value, but is again falling. In the Palace of Rosenborg is a throne of the kings of Denmark manufactured of this ivory; and Capt. Scoresby (the father of the Doctor) had a bed made of them. The oil is highly esteemed, and the flesh is very palatable. The skin of the Narwhal boiled to a jelly is looked upon, and justly so, as one of the prime dainties of a Greenlander. The hospitable Danish ladies resident in that country always make a point of presenting a dish of *mattak* to their foreign visitors, who soon begin to like it.

14. GLOBIOCEPHALUS SVINEVAL (Lacép.), Gray.

Delphinus melas, Traill, Nicholson's Journal, vol. xxii. (1809) p. 21.

Delphinus deductor, Traill, MSS. and Scoresby's Arctic Regions, vol. i. p. 496, t. 13. fig. 1.

Delphinus globiceps, Cuv. Ann. Mus. xix. t. 1. fig. 2.

Delphinus tursio, O. Fabr. Faun. Grœnl. p. 49. no. 31.

Popular names.—*Bottle-nose*, *Caaing Whale* (fishermen and seamen); *Grindaquealur* (Faroe Islands); *Grinde-Hval* (Swedish and Danish); *Nesernak* or *Nisarnak* (Greenland). The term Bottle-nose is applied by sailors to several species of Whales. In fact any

Whale which is not a "Right Whale," "finner," "parmacity" (spermaceti), "purpess," "unicorn" (Narwhal), or "White Whale" is with them included under the vague term of "Bottle-nose." The common and most characteristic name for this Whale is that used in the north of Scotland, viz. caaing or driving Whale—a term translated into *deductor**.

There seems little doubt that this is the *Delphinus tursio* of Fabricius, as the Eskimo name *Nesernak* is applied to the present animal. If so, Fabricius's name has the priority; but as it has been confounded with another species it is better to keep Lacépède's most barbarous trivial name. Gray and other authors look upon Fabricius's *Nesernak* as the type of a distinct species, and have described it as *Tursio truncatus*. The *Delphinus truncatus* of Montagu (Wernerian Society's Trans. vol. iii. t. 5. fig. 3) is a totally different animal. Fabricius's description ("Frons rotunda, declivis s. sursum repanda, desinens rostro attenuatiore; sic frontis anatis mollissimæ, non absimilis"), though seemingly contradictory of the identity of the *Globiocephalus vineval* and *Delphinus tursio* of O. Fabr., must in reality be received for no more than it is worth, Cetological critics have received the descriptions of Fabricius as if they were infallible or superior to those of any other author who has succeeded him. We know that many of his descriptions of other animals which are well known were erroneous, and that few of those regarding which there could be no mistake were altogether free from error; therefore I cannot see why we should receive the others otherwise than as approximately correct. Fabricius enjoyed during the few years he passed in Greenland no better opportunities than any other naturalist in that country at the present day. Many of the animals which he describes are very rarely killed or seen by the natives; and many of his descriptions bear on the face of them the marks of having been derived from the natives' narration, and not from actual specimens. Any one who has examined such unwieldy animals as the Cetacea must know how difficult it is, even under the most favourable circumstances, to arrive at anything like an accurate idea of the animal the external appearance of which we may be desirous of describing. Therefore, as the Greenlanders call this animal *Nesernak*, as the description does not widely differ from the appearance of the Caaing Whale, and as Montagu's *Delphinus truncatus*, with which it has been supposed to be synonymous, has never been found in Davis Strait, while the present species has, we are warranted in concluding with Dr. Reinhardt that the synonymy given under this species is correct.

This Whale is not a regular visitor of Davis Strait or Baffin's Bay, but is occasionally to be seen in droves in the summer time along the whole coast of Danish Greenland. An excellent account of this species is given by Turner M'Bain, derived from the exami-

* It has no connexion with *calling*, as it has sometimes been translated even in works written by Scotchmen. It is derived from the Scotch word *caa*, signifying to drive, relating to their ordinary method of capture, viz. by driving them ashore.

nation of some individuals of a drove which came into the Frith of Forth in the spring of 1867 (Journ. Anat. and Phys. 1867, and Proc. Roy. Phys. Soc. Edin. 1866-67 ined.)*.

15. **HYPEROODON BUTZKOF, Lacép.**

Monodon spurius, O. Fab. Faun. Grœnl. p. 31. no. 19.

Chœnocetus rostratus (Müll.), Eschr. Undersög. over Hvaldyr. 4^{de} Afh. 1845; Reinhardt, Tillæg til en Beskrevet af Grönland (Rink), p. 11.

Popular names.—*Bottle-nose* or *Bottlie* (English whalers); *Nabbhül* (Scandinavians); *Andarnefia* (Icelanders); *Dögling* (Faroelanders); *Anarnak* (Greenlanders).

This is undoubtedly the *Monodon spurius* of Fabricius, that author having made the not uncommon mistake of describing the upper for the lower jaw. As it is a rare animal on the Greenland coast, Fabricius could have been but little acquainted with it. The Whale is only seen about the mouth of Davis Strait, swimming in threes or fours; it is occasionally captured by them, as one will yield as much oil as a Narwhal. One ship's crew some years ago killed fifteen of them, and the oil was represented to me as mixing well with spermaceti, and selling for the same price, viz. 10s. 6d. per gallon.

16. **HYPEROODON LATIFRONS, Gray.**

Lagenocetus latifrons, Gray, Proc. Zool. Soc. 1864, p. 241.

This species is known from skulls and skeletons from various museums, and as an Arctic animal from a skull brought from "Greenland" by Capt. Wareham, and now in the Newcastle Museum. Greenland, however, is a loose term; but from what I have said as to the range and habits of *H. butzkof*, we may safely conclude that it was obtained in Davis Strait. I am not aware that we have any external characters to separate it from the preceding, but yet the apparently constant distinction presented by the skull would lead us to believe in its distinctness. Therefore, though we may not go so far as Eschricht in believing it to be the male of *H. butzkof*, yet we must hesitate before joining in the opinion of even such an experienced zoologist as Dr. Gray as to its claim to generic rank.

* In the Society's 'Proceedings' for 1853, p. 103, there is a notice of a paper "On the Capture of *Delphinus orca* in South Greenland," by M. Rehüller, in which it is said that the number taken at Westmanhavn since 1843 was 2200, whereas between 1819 and 1843 there were only 280. This additional capture, amounting in the aggregate to the value of £4000 sterling, was described as being due to the introduction of nets. Now there is no such place as "Westmanhavn" in Greenland, and I question if 2260 *Orcas* have ever been killed in Greenland since the beginning of time. Apparently the notice refers to the capture of *Globocephalus* in the Faroe Islands.

2. On *Pachybatrachus robustus*, a New Genus of Anurous Batrachians. By ST. GEORGE MIVART, F.L.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.

In examining at the British Museum the Anurous Batrachians of my own collection, in order to name them correctly, I discovered that the specimen here described was of a kind not present in the collection, that it was also of a kind unknown to Dr. Günther, and, finally, that, as I believe, the form is hitherto undescribed.

It appears to me to constitute a new genus, for which I propose the name *Pachybatrachus*, and *robustus* as its specific appellation.

According to the system of classification devised by Dr. Günther it must be placed in his *Ranidæ*, where its cleft tongue, webbed toes, and edentulous palate and normally placed digits approximate it to *Dicroglossus* and *Phrynobatrachus*. It differs from both these genera, however, in its very different habit, its larger size, relatively as well as absolutely much larger and broader head and mouth, its smooth skin and large tympanum. Its toes are less completely and largely webbed than in *Dicroglossus*, while they are more so than is the case in *Phrynobatrachus*.

The head of *Pachybatrachus robustus* is very large and broad; the snout is somewhat longer than the eye; the canthus rostralis is not much marked; the anterior end of the muzzle is rounded but not insignificant in vertical extent, and the loreal region is nearly vertical. The eye is rather large, and the upper eyelid is so marked transversely as at first to have somewhat the appearance of being free and notched behind, as in *Megalixalus**; but it is really entire, and is not furnished with any process. The tympanum is very large, its transverse diameter nearly equalling that of the aperture of the eye. The crown of the head is nearly flat. When the head is looked at from below, the upper jaw is seen to project forwards somewhat beyond the anterior extremity of the mandible; and the two rami of the latter diverge at an angle of about 60°.

There is a slight symphysial tubercle, but the outer margin of each of the notches which define it can hardly be said to rise into a distinct apophysis.

The external nostrils are moderate and situated at about the posterior end of the anterior third of a line drawn from the end of the snout to the anterior end of the eye.

There are no teeth in the lower jaw; but a range of small teeth runs along the maxillary border. The palate is absolutely edentulous. The choanæ are rather large, and the openings of the eustachian tubes are of nearly the same dimensions.

The tongue is well developed, and nearly its hinder half is free; it is distinctly notched, or rather the fleshy processes project from its hinder margin, each about 0.1 inch in length. There is no fold beneath the throat or across the chest; but a prominent line (a glandular fold) extends backwards, from the hinder angle of the eye-

* Dr. Günther, Proc. Zool. Soc. 1868, p. 485.

aperture, immediately above the tympanum; there it bifurcates, one branch descending obliquely downwards and backwards behind the tympanum to the root of the pectoral limb, the other branch passing backwards along the whole length of the side of the back to the lateral margin of the anus.



A. *Pachybatrachus robustus*, nat. size. B. Interior of mouth of ditto.

All the digits of both limbs have their extremities somewhat enlarged, and there are subarticular tubercles. The fingers are very well developed and quite free. They are normally disposed, neither the first two nor the first alone being opposite the others; the third is the longest, then the first and fourth, which are of nearly the same length; the second finger is the shortest. When the limb is turned backwards the longest digit attains the posterior margin of the middle of the body. There is a considerable prominence on the palm at

the root of the first finger. The pelvic limb, though elongated, as in all Frogs of ranoid habit, is yet remarkable for its short tarsus, which does not quite equal half the length of the tibia.

The toes are well webbed, the membrane extending nearly to the ends of the digits, but nevertheless being strongly emarginated. There is no shovel, but a very small yet distinct tubercle at the base of the first toe, and a scarcely noticeable rudiment of a second tubercle at the base of the fourth toe. There are no other tarsal tubercles whatever. The skin over the whole body is smooth, with numerous flat warts on the undersides of the thighs. The cephalic derm is not ossified. The colour of the specimen is now dark brown above, lighter beneath. A black line extends along each side of the back from the eye to the anus; and there are black markings on the limbs, and indications of spots in the middle of the back. Unfortunately, I have no knowledge from what part of the world the individual here described was obtained.

| | inches. |
|--|---------|
| Extreme length from end of snout to anus | 2·45 |
| Length from end of muzzle to anterior angle of eye | ·38 |
| Breadth between the eyes (their anterior angles) | ·53 |
| Length of the aperture of the eye | ·30 |
| Antero-posterior diameter of the tympanum | ·27 |
| Vertical diameter of the tympanum | ·27 |
| Breadth between the two posterior angles of the mouth . . | ·96 |
| Length from symphysis to mid point between said angles . | ·79 |
| —— from shoulder to elbow | ·47 |
| —— from elbow to carpus | ·58 |
| Extreme length of pectoral limb | 1·58 |
| Length of first digit | ·35 |
| —— of second digit | ·27 |
| —— of third digit | ·48 |
| —— of fourth digit | ·32 |
| —— from groin to knee | ·96 |
| —— of tibia | 1·10 |
| —— of tarsus | ·53 |
| —— of first toe | ·22 |
| —— of second toe | ·30 |
| —— of third toe | ·50 |
| —— of fourth toe | ·74 |
| —— of fifth toe | ·47 |

The generic and specific characters will be as follows:—

PACHYBATRACHUS, g. n. RANIDARUM.

No digital disks; maxillary teeth, but no vomerine teeth; sacral vertebra not dilated; no parotoids or lumbar glands, but a glandular fold on each side of the body; fingers quite free, and normally disposed; toes webbed; one small tarsal tubercle at base of first toe, and a minute rudiment at the base of fourth toe; tarsus less than half the length of tibia; tongue deeply notched, and free behind;

tympanum very large, but not very distinct; eustachian tubes moderate.

PACHYBATRACHUS ROBUSTUS.

Head large and broad, snout slightly longer than the eye, and the loreal region nearly vertical. Eye large, tympanum very large. Digits with their extremities rounded and with subarticular tubercles. Skin entirely smooth. A glandular fold extending from the eye to the anus, and sending down a branch behind the tympanum. Upper parts dark brown; glandular fold, tarsus, tibia, arm, and middle of back with black markings. Under parts lighter, and free from black markings. Transverse light markings on the hinder part of each upper eyelid.

The typical specimen has been deposited in the national collection.

3. Note on the Bottlenosed Whales (*Tursio*).

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

A short time ago the British Museum received three skeletons and a skull of the Bottlenosed Dolphin (*Tursio truncatus*), which were obtained from one school by Edward Gerrard, jun., in the Firth of Forth. They show the very great change that takes place in the form of the skull, and especially of the beak, during the growth of the animal.

The beak of the skull of the young animal is regular, conical, tapering and contracted in front. The skull is $17\frac{1}{2}$ inches long, with the beak, from the notch, $9\frac{1}{2}$ inches, and the teeth-line, by the callipers, 8 inches. The teeth are small, conical, acute, three and one-half in an inch.

The skull of a full-grown female is similar but larger than that of the young animal.

There is another skull of a full-grown animal of the same school, but its sex was not determined. It is very like that of the female, but rather larger.

The skull of the very old male animal (fig. 1, p. 561) is much thickened; but the great peculiarity is that the beak is broad and flattened, and very much expanded, flattened, and curved up at the tip in front, and as if part of the beak in front had been absorbed. The teeth have nearly all fallen out, and there is only one left, which is spread out towards the edges and flattened, and evidently would have fallen out in a very short time. The intermaxillary and palatine bones are visible nearly to the back part of the palate of the beak. The length of the skull is $20\frac{1}{2}$ inches, of the beak, from the notch, $11\frac{1}{2}$, of the teeth-line $9\frac{1}{2}$. Width of the brain-case at eyebrows $11\frac{1}{2}$, of beak at notch 6, in middle (or tenth tooth) $4\frac{1}{4}$.

There is a considerable difference in the form of the pterygoid bones and of the sheath of the hinder nasal opening in these four



Fig. 1.

Fig. 2.

Fig. 1. Skull of *Tursio truncatus* (σ), adult.

Fig. 2. Under surface of the upper jaw, showing the worn surface.

specimens, all obtained at the same time from the same school of these Dolphins from the Firth of Forth.

In the skull of the old male the sheath of the opening is nearly flat below and on the sides, the lateral ridges being almost on the edge.

In the skull of the full-grown female the sheath of the hinder nasal opening is nearly similar to that of the male, but the sides are more convex and swollen.

The third skull of a full-grown animal, the sex of which was not marked, is very like the skull in the British Museum that Colonel Montagu described as *Delphinus truncatus*, and it has, like the latter, all the teeth much worn down and truncated. They both differ from the skull of the adult male and of the full-grown female in the sheath of the hinder nasal aperture being rather narrower, more deeply impressed in the centre, and in the lateral keel being more within the margin, making the side of the sheath more convex and rounded.

Being very desirous of obtaining information bearing on the geographical distribution of Cetacea, and hearing that Mr. Moore, of the Liverpool Museum, had recently obtained the skull of a Bottlenosed Whale (*Tursio*) from the west coast of Africa, I requested him to send it to the British Museum for examination and comparison. It is intermediate, in some respects, between the skulls of the *Tursio truncatus*, of the English coast, and *T. metis*, the locality of which is unknown. It has the large teeth and long teeth-line of the *T. truncatus*; indeed the teeth-line is above half an inch longer than in that species; but the beak of the skull is rather slender: in this latter character it is more like *T. metis*; but that species has a rather shorter teeth-line even than *T. truncatus*.

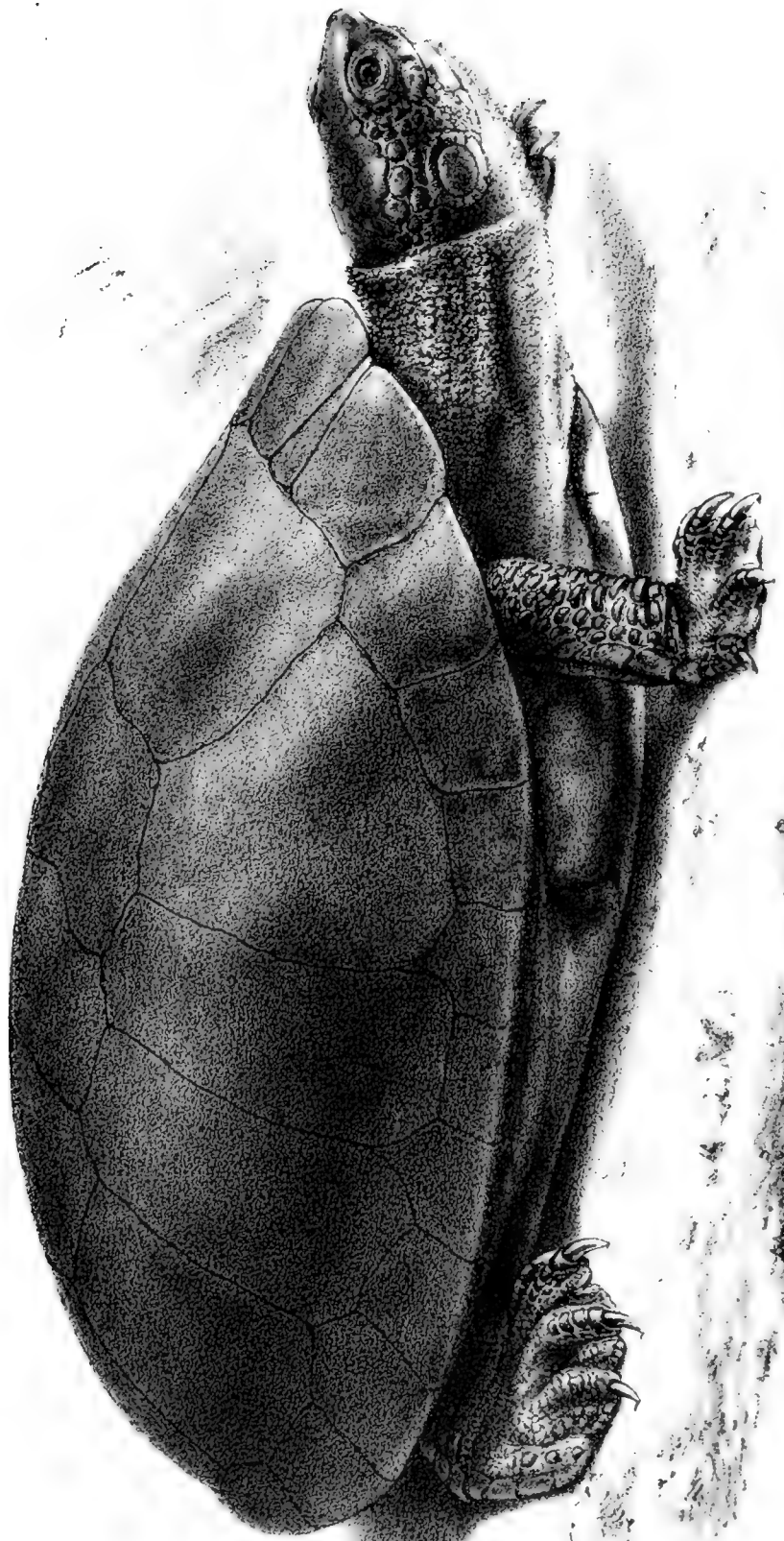
If it were not that I have lately observed that Dolphins that differ very little from each other in the form and proportion of their skulls have very different external characters, I should be inclined to think that *T. truncatus*, *T. metis*, and the specimen from West Africa were all of one species, varying a little in the form of the skull; but we must leave this question for further examination, more especially as different authors have described the living *Tursio* that came under their examination as being very differently coloured externally, and only record that a species of *Tursio* is found on the west coast of Africa, as well as in the North Sea, the Bay of Biscay, the Mediterranean, and the Red Sea.

The following are the measurements of the West-African skull:—

| | |
|---|------------------|
| | inches. |
| Length entire | 22 $\frac{1}{4}$ |
| —— of beak | 13 |
| —— of teeth-line | 11 |
| Width of brain-case | 10 $\frac{1}{2}$ |
| —— of beak at notch | 5 $\frac{7}{12}$ |
| —— of beak between tenth and eleventh tooth . . | 3 $\frac{7}{12}$ |

The skull was presented to the Liverpool Museum by Mr. J. Lewis Ingram, of the Temple, who obtained it at the Gambia.





4. Notice of *Hydraspis gordonii*, a New Species from Trinidad, living in the Gardens of the Society. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

(Plate XLII.)

Some living Tortoises belonging to the Society's collection have been brought to the British Museum to be determined and named. Among them there is an *Hydraspis*, deposited in the Society's Gardens in July last by the Hon. Arthur Gordon, Governor of Trinidad, which I have not seen before, and which is not in the Museum collection, at least in the adult state. It is the first species of the genus that has been brought from the West-India islands; all the others are from the American continent. It is very distinct from all that I have seen in the adult condition, but it may be only an adult specimen of a species that has been described from a very young animal; for, unfortunately, as I observed in my paper on the family in 1864, the species have been described from adult specimens and from very young ones, and it is impossible to determine whether some of these presumed species may not be young states of some that have been described under different names, and *vice versa*.

It is so uncommon to obtain a specimen alive and in an adult state, that I think it had better be described and figured, even with the disadvantage that one may be adding another synonym to the list.

HYDRASPIS GORDONI. (Plate XLII.)

Head rather large, crown flattish, with numerous small, flat, polygonal plates, those on the middle of the crown more or less united together, or only separated from one another by short lines of dots, with an arched sunken line over each eye. The shields on the hinder part of the head longer and more separate. The temple covered with distinct convex plates, separated from each other by well-marked grooves, those over the tympanum small, less distinct, and forming an arched series. Chin and throat covered with small acute plates; chin two-bearded. The sheath of the lower jaw whitish. The shell depressed, dark brown, shelving to the front edge, and slightly bent up on the side edge. The nuchal shield narrow, elongate. The first vertebral shield the largest, nearly square, four-sided, but rather narrower behind; second and third similar, small, with a small process on the middle of each side; the front narrower, elongate, nearly twice as long as wide. Sternum and lower side of the margin white. Intergular shield broad, rather longer than wide; the anal notch large, semicircular. The animal blackish; chin, throat, and underside of limbs near axilla and groin whitish.

Hab. Trinidad, near the mountain of Tamana (*Hon. Arthur Gordon*).

The Tortoise is like *Elseya latisternum* in general appearance; but that animal has no nuchal shield, the anal end of the sternum is

truncated and only slightly angularly bent in the middle, and the animal has a distinct white streak on each side of its neck, and the shields over the temples are flatter. The ridge of large tubercles on the under outer side of the hind legs are small and more equal; and the nose is longer, more conical, and produced. The under and outer sides of the hind legs with a series of large broad scales, the last, near the feet, being high and conical.

DESCRIPTION OF PLATE XLII.

Fig. 1. *Hydraspis gordonii* (nat. size), from the animal living in the Zoological Society's Gardens.

2. Gular end of sternum (one-fourth of nat. size).
3. Anal end of sternum (one-fourth of nat. size).

5. Note on *Oculinaria*, a New Genus of social *Ascidia*.

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

The British Museum lately received from Dr. Bowerbank some animals in spirits from Fremantle, West Australia. Among others there is a group of *Ascidia* that is very distinct from any that I have previously seen. It is very like a fragment of an old stem of *Oculina virginea*. I therefore propose to call it

OCULINARIA AUSTRALIS.

B.M.

The mass is cylindrical, about 8 inches long, and $1\frac{1}{3}$ inch in diameter in spirits. It is white, with ends rather tapering and rounded.



Oculinaria australis.

It entirely consists of a large number of more or less oblong cysts, placed closely side by side on every side of an imaginary central axis,

the cysts covering the ends of the mass like the rest of the body. The cysts are hard, cartilaginous, rather convex externally, with two concavities having an opening at the base of each. The apertures are slightly raised round the edge; and the centre is closed with four short valves, leaving a stellate 4-rayed aperture. The outer surface of the cyst is covered with a thick hard skin, strengthened externally with imbedded particles of sand, which are more abundant and clustered in certain parts, especially in those sunk below the general level of the surface. The animal is full of sand, in rhombs and crystals.

6. Note on *Theonella*, a New Genus of Coralloid Sponges from Formosa. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

Mr. Swinhoe sent to the British Museum in 1867, along with some other marine productions, a small specimen of coralloid sponge. The outline of the cup is irregular, and the base of the cavity imperfect, which induced me to consider that the species was imperfectly developed. Though I promised to describe it, I have waited in hopes that I might obtain a more perfect specimen; but Mr. Swinhoe has now left Formosa, and informs me that he is not likely to obtain any other specimen. The sponge in some external characters is like the genus *Macandrewia*, but it differs from that sponge in not having any stellate spicules, or at least Mr. Cooke, who has kindly examined the sponge for me, did not discover any. It is, I believe, the only sponge of the family in which they have not been discovered.

THEONELLA.

Sponge cup-shaped, thick, covered with a smooth rather coriaceous external coat; internally formed of netted spicules, arranged so as to leave an hexangular mass; the spicules subcylindrical, united at the inosculation of the network by a siliceous callosity; the body of the spicules generally smooth, but sometimes slightly spiculate on the surface, with numerous very slender fusiform spicules of very different sizes mixed in the sarcod. The parietes of the cup are pierced with many cylindrical tubes opening on the edge of the cup; but there is no appearance of any spines or oscules on the edge or surface of the dry specimen. The spicules form a coral-like network, very like *Macandrewia*. Their intersections are rough and tubercular, like the knots of a net, but more rugose; the spicules themselves are generally smooth; but some of them are more or less spinulose, with short acute tubercles. The fusiform spicules in the sarcod are abundant, very slender, slightly tapering and acute at each end; they vary greatly in length, but are always slender and smooth; they are generally straight, but some few are curved like a nearly expanded bow.

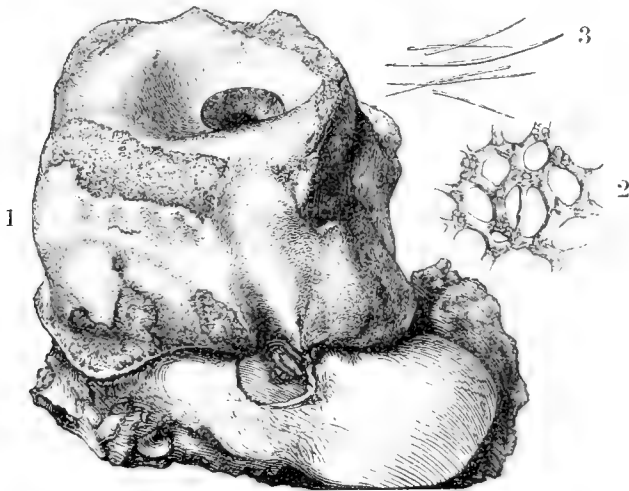


Fig. 1. *Theonella swinhoei*, nat. size.
 2. Network of ditto, magnified.
 3. Fusiform spicules of ditto, magnified.

THEONELLA SWINHOEI.

B.M.

Sponge thick, short, cup-shaped; base broad, expanded; the cup shallow, with a very thick edge; the outer surface covered with a rather smooth crustaceous coat, without any appearance of oscules.

Hab. Formosa (*Swinhoe*).

November 26, 1868.

Dr. Edward Hamilton, V.P., in the Chair.

Mr. P. L. Sclater called attention to the following recent noticeable additions to the Society's Menagerie:—

1. A female European Bison (*Bos bison*), bred in the Gardens of the Zoological Society of Amsterdam, and received in exchange from that Society November 6th.

2. A Monkey of the genus *Macacus*, deposited by Major C. Richards, of the Bengal Staff Corps, November 9th, having been captured at Dalamcote Fort, Bhootan, in December 1863. This animal appeared to be the *Macacus assamensis*, very shortly described by M'Clelland in his "List of Mammalia and Birds collected in Assam," in the Society's 'Proceedings' for 1839, p. 148. Whether it was the *Pithex oinops* or *P. pelops* of Hodgson (J. A. S. B. ix. p. 1212) could only be determined by an accurate examination of the animal when dead, and comparison of it with Hodgson's type specimens. It seemed, at all events, judging from the living animal,

to be specifically distinct from the common *Macacus rhesus*, having a pale flesh-coloured face, and longer, smaller, and much less densely furred tail.

3. Two White American Cranes (*Grus americana*), purchased of the Zoological Society of Antwerp, and received November 12th and 19th. These birds were in the brown immature plumage, in which stage they were not unlike the young of *Grus montignesia*, figured in the Society's 'Proceedings' for 1861, p. 369. Mr. Sclater remarked that the acquisition of this species raised the number of representatives of the family *Gruidæ* now or lately in the Society's Gardens to twelve in number, viz. :—

- | | |
|------------------------------|----------------------------------|
| 1. <i>Grus montignesia</i> . | 7. <i>Grus canadensis</i> . |
| 2. ——— <i>americana</i> . | 8. ——— <i>carunculata</i> . |
| 3. ——— <i>cinerea</i> . | 9. <i>Tetraptyx paradiseus</i> . |
| 4. ——— <i>leucogeranus</i> . | 10. <i>Balearica paxtonina</i> . |
| 5. ——— <i>antigone</i> . | 11. ——— <i>regulorum</i> . |
| 6. ——— <i>australis</i> . | 12. <i>Anthropoides virgo</i> . |

The only two well-determined species wanted to complete the series were *G. vipio* and *G. monachus* of Japan, of which the Society had never yet succeeded in acquiring specimens.

Mr. Sclater also remarked on the great difference in size between the two specimens of *G. canadensis* lately living in the Gardens, and stated his opinion that it was probably on a small specimen of this bird that Mr. Cassin had established his *Grus fraterculus*.

Mr. Sclater also called the attention of the Meeting to the two Eleonora Falcons (*Falco eleonoræ*) presented to the Society's collection by Capt. Thomas Waite on the 7th of October, and stated that, in reply to inquiries, Capt. Waite had favoured him with the following account of the exact locality in which these birds were procured :—“ I found these Falcons on the Island of Mogador. It is a very curious place ; and there are properly two islands and several detached rocks, but the whole extent is only about one-fourth by three-fourths of a mile. In height it does not exceed 100 feet ; and about half of it is very steep and craggy, and the rocks curiously honeycombed and forming natural holes and ledges, in which thousands of birds build and sleep—some sea-birds and Martins, but principally Pigeons. The favourite place with the birds is what we call the little island, which is nearly round, about 90 feet high and about one-fourth of a mile in diameter. When you get to the top you find it a mere shell, the centre being an immense basin, with perpendicular sides, a large archway at the north and south ends, through which the sea flows, and at high water you can get a boat inside. There is no water on the island, and the Pigeons go to the mainland in the daytime ; but I do not think the Falcons ever leave it.”

The following papers were read :—

1. On Peruvian Birds collected by Mr. Whitely. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.L.S.—Part III.*

A third small collection recently received from Mr. Whitely contains specimens obtained in the vicinity of Arequipa early in the present year. Mr. Whitely has now left the western coast-region, and, at the date of his last letters, was at Tinta, on a branch of the Vilcama-yu south-east of Cusco, whence he was intending to penetrate into the hot valley of Santa Ana, lower down the same stream.

The following species from Arequipa are contained in this collection:—

1. ANTHUS RUFUS.

See our remarks *anteà*, p. 173.

2. ATTICORA CYANOLEUCA.

See P. Z. S. 1867, p. 984.

3. PHRYGILUS PLEBEIUS, Tsch. F. P. *Aves*, p. 219, t. 19. fig. 1.

A pair of this *Phrygilus*, of which the female seems to be figured in the 'Fauna Peruana.' The species is closely allied to Sclater's *P. ocularis* (P. Z. S. 1858, p. 450), from Ecuador, but is distinguishable by its larger size, smaller bill, more distinct markings above, white colour below, and *black* tarsi. We may remark that Tschudi describes the tarsi as *brown*, but in both Mr. Whitely's skins they are black. Tschudi gives no exact locality for his species.

4. PHRYGILUS ALAUDINUS (Kittl.).

A nest of this species, taken near Arequipa in March, is in Mr. Whitely's collection. The nest is described as "made of coarse grass, lined with finer grass, and placed on the ground in fields of lucerne." The eggs, which have been already described by Mr. Yarrell (P. Z. S. 1843, p. 113), are very like those of our Yellow-Hammer (*Emberiza citrinella*).

5. SYCALIS CHLORIS, Cab. in Tsch. F. P. *Aves*, p. 216.

Two males, apparently of this species, which is nearly allied to *S. aureiventris* and *S. luteocephala*, but appears distinct from either.

6. MUSCISAXICOLA MACULIROSTRIS (Lafr. et d'Orb.).

Two examples of this species, which was originally obtained by d'Orbigny near La Paz in Bolivia.

7. ELAINEA ALBICEPS.

See *anteà*, p. 174.

8. THAUMASTURA CORA.

The nest of this species was taken near Arequipa, March 18th. It was placed in a prickly cactus.

* See Part I., P. Z. S. 1867, p. 982, and Part II., P. Z. S. 1868, p. 173.

9. RHODOPIS VESPERA.

The nest of this Humming-bird was also taken in March last, placed, like that of the last species, in a cactus.

10. ANTROSTOMUS ÆQUICAUDATUS.

Two skins of this species, concerning which see remarks, P. Z. S. 1867, pp. 342, 987.

11. CYPSELUS ANDICOLA (Lafr. et d'Orb.); d'Orb. Voy. Ois. p. 358, t. 42. fig. 2; Sclater, P. Z. S. 1865, p. 606.

Several skins of this highly interesting Swift, which we had only before seen in the British Museum.

Mr. Whitely having now left the western slope of the Andean range, it may be convenient to give a nominal list of species he has obtained in Western Peru, which are, altogether, eighty-three in number:—

I. PASSERES.

1. *Turdus chiguanco*.
2. *Troglodytes tessellatus*.
3. *Anthus rufus*.
4. *Hirundo andicola*.
5. *Atticora cyanoleuca*.
6. *Conirostrum cinereum*.
7. *Diglossa brunneiventris*.
8. *Tanagra darwini*.
9. *Pheucticus chrysogaster*.
10. *Spermophila telasco*.
11. *Volatinia jacarina*.
12. *Phrygilus atriceps*.
13. — *fruticeti*.
14. — *alaudinus*.
15. — *plebeius*.
16. — *speculifer*.
17. *Xenospingus concolor*.
18. *Zonotrichia pileata*.
19. *Chrysomitris capitalis*.
20. *Sycalis chloris*.
21. *Sturnella bellicosa*.
22. *Geositta cunicularia*.
23. *Cinclodes fuscus*.
24. — *nigrifumosus*.
25. *Synallaxis ægithaloides*.
26. — *orbignii*.
27. *Octhoëca leucophrys*.

28. *Muscisaxicola albifrons*.29. — *mentalis*.30. — *rubricapilla*.31. — *maculirostris*.32. *Centrites niger*.33. *Elainea albiceps*.34. *Myiobius rufescens*.35. *Pyrocephalus rubineus*.36. *Anæretes albocristatus*.

II. PICARIÆ.

37. *Ceryle cabanisi*.38. *Antrostomus æquicaudatus*.39. *Chordeiles peruvianus*.40. *Cypselus andicola*.41. *Oreotrochilus estellæ*.42. *Myrtis francescæ*.43. *Thaumastura coræ*.44. *Rhodopsis vesper*.45. *Metalura cupreicauda*.46. *Petasophora iolata*.47. *Patagona gigas*.48. *Crotophaga sulcirostris*.49. *Bolborhynchus orbignesi**.

III. ACCIPITRES.

50. *Cathartes aura*.51. *Milvago megalopterus*.

* The specimen determined (P. Z. S. 1867, p. 988) as probably *Conurus aurifrons* jr., is considered by Dr. Finsch, to whom it has since been shown, to belong to this species (cf. Finsch, Papag. ii. p. 129).

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|-------------------------------------|------------------------------------|
| 52. <i>Urubitinga uncinata.</i> | 66. <i>Charadrius virginicus.</i> |
| 53. <i>Buteo erythronotus.</i> | 67. <i>Ægialites vociferus.</i> |
| 54. <i>Hypotriorchis femoralis.</i> | 68. — <i>nivosus.</i> |
| 55. <i>Tinnunculus sparverius.</i> | 69. <i>Oreophilus ruficollis.</i> |
| 56. <i>Circus poliopterus.</i> | 70. <i>Thinocorus rumicivorus.</i> |
| 57. <i>Strix perlata.</i> | 71. — <i>orbignyianus.</i> |
| 58. <i>Glaucidium infuscatum.</i> | 72. <i>Calidris arenaria.</i> |
| 59. <i>Pholeoptynx cunicularia.</i> | 73. <i>Tringa bairdi.</i> |
| | 74. <i>Numerius hudsonicus.</i> |
| | 75. <i>Rallus rythirhynchus.</i> |
| | 76. <i>Gallinula galeata.</i> |
| | 77. <i>Fulica ardesiaca.</i> |

IV. COLUMBÆ.

60. *Zenaida auriculata.*
 61. *Metriopelia aymara.*
 62. *Chamæpelia erythrothorax.*
 63. — *cruziana.*

V. GALLINÆ.

64. *Tinamotis pentlandi.*

VI. GRALLÆ.

65. *Ædicnemus superciliaris.*

VII. ANSERES.

78. *Anas cristata.*
 79. *Querquedula oxyptera.*
 80. *Erisimatura ferruginea.*
 81. *Podilymbus antarcticus.*
 82. *Larus bonapartii.*
 83. — *belcheri.*

The most complete account yet given of the fauna of Western Peru is that of Tschudi, who, in his 'Fauna Peruana,' includes 101 species as inhabiting the three zones of elevation into which he divides the western slope of the Andes. Mr. Whitely's series, however, is sufficiently perfect to enable us to point out shortly some of the more salient features of this peculiar fauna, as compared with that of the corresponding eastern slope of the same range. These are:—

1. The extreme poverty of the avifauna in species—particularly in the Passeres and higher groups.

2. The entire absence of the great forest-loving families Formicariidæ, Cotingidæ, Galbulidæ, Momotidæ, Bucconidæ, Trogonidæ, Ramphastidæ, Capitonidæ, and Cracidæ, which form such characteristic features of the ornithology of every part of Eastern Tropical America.

3. The almost entire absence of the families Tanagridæ, Dendrocolaptidæ, Picidæ, and Psittacidæ, which are, for the most part, of similar habits. The Tanagridæ, so numerous in most parts of Tropical America, are represented by three or four species in Western Peru, the Dendrocolaptidæ by seven or eight species belonging mostly to peculiar genera. One Woodpecker (*Colaptes rupicola*) only is to be met with, and but two Parrots.

4. The most characteristic genera of this fauna are, perhaps, *Phrygilus*, *Xenospingus*, *Cinclodes*, *Muscisaxicola*, *Centrites*, *Muscigralla*, *Thinocorus*, and *Oreophilus*. Of these, *Xenospingus* and *Muscigralla* are monotypic forms peculiar to the district, whilst the remainder, with scarcely an exception, belong strictly to the Patagonian province of the Neotropical region, ranging, however, in many instances northwards along the higher plateaux of the Cordillera into New Granada, and affecting a greater elevation as they advance.





J. Smit lith

M & N Hanhart imp

HYPOCNEMIS HYPOXANTHA

2. Descriptions of some New or little-known Species of Formicarians. By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

(Plate XLIII.)

Having lately had occasion to look carefully through the specimens of Formicariidæ in my collection in order to identify some of the species described in the second part of Herr von Pelzeln's 'Ornithologie Brasiliens,' I have found amongst them examples of five well-marked species which appear to have been hitherto unnoticed, and of which I subjoin the descriptions, together with that of a species which seems to constitute a new genus in the family. These are:—

1. THAMNOPHILUS NIGRICEPS.

Supra brunneo-rufescens, interscapulio, alis extus et cauda tota saturate rufis; dorsi plumis laxis, elongatis, usque ad mediam caudam protensis, ad basin cinereis, juxta apicem rufescentibus: capite toto cum gutture et pectore nigris, plumarum scapis in pileo angustissime, in corpore inferiore latius, albo strigatis: subtus ex cinereo fulvus, hypochondriis et crisso rufescente perfusis, ventre medio sicut pectus striato: remigum marginibus internis cum subalaribus pallide fulvis: rostro nigricanti-plumbeo, pedibus fuscis: long. tota 6·0, alæ 3·0, caudæ 2·75, rostri a rictu 0·8, tarsi 0·9 (poll. Angl. et dec.).

Hab. in Nova Granada int.

Mus. P. L. S.

The single specimen of this bird in my collection was obtained out of a collection of Bogotá skins, and presented to me by Mr. Osbert Salvin. It is a small, rather weakly formed species, about the size of *Th. doliatus*, and but for its long tail might almost go with *Dysithamnus*. In colouring it is not very like any other known species, but is readily distinguishable by its black head and breast which are marked with white shaft-spots, and rufous wings and tail. The fourth, fifth, sixth, and seventh primaries are nearly equal and largest.

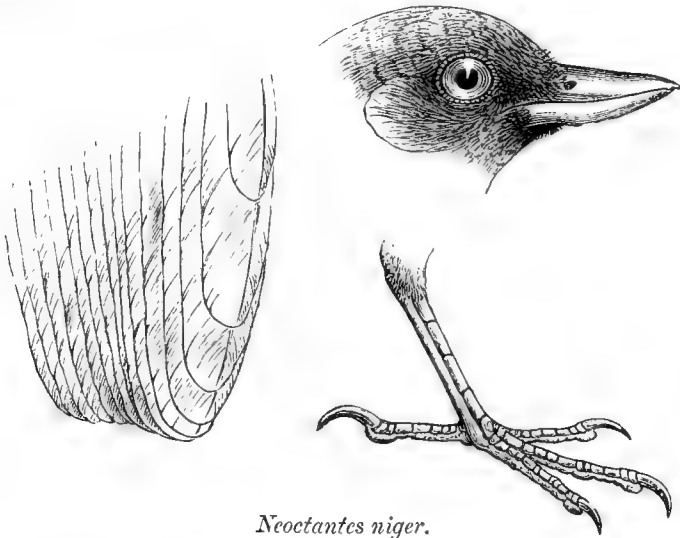
2. NEOCTANTES NIGER.

Xenops niger, Natt. MS.: Pelzeln, Sitz. K. Akad. Wiss. xxxiv. p. 111.

Pteroptochus niger, Pelzeln, Orn. Bras. p. 46.

This singular bird was originally described by Herr von Pelzeln as a *Xenops*, under the designation which it had received in Natterer's MS. In his recently published 'Ornithologie Brasiliens,' Herr von Pelzeln has removed it to the genus *Pteroptochus*; but a glance at the structure of the nostrils (which have no traces of the characteristic operculum of the Pteroptochidæ) is sufficient to show that this is not its natural position. For myself, I believe that it may be correctly removed to the Thamnophilinæ, with which it agrees in general structure, but that it must stand as the type of a new

genus in the neighbourhood of *Thamnistes*, which I propose to call *Neotantes**.



Neotantes niger.

Neotantes genus novum Thamnophilinarum. *Habitus generalis* Thamnophili, sed rostro compresso, subrecurvato differt. *Nares* patulæ. *Culmen* rectum, subdescendens, ad apicem paulum incurvum. *Tomiarum* linea parum ascendens. *Gonys* recurvus fortiter ascendens. *Alæ* breves, remigibus quinto sexto et septimo inter se fere æqualibus et longissimis. *Pedes* sicut in speciebus minoribus generis Thamnophili.

Typus et species unica N. niger.

♂. *Ater unicolor*: macula magna interscapulii celata alba: dorsi plumis laxis elongatis, ad basin nigricanti-cinereis: alis caudaque intus fusciscentibus, rectricum fasciis obsoletis vix apparentibus: rostro plumbeo, mandibula inferiore partim albicante, pedibus nigris: long. tota 6·0, alæ 2·9, caudæ 2·4, rostri a rictu 0·8, tarsi 0·9.

♀. *Mari similis*, sed magis in schistaceum vergens, pectore cinnamo-meo-rufa: plumis dorsi et pectoris ad basin griseo-albis; remigibus ultimis et rectricibus fasciis obscurioribus transversis, parum conspicuis, notatis.

Hab. Marabitanas, Rio Negro (*Natterer*).

Mus. Vindob. et P. L. S.

My collection contains a single imperfect skin of the male of this rare bird, received in exchange from the Vienna Museum. *Natterer* appears to be the only collector that has ever met with it.

3. CERCOMACRA NAPENSIS.

Cercomacra cinerascens, Sclater, P. Z. S. 1858, p. 245, et Cat. A. B. p. 184 (*err.*).

Cinerea unicolor, alis caudaque nigricantioribus, tectricibus alarum

* νέος (*novus*), et κτάνης (*occisor*).

et remigum marginibus externis dorso concoloribus: macula interscapulii celata et reetricum lateralium apicibus angustis albis; tetricibus subalaribus pallide cinereis: rostro nigro mandibula ad basin albicante, pedibus nigris: long. tota 5·5, alæ 2·6, caudæ 2·6, rostri a rictu 0·9, tarsi 0·8.

Hab. ad ripas fl. Napo, reipublicæ Æquatorialis.

Obs. A *Cercomacra cinerascens* alis omnino immaculatis et caudæ reetricibus angustius albis distinguenda.

Upon obtaining from Mr. E. Bartlett's collection specimens of the true *Cercomacra cinerascens* (which I had originally described, P. Z. S. 1857, p. 131, from skins in the British Museum) I at once recognized their complete distinctness from the present bird, and assigned to the latter the MS. name *napensis**. I have since purchased of a dealer a second example of this species, which by its make appears to be from Cayenne.

The absence of white markings on the wings will serve to distinguish this bird, not only from *C. cinerascens*, but also from its other allies, *C. cærulescens* and *C. tyrannina*.

4. HYPOCNEMIS HYPOXANTHA. (Plate XLIII.)

Supra olivacea; capite nigro, striga verticali elongata alba; loris et superciliis ad nucham productis flavis: alarum tetricibus nigris albo terminatis; cauda olivacea, reetricum apicibus nigricantibus albo terminatis; subtus sulphureo-flava, gutturis et pectoris lateribus parce nigro striolatis, hypochondriis virescentibus: rostro nigro, pedibus fuscis: long. tota 4·2, alæ 2·1, caudæ 1·7, rostri a rictu 0·7, tarsi 0·8.

Hab. in Amazonia superiore.

Mus. P. L. S.

Obs. Proxima *H. flavescens*, sed superciliis et corpore toto subtus sulphureo-flavis dignoscenda.

Of this well-marked species of *Hypocnemis* I have lately acquired a single specimen from a French dealer. Its colouring above closely resembles that of *H. flavescens* (Sclater, P. Z. S. 1864, p. 609); but the lengthened superciliaries are bright yellow like the breast, and the present bird has no trace of rufous on the flanks and belly. M. Jules Verreaux tells me that this species was obtained by D'Orbigny during his Bolivian travels; but it does not appear to have been noticed in the ornithology of that author's well-known 'Voyage.'

5. HETEROCNEMIS SIMPLEX.

Nigricanti-schistacea, alis caudaque fusco-nigricantibus, alarum tetricibus maculis parvis rotundis albis terminatis; subtus schistacea unicolor, medialiter paulo dilutior: rostro nigro, pedibus pallide fuscis: long. tota 6·2, alæ 2·7, caudæ 2·2, rostri a rictu 1·0, tarsi 1·1.

Hab. in Surinamo, ad ripas fl. Maroni (*C. Bartlett*).

I have a single indifferent skin of this Ant-Thrush, for which I

* Cf. P. Z. S. 1866, p. 186.

have long tried in vain to find a published description. It was obtained along with other birds by Mr. Clarence Bartlett, at Mr. Kappler's plantation on the Maroni River, Surinam, in 1866. It is rather a strongly built species, appearing to agree better with *Heterocnemis* than with any other genus, the divisions of the anterior scutes of the tarsus being quite obsolete. There are no traces of an interscapular spot.

I was at first inclined to think this might be the male of *Herpsilochmus argentatus* of Des Murs (*Myrmeciza*, sp. 1141 of my Catalogue), although it has a much longer tail. But it is certainly different from *Heterocnemis albiventris* of Pelzeln (Orn. Bras. p. 161), which Pelzeln supposes to be, and which probably is, the male of the bird in question.

6. CONOPOPHAGA GUTTURALIS.

Supra brunnescenti-olivacea, dorsi plumis quibusdam vix conspicue nigro marginatis: fasciculo postoculari albo: capite toto et corpore subtus ad imum pectus castaneis, plaga in gutture medio alba: ventre medio schistaceo, lateraliter olivaceo perfuso: rostro superiore nigro, inferiore flavo: pedibus corylinis: long. tota 4.5, alæ 2.8, caudæ 1.6, tarsi 1.1, rostri a rictu 0.8.

Hab. in Nov. Granada int.

I have a single "Bogotá" skin of this well-marked species, purchased of Mr. S. Stevens. In general aspect it comes nearest to *C. cucullata*, mihi (P. Z. S. 1856, p. 29, t. 119), which has a somewhat similar guttural spot; but that species has no postocular tuft, and a yellow bill. The present species has a white postocular tuft, as in *C. aurita*, and belongs to the first section of the genus as arranged P. Z. S. 1858, p. 284.

When I published my Catalogue of American Birds in 1862, my collection of Formicariidæ consisted of 280 skins referable to 145 different species. I have since added to it 101 skins, and have now 381 specimens belonging to 178 different species. The new species added since the catalogue was issued are:—

I. THAMNOPHILINÆ.

1. *Thamnophilus hollandi*, Lawr., ex Nicaragua.
2. *T. melanurus*, Gould, ex Peruv. orient.
3. *T. borbæ*, Pelz., ex fl. Madeira.
4. *T. cinereoniger*, Pelz., ex Rio Negro.
5. *T. luctuosus*, Licht., ex Pará.
6. *T. tschudii*, Pelz., ex fl. Madeira.
7. *T. murinus*, Sclater, ex Rio Negro.
8. *T. nigriceps*, Sclater, ex Nov. Granada int.
9. *T. tenuipunctatus*, Lafr., ex Æquat. et Nov. Granada.
10. *T. albicans* (Lafr.), ex Nov. Granada int.
11. *T. argentinus*, Cab., ex rep. Argentina.

12. *Neoctantes niger* (Pelz.), ex fl. Madeira.
 13. *Dysithamnus schistaceus*, Lafr. et d'Orb.*

II. FORMICIVORINÆ.

14. *Myrmotherula fulviventris*, Lawr., ex Panama et rep. Æquat.
 15. *M. hæmatonota*, Scl., ex Amazon. sup.
 16. *M. cinereiventris*, Scl., ex Cayenna et Amazonia.
 17. *M. unicolor*, Ménétr., ex Nov. Granada int.
 18. *Formicivora strigilata*, Max., ex Brasil.
 19. *Cercomacra cinerascens*, Sclater†, ex Peruv. orient.
 20. *Percnostola fortis*, Scl. et Salv., ex Peruv. orient.

III. FORMICARIINÆ.

21. *Heterocnemis simplex*, Sclater, ex Surinam.
 22. *Myrmeciza hemimelæna*, Scl., ex Amaz. sup.
 23. *M. immaculata*, Scl. et Salv., ex Panama.
 24. *Hypocnemis flavescens*, Scl., ex Rio Negro.
 25. *H. hypoxantha*, Scl., ex Amaz. sup.
 26. *H. melanura*, Scl. et Salv., ex Peruv. or.
 27. *H. hemileuca*, Scl. et Salv., ex Peruv. or.
 28. *Pithys bicolor*, Lawr., ex Panama.
 29. *Phlogopsis macleannani*, Lawr., ex Panama.
 30. *Formicarius hoffmanni*, Cab., ex Costa Rica.
 31. *Pittosoma michleri*, Cassin, ex Panama.
 32. *Grallaria hypoleuca*, Scl., ex Nov. Granad. int.
 33. *G. perspicillata*, Lawr., ex Panama.
 34. *Grallaricula costaricensis*, Lawr., ex Costa Rica.
 35. *G. nana* (Lafr.), ex Nov. Granad. int.
 36. *G. loricata*, Scl., ex Venezuela.
 37. *Conopophaga gutturalis*, Scl., ex Nov. Granad. int.

3. Notes on the *Ceratelladæ*, a family of Keratose Sponges.

By DR. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., &c.

There have been in the British-Museum collection for several years two plant-like sea-animals that I do not think have been described, the delay having been partly caused by the difficulty that existed in determining to what group of animals, if they were animals, they ought to be referred. They were temporarily placed in the collection with the Gorgonoid Corals; but a very cursory examination showed that they did not belong to that group; and though the surface of the

* The species called by this name in my American Cat. (no. 1087) has been since named *D. ardesiacus*, P. Z. S. 1867, p. 756.

† The bird thus termed in my Catalogue is *C. napensis*, mihi, *suprà*, p. 572.

smaller branches and the cell-like projections on their surface were covered with spines, they could scarcely belong to the "*Alcyoniens armés*" of M. Milne-Edwards, and they at once differed from all the known forms of that group of animals by the skeleton being formed of horn.

One naturalist to whom I showed them declared that they must be plants belonging to the Algæ. But this cannot be the case; they have none of the characters, except the mere external form of Algæ; and their external form is as like to that of some corals as to any genus of Algæ that I am acquainted with.

In general appearance they combine with their plant-like form some characters of the spicular alcyonoid polytypes, the texture of the very porous coral called *Porites*, and the horny consistence of the coarser horny sponges.

After very mature consideration, I am inclined to regard them, until their internal organization and growth is known, and the animal that forms them has been observed and described, as belonging to that very polymorphous group of animals which has been called Sponges. At the same time, I know no group of sponges with which they can be compared.

If they are sponges, they must be arranged with the keratose sponges; but, unlike all the known sponges of that group, they have a series of conical protuberances on the sides of the branchlets, which are developed as the branchlets grow in length, just as the cells of Alcyonoids and stony Madreporæ are developed by the budding of new cells from the bases of the last formed ones. The branches and these cells are all formed by the projecting terminations of the horny fibres.

The stem and older branches are formed of hard, horny, translucent fibres, of a nearly uniform cylindrical form, which are very closely united together into a horny network, with very small circular openings in all directions. This network is very like that found in the older parts of the genus *Porites* among the stony Madreporæ; but in that genus the network is hard and stony, in this it is hard, horny, and translucent. This hard horny network is very little softened by being soaked in water even for many hours.

The surface of the stem is either smooth and covered with a very large number of very minute, close, cylindrical canals, or with transverse ridges of a similar structure to the stem.

The upper branches and branchlets are chiefly composed of and covered with agglutinated, closely packed, projecting terminations of the horny fibres; and on the sides of the branches are placed, in a more or less regular manner, a number of small, short, conical or subcylindrical projections, formed of similar spiculum-like fibres, some of which project beyond the tips of the projections. These projections are placed on the side of the branchlet, which also terminates with a similar tuft of spines, the branchlet increasing in length by the development of new tufts or cells from the base of the old one.

The texture of the stem and branches would lead one to suppose that the entire coral or sponge is covered with sarcode or flesh in the living state, as in *Porites* and most sponges. True there is not the

slightest indication of such a covering to be observed in any of the specimens I have examined ; but that is also the case in the *Porites* and sponges that are generally found in collections.

The younger parts of these plant-like animals are formed of agglutinated, free, horny, projecting fibres, and the older parts of keratose network ; so that it is probable that, as part of the animal becomes old, or only required for the support of the young or more lately developed portion, the projecting portions become gradually transformed into a horny network.

I have not been able to discover, in the very cursory microscopic examination of these specimens which the state of my eyes will allow me to make, any appearance of aquiferous canals in the stem or branches, such as one might expect to exist if they are sponges, or if the prominences on the branches are oscules ; nor have I been able to observe any indications of any lamellar star-like cavities either in the prominences or cells on the branches, or in the substance of the stems or branches, which ought to be there if they are madreporic corals allied to *Porites*, even supposing that a horny coral does exist ; and a horny madreporic coral would be a very aberrant form. A sponge has been described under the name of *Darwinella* which is said to be made up of horny spicules ; but I have not seen this sponge, and do not know the remainder of its structure.

I have requested Mr. M. E. Cooke to undertake to examine the microscopic structure of these specimens, which the state of my eyes will not allow me to attempt. He states that he has not been able to discover any siliceous spicules.

The absence of any lacunæ in the structure of the stem or branches, or communication with the cell for the circulation of the water, which ought, according to the idea of its being a sponge, to be emitted by the cell-like oscules (and the regular development of the cell is much more like the budding of a fully developed polype than the growth of a Protozoon or sponge), leads one to doubt its proper arrangement with them. At the same time, the want of the cylindrical cells for the bodies of the actinoid polypes is equally repugnant to the idea of its being a horny madreporoid coral.

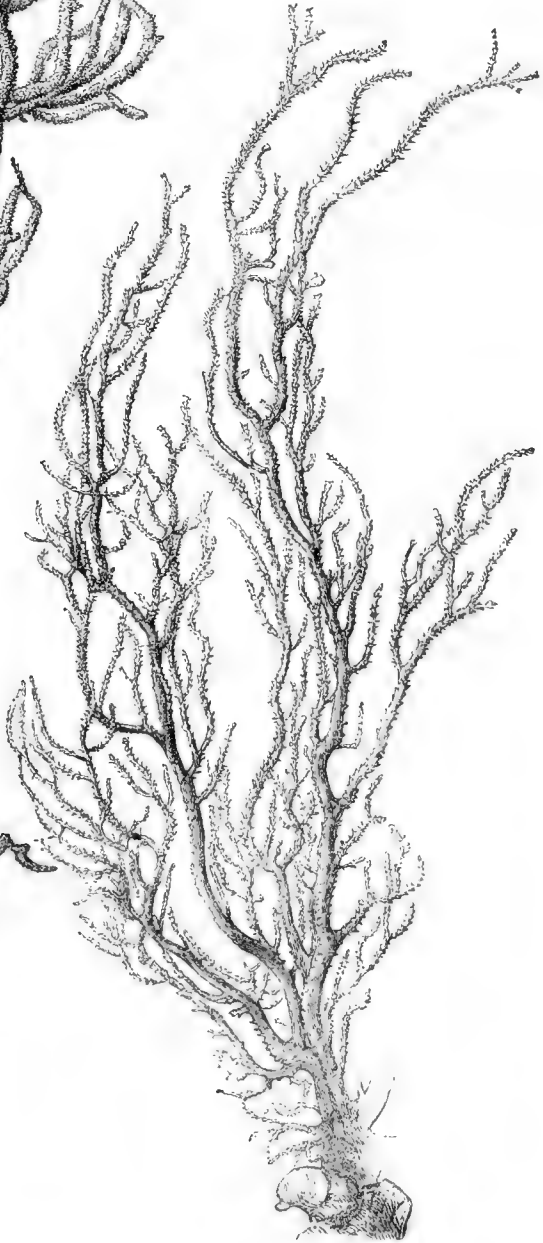
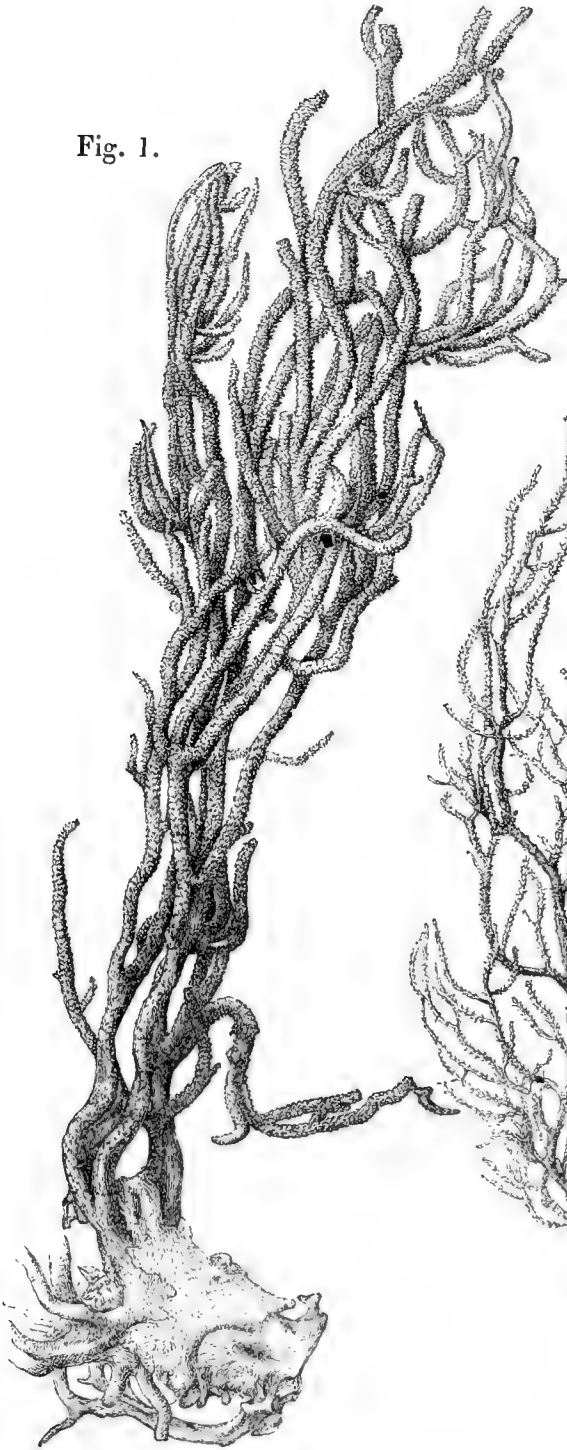
There can be no doubt that though the two specimens of these animals which I have examined are sufficiently different from each other in structure and growth to be regarded as belonging to two genera, yet they are so allied as to form a single family, which I propose to call CERATELLADÆ. The family may be characterized by the details which I have already given of their structure.

CERATELLA.

Sponge or coral irregularly dichotomously branched, more or less expanded on a plane from a single base ; of a dark brown colour, of a uniform, hard, horny substance ; stem hard, dark brown, solid ; base dilated, rather compressed, of a uniform rigid somewhat spongy texture, with a velvety surface, which is formed of an abundance of very minute, cylindrical, tortuous grooves. The branches and branchlets tapering, formed of a very large quantity of nearly parallel,

Fig. 1.

Fig. 2.



Dehitella atrorubens.

Ceratella fusca.





paler brown, projecting, horny points, divergent at the ends, and producing a spinulose surface. The branchlets tapering to a point, with a series of acute divergent tufts of spicules on each side (oscles or cells), with a small circular mouth below the produced acute outer edge of the tufts of spicules; one of the tufts is placed at the end of the branchlet, and the tufts seem to be produced at the base of the previously formed tufts.

CERATELLA FUSCA. (Fig. 2, p. 578.)

B.M.

Coral expanded, fan-shaped, forming an oblong frond; branches divergent from the base, with numerous lateral, subalternate, subdichotomous branches; similar but smaller lateral branchlets.

Hab. Australia, New South Wales, at the head of Bondy Bay.

2. DEHITELLA.

Sponge or coral dichotomously branched, expanded, growing on a large tuft from a broad, tortuous, creeping base, of a dark brown colour, and uniform hard rigid substance. Stem hard, cylindrical, opaque, smooth; branches and branchlets tapering to a point, cylindrical, covered with tufts of projecting horny spines on every side; those on the branches often placed in sharp-edged, narrow, transverse ridges; those of the upper branches and branchlets close but isolated, and divergent from the surface at nearly right angles.

This genus is distinguishable from *Ceratella* by the greater thickness and cylindrical form of the stem, by the more tufted and irregular manner of growth, and by the tufts of spicules (oscles or cells) being more abundant and equally dispersed on all sides of the branches and branchlets.

DEHITELLA ATRORUBENS. (Fig. 1, p. 578.)

B.M.

Hab. Australia?

4. Description of a New Species of the Genus *Leucosticte*.

By THOMAS SALVADORI, M.D., C.M.Z.S.

(Plate XLIV.)

LEUCOSTICTE GIGLIOLII, sp. nov. (Plate XLIV.)

Leucosticte fusco-purpurascens; pileo, gula et pectore fusco-griseo-sericeis; pilei ac pectoris plumis obscure marginatis; plumis nasalibus et regionibus ante et supra oculos rubescentibus; cervice sordide griseo-rufescente, dorso et scapularibus brunneis vix rubescente tinctis, uropygio magis rubro; supra-caudalibus nigricantibus apice obscure rubescentibus, ultimis nigris griseo tinctis; abdomine fusco-rufescente; subcaudalibus nigricantibus; alis nigricantibus, remigibus subtilissime rufescente limbatis, tectricibus alarum minoribus subtilissime rubro marginatis; subalaribus intense plumbeis; cauda nigri-

cante parum griseo tincta; rostro flavo, apice fusco; pedibus cum unguibus nigris.

Long. tot. 0^m·175, al. 0^m·113, caud. 0^m·078, rostri culm. 0^m·011, tarsi 0^m·020.

Hab. Dauria.

Mus. Turatiano Mediolani.

I have examined two specimens of this species. One is slightly less in its dimensions than those given above, and is rather darker both on its upper and on its under parts; the tail and upper tail-coverts are also more blackish.

This species has, in common with *L. arctoa*, the frontal feathers tinged with dark red; but it differs from it in not having the rectrices, remiges, upper and under tail-coverts white mixed with grey.

In its mode of coloration it is more nearly allied to *L. griseinucha*, *L. tephrocotis*, *L. brandti*, and more particularly to *L. brunneinucha*; but from all the above species it may at once be distinguished by the dark red colour of its frontal feathers.

I have named this bird after my friend Dr. Henry Giglioli, lately scientific officer on board the Italian frigate 'Magenta,' whose researches in divers branches of natural history will highly interest the scientific world.

With this one the known species of the genus *Leucosticte* will stand as follows—

| | |
|---------------------------------------|--------------------------------|
| <i>Leucosticte tephrocotis</i> , Sw., | <i>L. hæmatopygia</i> (Gould), |
| <i>L. griseinucha</i> (Brandt), | <i>L. brandti</i> , Bp., |
| <i>L. brunneinucha</i> (Brandt), | <i>L. arctoa</i> (Pall.); |
| <i>L. gigliolii</i> , mihi, | |

while to the restricted genus *Montifringilla* are to be referred, with more propriety, the following three species:—

| | |
|-------------------------------------|---------------------------|
| <i>Montifringilla nivalis</i> (L.). | <i>M. adamsi</i> , Moore. |
| <i>M. gebleri</i> (Brandt). | |

Dr. F. Stoliczka, of the Geological Survey of India, has recently, in his "Ornithological Observations in the Sutlej Valley, N.W. Himalaya," p. 62 (Journ. As. Soc. Beng. xxxv. 1868), spoken of another species of *Montifringilla* (*Leucosticte*?) not yet described, which is only to be found in Ladak, and of which he possesses a single specimen.

5. Observations on Indian Fishes.

By FRANCIS DAY, F.Z.S., F.L.S.

During the last year I have abstained as much as possible from remarking upon the Cyprinidæ, being aware that Dr. Günther, F.R.S., was engaged upon this family. Having now received the seventh volume of his catalogue of the fishes of the British Museum, I propose offering some observations upon a few species apparently new. In doing this I shall follow the nomenclature adopted by

Dr. Günther for families and genera, confining my remarks to species.

Commencing with the genus *Barbus*, representatives of it exist in Southern India in almost every tank or river. These fishes are very valuable as food, though some are more bony than others. The various species termed "Mahseers" belong to this genus; a few of them attain a very large size.

In the Madras Presidency the following appears to be the relative economic value of the Barbels, subdividing them by the number, presence, or absence of their appendages. I have not perceived any variations in the species in this respect, except in the *Barbus neilli*, wherein one barbel was divided into three at its external extremity.

All or nearly all those fish having *four barbels* in the Madras Presidency, provided they are soberly coloured, and either have or are deficient in the lateral blotch, grow to a large size. The brilliantly coloured ones are mostly residents of mountain-streams, or of rivers contiguous to hills, and they are generally small.

Those with *two barbels* never grow to the large size attained by those with four. They are extensively distributed; and some, especially when living in mountain-streams, have brilliant colours.

Those *without barbels* are mostly of small size; some of them have a vivid coloration.

These facts are, or should be, important considerations in India with respect to stocking new pieces of water; for when large species are required those which have four barbels should be selected, irrespective of the consideration as to whether they have a serrated or smooth dorsal spine.

In the Madras Presidency the "Tamil" name for a Carp is "Candee meen" or "Carpfish," but with numerous prefixes to it, differing in different localities, in fact changing about as the thought strikes the native who is being interrogated. Thus the *Barbus (Leuciscus) filamentosus*, Cuv. & Val., having a red tail, is called "Saal Candee" or "red-tailed Carp;" the *Chela*, from its brilliant white colour, the "Vella Candee" or "white Carp;" the *Barilius*, from living in rivers, the "Aart Candee" or "river Carp." Having premised this, which shows the general inaccuracy of native names, I have still, however, given them when obtained; but their designations are more generic than specific, or, rather, more family ones than either.

BARBUS NEILLI, sp. nov.

B. iii. D. $\frac{4}{5}$. P. 15. V. 10. A. $\frac{3}{5}$. L. l. 24-26. L. tr. $\frac{4\frac{1}{2}}{4}$.

Length of specimens from 4 to 36 inches.

Length of head $\frac{2}{9}$, of pectoral $\frac{1}{6}$, of base of dorsal $\frac{1}{9}$, of base of anal $\frac{1}{11}$, of caudal $\frac{1}{5}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{3}$, of dorsal fin $\frac{1}{11}$, of ventral $\frac{1}{7}$, of anal $\frac{1}{11}$ of the total length.

Eyes nearly circular, upper margin near the profile; diameter from $\frac{2}{9}$ to $\frac{1}{5}$ of length of head, $1\frac{1}{2}$ diameter apart and the same distance from end of snout.

Head slightly pointed and compressed at the snout.

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Cleft of mouth extending but little more than half the distance to beneath the anterior margin of the orbit, but the posterior extremity of the maxilla to nearly below the same margin. Lower jaw slightly the shortest. Nasal barbels extend to the anterior margin of the orbit; the maxillary barbels are equal to $1\frac{1}{2}$ diameter of the orbit in length. In the largest preserved specimen one of these barbels is subdivided into three at its external extremity. In one moderate-sized specimen a number of glands open along its suborbital ring of bones.

Pharyngeal teeth curved, short, 5, 3, $2\frac{1}{2}$, 3, 5.

Fins. Dorsal arises slightly in advance of ventrals; first two undivided rays osseous but minute, third not half so long as fourth, which is moderately bony, smooth, ends in an articulated extremity, and is then as long as the first branched ray. Upper margin of the fin concave. Pectoral extends to ventral, which does not extend, by the width of two scales, to the anal, which last fin commences midway between the extremity of the caudal and base of the pectoral; its first undivided ray minute, its third as long as the first branched one. Anal laid flat reaches the base of the caudal. Caudal almost lunated, its central rays almost equal to the longest of the outer rows.

Scales. Four and a half rows between lateral line and base of dorsal fin, and two and a half between lateral line and base of ventral.

Lateral line in single tubes, curves very slightly downwards, and opposite the end of the ventral proceeds direct to centre of base of caudal fin.

Colours. Silvery above lateral line, and with a dash of yellow below it. Fins of a bluish tinge, especially the caudal. Eyes golden.

This magnificent Carp grows to a very large size: one was brought weighing 38 pounds; and its size may be imagined when the specimen 39 inches long did not weigh 14 pounds. It is said to grow to 50 or 60 pounds weight, and is very common at Kurnool, where it is esteemed as food by the natives. It is one of the Mahseers of India.

I have named it after my esteemed friend and correspondent A. C. Brisbane Neill, Esq., F.Z.S.

BARBUS GUENTHERI, sp. nov.

B. iii. D. $4\frac{1}{9}$. P. 15. V. 9. A. $3\frac{1}{5}$. C. 19. L. 1. 42. L. tr. $10\frac{1}{6}$.

Length of specimens from 2 to $5\frac{2}{10}$ inches.

Length of head a little above $\frac{1}{5}$, of pectoral $\frac{1}{6}$, of caudal $\frac{2}{7}$, of base of dorsal $\frac{1}{8}$, of base of anal $\frac{1}{15}$ of the total length. Height of head $\frac{1}{7}$, of body $\frac{1}{4}$, of dorsal fin $\frac{1}{4}$, of ventral $\frac{1}{6}$, of anal $\frac{1}{6}$ of the total length.

Eyes. Upper margin near the profile; diameter $\frac{1}{3}$ of length of head, 1 diameter from end of snout, and 1 diameter apart.

Body rather compressed; a considerable rise in the profile from the occiput to dorsal fin. Snout somewhat obtuse.

Lower jaw slightly shorter than the upper; the posterior extremity of the maxilla extends nearly to beneath the anterior margin of the orbit. The maxillary cirri are equal to the diameter of the orbit in length, extending to slightly beyond its centre. The superior

margin of præorbital bone its longest. Operculum one-third higher than broad.

Teeth. Pharyngeal teeth crooked, pointed, in three rows, 5, 3, 2/2, 3, 5.

Fins. Dorsal commences slightly in advance of the ventral, and midway between snout and base of caudal; its first two undivided rays are very short; the fourth is cartilaginous and articulated, in large specimens it becomes osseous, but is never strong. Anal begins midway between the posterior extremity of operculum and the posterior extremity of the caudal fin, which last is deeply lobed.

Scales with numerous horizontal striæ; there is an exceedingly low row along the base of the dorsal fin, and one hardly higher along the base of the anal.

Lateral line curves downwards along the first six or seven scales, when it becomes straight and passes along the middle of the side of the body.

Colours. Silvery, with a tinge of yellow, but without any spots or markings.

Hab. Kurnool, where it is exceedingly common in both the Hindree and Tamboodra rivers. It grows to upwards of a foot in length, and is esteemed good eating by the natives, but, like the rest of its genus, is bony.

I have named this species after Dr. A. Günther, F.R.S., who was good enough to point out that the name that I had originally given to it was preoccupied.

BARBUS AMBASSIS, sp. nov.

B. iii. D. $\frac{3}{8}$. P. 11. V. 9. A. 2/5. C. 19. L. 1. 36.

Length of specimens to $2\frac{3}{10}$ inches.

Length of head $\frac{2}{11}$, of base of dorsal $\frac{1}{9}$, of base of anal $\frac{2}{11}$, of caudal $\frac{1}{4}$ of the total length. Height of the head $\frac{2}{11}$, of body $\frac{2}{7}$, of dorsal $\frac{2}{11}$, of ventral $\frac{2}{11}$, of anal $\frac{1}{7}$ of the total length.

Eyes without any adipose lids; nearly $\frac{2}{5}$ of length of head, 1 diameter apart, $\frac{1}{2}$ a diameter from end of snout.

Opening of mouth oval; upper jaw slightly the longest; no horny covering to the lips, which are thin. Maxilla extending to nearly beneath the anterior margin of the orbit. Suborbital ring of bones covers the cheek. No barbels.

Pharyngeal teeth sharp, curved, 5, 3, 2/2, 3, 5.

Fins. Dorsal arises slightly anterior to the ventral, midway between snout and the base of the caudal; its third undivided ray is very strong, flattened, and strongly serrated posteriorly, having about fifteen sharp teeth; superiorly it ends in a soft point. Anal arises midway between the snout and the posterior extremity of the caudal fin, which last is deeply lobed. The pectoral scarcely reaches the ventral, which latter just extends to the anal.

Scales small, very deciduous. Six rows between the lateral line and the base of the ventral fin. No enlarged row along the base of the anal fin.

Lateral line in a single tube in each scale, but only distinctly apparent in the anterior third of the body; still a rudiment of it is perceptible at irregular intervals as far as the centre of the base of the caudal fin. A small row along the base of the dorsal fin.

Colours. Light greenish superiorly, becoming white along the abdomen. A brilliant broad silvery band extends from the eye along the side to the root of the caudal fin. A small black spot is present at the base of the dorsal fin at its anterior margin, and a large black finger-mark at the root of the tail. The coloration is essentially that of an *Ambassis*.

This elegant little fish does not seem to grow to any large size. At Kurnool, in October, females 2 inches in length were found full of ova.

Hab. Kurnool, in Madras; some specimens have also been received from Arcot, showing that its geographical range is wide.

This fish cannot be looked upon as a typical *Barbus*, but approaches that genus, as defined by Dr. Günther, more nearly than any other.

BARBUS NASHII, sp. nov.

B. iii. D. 3/11. P. 15. A. 3/5. C. 19. L. l. 41. L. tr. $\frac{7\frac{1}{2}}{4\frac{1}{2}}$.

Length of specimens up to $3\frac{2}{10}$ inches.

Length of head $\frac{1}{5}$, of pectoral $\frac{1}{5}$, of base of dorsal $\frac{1}{5}$, of base of anal $\frac{1}{6}$, of caudal $\frac{2}{9}$ of the total length. Height of head $\frac{1}{8}$, of body $\frac{1}{5}$, of dorsal fin $\frac{1}{6}$, of anal $\frac{1}{6}$ of the total length.

Eyes without any adipose lid; diameter $\frac{1}{3}$ of length of head, 1 diameter from end of snout, $1\frac{1}{4}$ diameter apart.

Mouth antero-inferior; there is a slight thickening of the mucous membrane covering the jaws, but not sufficient to be termed horny; in fact it would be scarcely apparent were it not that it is of a dark colour; if the species grows much larger, which is doubtful, it may become horny. Lips thin, not fringed, no lateral lobe, no tubercle on symphysis, nor pores on the snout. No barbels.

Pharyngeal teeth crooked, sharp, 5, 4, $\frac{3}{3}$, 4, 5.

Fins. Dorsal arises slightly in advance of the ventral, but does not extend so far as to above the commencement of the anal; the upper margin of the fin slightly concave, its third undivided ray articulated and weak. Caudal deeply forked.

Scales. No enlarged ones along the base of the anal fin.

Lateral line proceeds direct to the centre of the base of the caudal fin.

Colours. Reddish brown along the back, and silvery over the abdomen. A black band passes from the eye to the centre of the base of the caudal fin. Fins whitish. A dark band along the middle third of the dorsal, and a dark edging to the caudal.

This very pretty little fish was collected for me, amongst others, from the Fraserpett river, at the base of the Coorg Hills. Judging from its coloration, it is a small species and only found in hilly regions or along their bases.

I have named it after Dr. Nash, to whom I am indebted for many specimens from the Coorg district.

BARBUS (PUNTIUS) MELANAMPYX, Day.

This species Dr. Günther* considers identical with *Barbus (Puntius) grayi*, Day, and *Barbus (Systomus) arulius*, Jerdon.

Whether my *B. grayi* is merely a variety of *B. melanampyx* I am unable to be quite decided about, not having a specimen of the latter at hand to compare with; but it certainly is not identical with the *B. arulius*, as I shall presently show. Dr. Jerdon observes, "I know your *Puntius melanampyx* well; I noticed it in my catalogue as *Cirrhinus fasciatus*." This fish Dr. Günther has placed as a *Tylognathus* (p. 62) amongst the doubtful species. But the specific name *fasciatus* is occupied by a species of Dr. Bleeker's †.

As regards the differences between the *Barbus grayi* and *B. arulius*, some easily recognized ones are as follows:—

B. grayi. D. 3/7–8. A. 2/5–6. L. l. 20. Four barbels. Lateral line first curves very slightly downwards and then rises opposite to the commencement of the dorsal fin. Caudal lobed in its outer third or, even, half.

B. arulius. D. 3/8–9. A. 2/5. L. l. 23. No barbels. Lateral line curves directly downwards to above the ventral fin. Caudal deeply emarginated in its posterior three-fourths. The rise from the snout to the dorsal is great in the *B. grayi*, but slight in the *B. arulius*.

Having been unexpectedly directed to visit the various "anicuts" or weirs in the rivers of the Madras Presidency, for the purpose of ascertaining whether they are or are not causing destruction to the freshwater fisheries, I must defer the continuation of this paper until after my return.

6. Some remarks on the New Genus *Macrobrachium* of Mr. Spence Bate. By Dr. C. SEMPER.

The second number of the 'Proceedings of the Zoological Society' of 1868 contains an article by Mr. Spence Bate on a new genus of freshwater Crustaceans. Having had the opportunity of examining the original specimens of two of Mr. Bate's so-called new species, I found, to my great astonishment, that certainly two, if not three, of these new species are well known, and have been repeatedly figured and described.

Macrobrachium americanum, Spence Bate, from Lake Amatitlan, is identical with *Palæmon jamaicensis*, Herbst. To my knowledge, Sir Hans Sloane ‡ is the first author who described and figured this crustacean from Jamaica, as early as 1725; and Parra § described it in 1787 as "*Camaron de agua dulce*." Leach, in his 'Zoological Miscellany,' repeats that it lives in fresh water; but Milne-Edwards

* Catalogue of Fishes, vii. p. 133.

† Günther's Catalogue, vii. p. 122.

‡ A Voyage to the Islands Madera &c., 1725, vol. ii. p. 271, t. 245. fig. 2.

§ Description de diferentes piezas de historia natural &c., 1787, p. 154, t. 55. fig. 2.

omits this fact and simply mentions the Antilles as its home. In the British Museum are numerous specimens of different sizes from Brazil, the West Indies, Surinam, British Guiana, Bahia, and the Isles of Cape Verde. The specimens from Surinam and British Guiana came from fresh water. The only difference between the younger and smaller specimens and the larger ones is that the spines on the legs of the latter are replaced by tubercula; besides they lack the two or three large teeth on the inside of the digits which are found in the extraordinarily large specimens from Lake Amatitlan. Even Milne-Edwards mentions, in his well-known handbook, that these teeth are exclusively found in the oldest individuals—a statement which seems to have escaped Mr. Spence Bate.

Macrobrachium formosense, Spence Bate, is probably only a variety of the well-known *Palæmon ornatus*, Olivier. This species is found distributed from the East Indies, over the Malaccas and Philippine Islands, as far as Australia and the Fiji Islands in the Pacific. I found it myself only in fresh water in the Philippines. The specimens in the British Museum from the Fiji Islands and Australia are also from fresh water.

Macrobrachium longidigitum, Spence Bate, I cannot at present identify with any species known to me; it may therefore pass as a new species.

Macrobrachium africanum, Spence Bate, is one of those unfortunate creatures which nearly every naturalist has declared to be new without even comparing it with other allied species. It is the old *Palæmon gaudichaudii*, Olivier, well figured by d'Orbigny*, 1843. Two specimens of this species with the original labels of Stimpson are in the British Museum; and these, though smaller, so completely correspond with Mr. Spence Bate's original specimens from the Tambo River that their specific identity cannot be doubted. Poëppig † described (1836) the same species from the river "Aconcagua" in Chile, under the name of *Palæmon cæmentarius*. His description is so careful and exact that no doubt can prevail. Later, Philippi ‡, having obtained the same species from the river "La Ligua" in Chile, founded upon it his genus *Bithynis* with the species *longimana*. The only distinction he could find between this new genus and *Palæmon* was the extremely short rostrum. On the other hand, Mr. Spence Bate, in setting up his genus *Macrobrachium*, attaches great importance to the long arms, but forgets that the species in question has shorter arms than other species of *Palæmon* (as, for instance, *Palæmon carcinus*, Fabr., which also lives in fresh water), and that between these species with very long and others with very short arms all possible transitions are to be found. Both gentlemen, however, entirely overlook another characteristic which seems to be of importance with regard to the subgenus *Leander*. It is the absence of a second spine behind or under the marginal spine of the thorax. If I remember right, Heller mentions somewhere that the species of the genus *Leander*,

* Voyage dans l'Amérique méridion. &c., tome vi. p. 37, pl. 17. fig. 2.

† Archiv f. Naturgesch. 1836, Bd. i. pp. 143-145.

‡ Archiv f. Naturgesch. 1860, Bd. i. pp. 161-164.

which have two spines on the anterior rim of the thorax, are marine, while those of the genus *Palæmon*, with the two spines of the thorax placed one behind the other, are exclusively freshwater forms. This is decidedly wrong, according to my own observations in the Philippines. There are genuine species of *Palæmon* and *Leander* in the sea as well as in rivers and lakes. Philippi's genus *Bithynis*, with only *one* spine on the anterior rim, may therefore be considered a third subgenus of *Palæmon*. The synonymy of this species is therefore as follows:—

Palæmon gaudichaudii, Olivier.

Palæmon cæmentarius, Poeppig.

Bithynis longimana, Philippi.

Macrobrachium africanum, Spence Bate.

I am very glad that I need not change the latter name, which I should be obliged to do if it really were a new species. Mr. Spence Bate seems to be of opinion that the Tambo River is in Africa, whereas it is really on the west coast of South America, near Islay in Peru. The original specimens were collected there by Mr. Whitely.

When Mr. Spence Bate expresses the opinion that all the four species of his supposed new genus have descended from one single primitive form, the reasons which he alleges in favour of this view are not convincing. My own observations in the Philippines make me rather doubtful of the alleged fact that only one particular and no other Palæmonide inhabits each river and lake.

The new genus of Mr. Spence Bate must therefore be suppressed, and also three of his supposed new species. It is not a new fact that these large species of *Palæmon* can be eaten, nor that they live in fresh water. The older naturalists, as Sloane, Parra, Leach, Poeppig, and Philippi, knew it long ago, as may be seen from their writings.

7. On the Genus *Ceyx*.

By R. B. SHARPE.

It seems necessary to say a few words on this genus, as considerable confusion still exists with regard to the correct determination of some of the species; and I am further anxious to set right a point in the synonymy of two of them, by which I myself, in my 'Monograph of the *Alcedinidæ*,' as well as other ornithologists, have been led into error.

The genus *Ceyx* was established in 1801, by Lacépède, and the species included in it have only three toes. The birds seem principally insectivorous, in contrast to the members of the three-toed genus *Alcyone*, the species of which are closely allied to true *Alcedo*, and are almost wholly piscivorous. All the members of the genus *Ceyx* seem occasionally to feed on fish, but are not generally found in the neighbourhood of streams. In their general habits they are allied to the African *Ispidinæ*.

The genus *Ceyx* may be divided into two natural sections, viz.

(1) those species having the head and rump lilac-rufous, and (2) those of which the heads are black, spotted or banded with blue. The latter section may again be divided into species which have the beak red, and those which have it black. The following synoptic table will, I think, satisfactorily set forth the distinctive characters of each species:—

- A. Capite et uropygio lilacinis: rostro corallino.
- a. Macula ad latera colli cærulea nulla.
- a'. Scapularibus lilacino-rufis 1. *C. rufidorsa*.
- b'. Scapularibus nigris cæruleo lavatis 2. *C. dillwynii*.
- b. Macula ad latera colli cærulea.
- a'. Major: capite lilacino obscuriore maculato: interscapulio et scapularibus rufis: pectore pulchre violaceo lavato 3. *C. melanura*.
- b'. Minor: interscapulio et scapularibus nigris cyaneo maculatis: subtus flava 4. *C. tridactyla*.
- B. Capite nigro, cæruleo aut cyaneo maculato: dorso postico et uropygio cyaneis, ultramarinis, aut argenteo-cæruleis.
- a. Rostro corallino.
- a'. Rostro brevior: genis et regione parotica nigris: dorso postico et uropygio argenteo-cæruleis..... 5. *C. cajeli*.
- b'. Rostro longior: genis et regione parotica cyaneo aut cæruleo maculatis: dorso postico et uropygio cyaneis aut ultramarinis.
- a''. Scapularibus nigris: dorso postico et uropygio læte cyaneis 6. *C. wallacii*.
- b''. Scapularibus cæruleo lavatis: dorso postico ultramarino; uropygio cyanescente.
- a'''. Major: rostro robustior: maculis lorilibus majoribus: capitis summi maculis et interscapulio cærulescentioribus... 7. *C. lepida*.
- b'''. Minor: subtus intense aurantia: uropygio læte argentescente.. 8. *C. uropygialis*.
- b. Rostro nigro: capite cyaneo fasciato.
- a'. Major: pectore et abdomine intense rufis ... 9. *C. philippinensis*.
- b'. Minor: pectore et abdomine flavis: gula alba 10. *C. solitaria*.

There are in the Indian Region two rufous-headed species of *Ceyx*, one of which has the whole back lilac-rufous, while the other has the middle of the back and scapularies black washed with blue; I propose to call them, for the sake of illustration, the rufous-backed and the blue-backed species respectively. These two birds are sufficiently distinct, but nevertheless they were placed together by all the old writers as being sexes or varieties of one species. The first description and figure of these birds we find in an old Dutch work, by Vosmaer, printed at Amsterdam in 1768. The Zoological Society have just acquired for their library a copy of this rare work, and we find therein the following paper:—"Beschryving van twee zeer fraaie, kortstaartige oost-Indische Ys-vogeltjes," accompanied by a full description and a coloured plate. The upper figure in this plate represents the blue-backed, and the lower figure the red-backed species.

The next mention we find made of these birds is by Pallas in 1769, one year after Vosmaer's description. In the 6th fasc. of his 'Spicilegia' we find a description of *Alcedo tridactyla*, which description I here append.

"*Vertex ferrugineus, violaceo nitens; frons ad latera dilutiôr. Genæ et tota subtus avis e croceo lactei coloris; præter gulam prorsus albam. Temporum macula lazurea, infraque eam longitudinalis, alba. Interscapulium lazereum, alares plumæ tantum apicibus. Uropygium ferrugineo-violaceum.*

"*Remiges ferrugineo nigricantes, interiorum quædam margine exterioriore ferrugineæ. Cauda brevis, rotundata, ferruginea.*

"*Pedes albidî, ut rostrum, etc. Unguiculi albicantes.*

"*Varietas, ut puto, fæminæ, supra tota jucunde ferruginea, alaribus quoque plumis; remigumque, præter extimis, margine. Vertex, uropygium, extremaque aliquot plumarum dorsalium violaceo nitore perfusa. Pectus magis quam in altera ferrugineum, abdomen albidius. Cærulea temporum areola deficiens."*

It will thus be seen that Pallas considers the red-backed bird to be a variety of his *Alcedo tridactyla*.

In 1771 we find that Linnæus first makes mention of *Alcedo tridactyla*; but, as Dr. Pucheran clearly shows, Linnæus's description is merely a reproduction of Vosmaer's. The following is Linnæus's description:—

"*A. brachyura, supra caudaque rufis, subtus flava, pedibus tridactylis.*

"*Hab. in India orientali.*

"*Altera avis supra tota rufa, etiam cauda; ventre postico flavo.*

"*Altera dorso cæruleo, tota subtus flava, gula alba; genæ flavæ; remiges nigræ."*

In 1783 Boddaert named the blue-backed species *Alcedo rubra* from Buffon's Pl. Enl. 778. fig. 2, upon which also the *Alcedo purpurea* of Gmelin's 'Systema' (1788) was founded. In 1846 Mr. Strickland received both birds from Malacca, and he at once saw that they constituted distinct species. Applying the name *tridactyla* of Pallas to the blue-backed bird, he gave to the red-backed one the appropriate name of *rufidorsa*.

To this decision Dr. Pucheran demurs; and the following is the argument of the learned doctor. He says that the first time Linnæus makes mention of the name *tridactyla* is in the 'Mantissa,' and the only work quoted by him is Vosmaer's 'Monographia.' Dr. Pucheran had not the original edition of Vosmaer's book; but he had the French translation, and he proceeds to show (which is undoubtedly the case) that the description of Linnæus is merely a copy of that of Vosmaer's.

The learned doctor then quotes Pallas's description, as given above, and shows that his "*varietas*" is the same to all intents and purposes as Mr. Strickland's *Ceyx rufidorsa* (P. Z. S. 1846, p. 99); and there can be no doubt, as Mr. Strickland himself observes,

that his is the same bird as the red-backed variety of Vosmaer's Ys-vogel, and of Pallas's and Linnæus's *Alcedo tridactyla*. Dr. Pucheran thus sums up his argument:—"However the case may be, it is impossible to deny that the variety, or rather the race with the back blue, of which Vosmaer, Linnæus, and Pallas have spoken, has been signalized as a distinct species by Gmelin, who gave it the name of *Alcedo purpurea*, afterwards the *Ceyx purpureus* of Cuvier. This synonymy appears to us incontestable; and this conviction results from it, that, the two types, one with the back blue and the other with the back red, having been first confounded by Linnæus, and afterwards by Pallas, under the common denomination of *Alcedo tridactyla*, and the first having been separated by Gmelin (*Alcedo purpurea*, Gm.; *Ceyx purpureus*, Cuv.), the name of *Alcedo tridactyla* ought properly to fall to the second, and to become a synonym of the *Ceyx tridactyla* of Jardine and Selby, which is the same bird as *Ceyx rufidorsa*, Strickland.

It was the conviction that Dr. Pucheran was right that induced me to coincide in his rectification of the synonymy of these two birds in my 'Monograph.' But since the examination of Vosmaer's original work, I have had occasion to be somewhat sceptical as to the value of the worthy doctor's argument.

Vosmaer, as it appears, was not a binominalist, and nowhere does he apply a Latin name to the birds he was describing in the present instance.

Then, again, Dr. Pucheran was most decidedly wrong in saying, in the above-quoted sentence, that the two birds were *first* confounded by Linnæus, and *afterwards* by Pallas; for the name of the latter has a priority of two years.

The plain solution of the difficulty seems to be that the blue-backed bird is the *Alcedo tridactyla* of Pallas, and therefore ought to bear the name. Vosmaer must be left out of the question, as he never gave a scientific name to the bird at all. And the name *rufidorsa* must be applied to the red-backed species, Mr. Strickland's being the first description of that bird. I have endeavoured to give the full and correct synonymy of the two species at the end of this paper.

I cannot reconcile the *Martin-pêcheur de l'île de Luçon* of Sonnerat exactly with any of the rufous-headed species. The descriptions of the old authors are so erroneous in many cases that they are not at all to be depended upon; but if, as Dr. Pucheran suggests, the bird described by him is really distinct from *Ceyx rubra*, it can only be referable to *Ceyx melanura* of the Philippines; and of this species his description can only be considered a loose and inaccurate one.

Ceyx melanura is a very excellent species, easily distinguishable by the obscure lilac spots on the crown. While engaged in the study of the rufous-headed *Ceyces*, my attention was attracted to a plate in Prof. Reichenbach's 'Handbuch' representing what he calls *Ceyx tridactyla*, and I could not recognize these figures as being copies of any figures in any work with which I was acquainted. They are intended to represent two Bornean birds in the Dresden Museum.

Now these figures of Reichenbach cannot be reconciled with any of the three rufous-headed species of *Ceyx*, viz. *Ceyx tridactyla* of Penang and the Indian peninsula, *Ceyx rufidorsa* of Malayana, and *Ceyx melanura* of the Philippines. Reichenbach's bird cannot be *Ceyx rubra*, because this species has the middle of the back black washed with blue, and has a conspicuous blue spot behind the ear. This spot is wanting in the Bornean bird, which also has the back rufous from beak to tail. Nor can his bird be intended for either of the other two species, as both of these have rufous scapularies. I therefore came to the conclusion that the Bornean *Ceyx* must be a distinct species; and I have had some correspondence on the subject with Dr. Salvadori of Turin, who is contemplating the publication of a paper on the genus.

In the 'Natural History of Labuan,' by Messrs. Motley and Dillwyn, I found a curious corroboration of my ideas on the subject; for there we read that a specimen of *Ceyx tridactyla* is "above, from the beak to the tail, rufous red," and has the "scapulars dusky black, tipped with rich blue." This description will not do for the Malaccan, while it answers exactly to Reichenbach's figures of the Bornean birds. I therefore wrote to Mr. Dillwyn to ask him to favour me with a sight of the bird described by him as *Ceyx tridactyla*; and he very kindly sent me the bird to examine. I immediately found all my ideas as to its specific distinctness to be quite correct, and I therefore propose to name this beautiful bird

CEYX DILLWYNNI, sp. n.,

in acknowledgment of that gentleman's kindness in enabling me thus to elucidate this difficult question. The new species has no blue spot at the side of the neck, and therefore cannot be confounded with *Ceyx tridactyla* or *Ceyx melanura*. From *Ceyx rufidorsa* it is at once distinguished by its slightly larger size, and by the scapularies, which are black washed with blue.

Of the other section of the genus *Ceyx* (that is, of those of which the heads are black with bright blue spots) the first described were *C. lepida* and *C. solitaria*, which were figured by Temminck in the 'Planches Coloriées.' The type specimen of *C. lepida*, which is a young bird, is figured by me in the plate of the species in my 'Monograph of the Alcedinidæ,' but the blue on the scapularies is not very well represented. I know, however, that the type specimen has this colour, as Mr. Keulemans made a careful examination of the specimen for me. In Bouru the very distinct species *C. cajeli*, Wall., is found, and in the Sula Islands the equally distinct species *C. wallacii*, Sharpe. The newly described *Ceyx philippinensis* of Gould, though closely allied to *Alcyone cyanipectus*, is a good species, as I have since found another specimen in the British Museum. I cannot satisfactorily make out the *Ceyx uropygialis* of Mr. Gray. I believe it to be distinct; but it is the most obscure species of the whole genus. It differs principally in its smaller size and brighter colouring of the rump. I have seen specimens from Gilolo, Batchian, and Ternate, from which latter island the type specimen

came. There is, however, another bird of which I have seen specimens from Batchian and Gilolo, which I cannot reconcile at all with any of the other species. It is larger than *C. uropygialis* and about the size of *C. lepida*, and many people would be inclined to consider it the young of the latter bird; but the blue spots on the head are very small and obscure, and the blue on the back not nearly so much developed as in *C. lepida*, while it presents the bright rump of *C. uropygialis*. I at present consider it to be a variety of the latter bird; but I think that when we know more of the different species, it may prove to be distinct.

I add a list of the species at present known to me, with a full synonymy, the descriptions being taken from my 'Monograph' when the species have already been noticed there.

1. *CEYX RUFIDORSA*, Strickl. Strickland's Kingfisher.

Alcedo purpurea, var., Shaw, Gen. Zool. viii. p. 97 (1811).

Ceyx tridactyla, Jard. and Selby, Ill. of Orn. i. pl. 55. fig. 2; Sharpe, Monogr. *Alced.* part 2. plate only (1868).

Ceyx rufidorsa, Strickl. P. Z. S. 1846, p. 99; Gray, Gen. of Birds App. p. 5 (1848); Blyth, Cat. Birds Mus. As. Soc. Beng. p. 50 (1849); Reich. Handb. *Alced.* p. 8, t. cccxcviii. fig. 3070 (1851); Cass. Cat. Halc. Phil. Mus. p. 13 (1852); Bonap. Consp. Vol. Anis. p. 9 (1854); Hartl. Journ. f. Orn. 1854, p. 413; Horsf. & Moore, Cat. Birds Mus. E. I. Co. p. 132 (1854); Moore, P. Z. S. 1854, p. 270; Cab. & Heine, Mus. Hein. Th. ii. p. 152 (1860); Wallace, P. Z. S. 1863, p. 484; Sharpe, P. Z. S. 1868, p. 271.

Dacelo rufidorsa, Schl. Mus. Pays-Bas, *Alced.* p. 48 (1863); id. Vog. Ned. Ind. *Alced.* pp. 40, 67, pl. 16 (1864).

Chuchack-wrang of the Javans (*Horsfield*).

Binti-abang of the Malays of Sumatra (*Raffles*).

Bintei of the Bornese (*Motley*).

C. capite et uropygio lilacinis: rostro corallino: macula ad latera colli carulea nulla: scapularibus lilacino-rufis: subtus flava.

Hab. in regione Indo-Malayana.

Above lilac-rufous, tinged on the sides and back of the head and on the back with shining violet; wing-feathers blackish, the inner web rufous from the base, more conspicuous on the secondaries, which are almost entirely rufous; throat and a patch of feathers on each side of the neck white, tinged with light orange; a loreal spot (very faintly developed), cheeks, and under surface of the body bright orange; bill and feet coral-red. Total length 4·7 inches, of bill from front 1·2, from gape 1·09, wing 2·2, tail 0·8, tarsus 0·25, middle toe 0·4, hind toe 0·2.

Hab. Malacca (*Cantor*), Sumatra (*Mus. Lugd.*), Bangka (*Mus. Lugd.*), Java (*Mus. Lugd.*), Bavian Island (*Hartlaub*), Lombok (*Wallace*), Sumbawa (*Mus. Lugd.*), Flores (*Wallace*), Borneo (*Motley*).

The above description and measurements are taken from a nicely preserved skin obtained in Flores by Mr. Wallace, and now in my own collection. I have another specimen in my collection, which

is larger and brighter than any I have yet seen. This was purchased of a dealer, and is said to be from Singapore; but Lord Walden thinks it may have come from Camboja. The following are the measurements of this specimen. Total length 5·1 inches, of bill from front 1·4, from gape 1·7, wing 2·4, tail 1, tarsus 0·25, middle toe 0·45, hind toe 0·2.

2. CEYX DILLWYNNI, Sharpe, sp. n. Labuan Kingfisher.

Ceyx tridactyla, Reich. Handb. *Alced.* p. 8, t. ccciii. b. fig. 3389 (1851); Motley & Dillwyn, Nat. Hist. of Lab. p. 13 (1855).

Ceyx rufidorsa, Sclater, P. Z. S. 1863, p. 213.

C. capite et uropygio lilacinis: rostro corallino: macula ad latera colli cærulea nulla: scapularibus nigris cæruleo lavatis.

Hab. in insulis "Labuan" et "Borneo" dictis.

Head, neck, and the whole of the back lilac-rufous, with beautiful shades of violet; a little spot at the base of the beak blue; a longitudinal patch of feathers on the sides of the neck white; scapularies black, washed with bright blue; tail rufous, blackish towards the tips of the feathers; wing-coverts rufous; wing-feathers blackish, the inner web rufous from the base, more conspicuous on the secondaries, the outer web of the exterior primary rufous for the greater part of its length; chin and abdomen white; shoulders, upper part of the breast, flanks, and under wing- and tail-coverts rufous; bill and feet coral-red. Total length 5·8 inches, of bill from gape 1·5, wing 2·45, tail 1·2, tarsus 0·25, middle toe 0·4, hind toe 0·2.

Hab. Labuan (*Dillwyn*); Banjermassing (*Motley*).

The above description and measurements are taken from the type specimen, which has been most kindly presented to me by Mr. Dillwyn, and now forms part of my collection. I have ascertained that the specimen recorded by Dr. Sclater (*l. c.*) is referable to this species, by a personal examination of the bird, which is now in Lord Walden's collection.

3. CEYX TRIDACTYLA (Pall.). Penang Kingfisher.

Alcedo tridactyla, Pallas, Spic. Zool. vii. p. 10, t. 2. fig. 1 (1769); Linn. Mant. Plant. p. 524 (1771); Scop. Del. Faun. et Flor. Insubr. ii. p. 90 (1786); Gm. Syst. Nat. i. p. 459 (1788).

Alcedo rubra, Bodd. Tabl. Pl. Enl. p. 49 (1848).

Ceyx rubra, Gray, Cat. Fiss. Brit. Mus. p. 49 (1848).

Dacelo rubra, Schl. Mus. Pays-Bas, *Alced.* p. 49 (1863); id. Vog. Ned. Ind. *Alced.* pp. 40, 68, pl. 16 (1864).

Alcedo purpurea, Gm. Syst. Nat. i. p. 449 (1788).

Ceyx purpurea, Less. Traité d'Orn. p. 38 (1831); Reich. Handb. *Alced.* p. 9, t. ccxcviii. fig. 3071 (1851); Bonap. Cons. Vol. Anis. p. 9 (1854).

Ceyx purpureus, Cuv. Règne Anim. i. p. 120 (1829); Hartl. Journ. f. Orn. 1855, p. 423.

Ceyx tridactyla, Sykes, P. Z. S. 1832, p. 84; Strickl. P. Z. S. 1846, p. 99; Gray and Mitch. Gen. of Birds, i. p. 459 (c. 1844);

Jerdon, Ill. Ind. Orn. pl. 25 (1847); Gray, Cat. Fiss. Brit. Mus. p. 59 (1848); Bonap. Consp. Gen. Av. i. pp. 157, 158 (1850); Cass. Cat. Halc. Phil. Mus. p. 13 (1852); Bonap. Consp. Vol. Anis. p. 9 (1854); Hartl. Journ. f. Orn. 1854, p. 413; Moore, P. Z. S. 1854, p. 269; Jerdon, Birds of Ind. i. p. 229 (1862); Gray, Cat. Mamm. and Birds of Nep. p. 24 (1863); Sharpe, P. Z. S. 1868, p. 271.

Alcedo erithaca, Gm. Syst. Nat. i. p. 449 (1788).

Ceyx erythaca, Blyth, Cat. Birds Mus. As. Soc. Beng. p. 50 (1849); Mason, Burmah, p. 674.

Ceyx luzoniensis, Stephens, Gen. Zool. xiii. p. 106 (1825).

Ceyx microsoma, Burton, P. Z. S. 1837, p. 89.

Martin-pêcheur de l'île de Luçon, Sonn. Voy. Nouv. Guin. p. 67, pl. 32 (1776).

Martin-pêcheur de Pondicherry, Buff. Pl. Enl. 778. fig. 2.

Dein-nygeen of the Aracanese (*Blyth*).

Raja-whodan of the Malays (*Eyton*).

C. capite et uropygio lilacinis: rostro corallino: macula ad latera colli cærulea: minor: interscapulio et scapularibus nigris, cyaneo lavatis: subtus flava.

Hab. in regione Indica.

Head and nape rufous, tinged with lilac; upper part of the back, scapularies, and wing-coverts black, washed with bright blue; lower part of the back, rump, and upper tail-coverts rufous, washed with bright lilac; wing-feathers blackish, the inner web rufous from the base; tail rufous; a spot in front of the eye, cheeks, sides of the neck, and under surface of the body pale orange; chin and a patch of feathers on the side of the neck white; a spot at the base of the bill and a patch of feathers behind the ear blue; bill and feet coral-red; eyes brown. Total length 5·3 inches, of bill from front 1·2, from gape 1·6, wing 2·3, tail 1, tarsus 0·2, middle toe 0·4, hind toe 0·2.

Hab. India and Ceylon (*Jerdon*), Nepal (*Hodgson*), Penang (*Cantor*), Singapore (*Mus. Phil.*), Sumatra (*Mus. Lugd.*), Java (*Mus. Brit.*), Philippines (*Cuming*).

4. CEYX MELANURA, Kaup. Lilac-spotted Kingfisher.

Ceyx melanura, Kaup, Fam. der Eisev. p. 15 (1848); Gray, Cat. Fiss. Brit. Mus. p. 59 (1848); id. Gen. of Birds, App. p. 5 (1848); Bonap. Consp. Gen. Av. i. p. 158 (1850); Reich. Handb. *Alced.* p. 9 (1851); Cass. Cat. Halc. Phil. Mus. p. 13 (1852); Hartl. Journ. f. Orn. 1854, p. 415; Bonap. Consp. Vol. Anis. p. 9 (1854); Cab. & Heine, Mus. Hein. Th. ii. p. 151 (1860); Sharpe, P. Z. S. 1868, p. 271; id. Monogr. *Alced.* pt. 2 (1868).

Dacelo melanura, Schl. Mus. Pays-Bas, *Alced.* p. 49 (1863).

C. capite et uropygio lilacinis: rostro corallino: macula ad latera colli cærulea: major: capite lilacino obscure maculato: interscapulio et scapularibus rufis: pectore pulchre violaceo lavato.

Hab. in insulis Philippinis.

Above lilac-rufous, the head and cheeks obscurely spotted with faint lilac; scapularies rufous, a line of black feathers at the base; a patch of feathers on the sides of the neck blue; wing-coverts black, the tip of each feather spotted with bright blue; wing-feathers blackish, the inner web rufous from the base; tail above rufous, the exterior feathers blackish; a loreal spot very faint orange; throat and a longitudinal patch of feathers under the before-mentioned blue spot on the sides of the neck white; breast shining lilac tinged with violet; centre of the abdomen whitish; under wing- and tail-coverts light rufous; bill and feet rich coral-red. Total length 5 inches, of bill from front 1·2, from gape 1·6, wing 2·1, tail 0·7, tarsus 0·5, middle toe 0·45, hind toe 0·2.

Hab. Philippine Islands (*Mus. R. B. Sharpe*): Luzon; Manilla (*Mus. J. Gould*).

5. CEYX CAJELI, Wallace. Bouru Kingfisher.

Ceyx cajeli, Wall. P. Z. S. 1863, p. 25, pl. v.; Sharpe, P. Z. S. 1868, p. 271; id. Monogr. *Alced.* pt. i. (1868).

Dacelo cajeli, Schl. Vog. Ned. Ind. *Alced.* pp. 39, 67, pl. 16 (1864); id. Ned. Tijdschr. 1866, p. 339.

C. capite nigro, cyaneo maculato: dorso postico et uropygio argenteo-ceruleis: rostro corallino, brevior: genis et regione parotica nigris.

Hab. in insula dicta "Bouru" maris Celebensis.

Crown of the head and wing-coverts black, with very minute spots of clear blue, each feather having a central streak of brighter colour; back silvery blue; scapulars and tail black; wing-feathers black, the inner web light reddish near the base; a loreal spot light orange; a patch of feathers on each side of the neck white tinged with orange; throat white; under part light orange, deeper on the flanks; a considerable patch of feathers on the sides of the upper part of the breast black; bill and feet pale coral-red; eyes dark. Total length 5·5 inches, of bill from front 1·2, from gape 1·6, wing 2·5, tail 1, tarsus 0·3, middle toe 0·9, hind toe 0·2.

Hab. Bouru (*Wallace*).

6. CEYX WALLACII, Sharpe. Wallace's Kingfisher.

Ceyx wallacii, Sharpe, P. Z. S. 1868, p. 270; id. Monogr. *Alced.* pt. 1 (1868).

Ceyx lepida, Wall. P. Z. S. 1862, p. 338.

C. capite nigro cyaneo maculato: rostro corallino, longior: genis cum regione parotica cyaneo maculatis: scapularibus nigris: dorso postico et uropygio læte cyaneis.

Hab. in insulis dictis "Sula" maris Celebensis.

Above black; head and neck spotted with cobalt, more on the latter, each feather having a central stripe of brighter blue; cheeks and wing-coverts streaked with bright cobalt; back very rich shining cobalt, the upper tail-coverts slightly tinged with ultramarine; scapularies black; wing- and tail-feathers blackish, the inner web of

the former light rufous from the base; throat whitish; a spot on each side of the base of the bill and the whole of the under surface bright orange; the characteristic spot on the sides of the neck deep rufous brown; a line at the base of the loreal spot, also the space between this spot and the eye, and a large patch of feathers on the side of the upper part of the breast deep black; bill and feet coral-red; iris dark. Total length 5·5 inches, of bill from front 1·4, from gape 1·7, wing 2·5, tail 1, tarsus 0·2, middle toe 0·5, hind toe 0·2.

Hab. Sula Islands (*Wallace*).

7. CEYX LEPIDA, Temm. Beautiful Kingfisher.

Ceyx lepida, Temm. Pl. Col. 595; Gray, Cat. Fiss. Brit. Mus. p. 59 (1848); Bonap. Consp. Gen. Av. i. p. 158 (1850); Reich. Handb. *Alced.* p. 10, t. ccxcviii. fig. 3066 (1851); Cass. Cat. Halc. Phil. Mus. p. 14 (1852); Bonap. Consp. Vol. Anis. p. 9 (1854); Gray, P. Z. S. 1860, p. 348; id. P. Z. S. 1861, p. 433; Sharpe, P. Z. S. 1868, p. 271; id. Monogr. *Alced.* pt. 2 (1868).

Alcyone lepida, Gray and Mitch. Gen. of Birds, i. p. 82 (c. 1844).

Dacelo lepida, Schl. Mus. Pays-Bas, *Alced.* p. 48 (1863); id. Vog. Ned. Ind. *Alced.* pp. 39, 66, pl. 16 (1864).

C. capite nigro, cæruleo maculato: rostro corallino, longiore, robustiore: genis et regione parotica cæruleo maculatis: dorso ultramarino, uropygio cyanescente: major: maculis lorealibus majoribus: capitis summi maculis et interscapulio cærulescentioribus.

Hab. in insulis dictis "Ceram," "Amboina," et in Nova Guinea australi et australi-occidentali.

Head, nape, cheeks, and wing-coverts black, plentifully spotted with rich ultramarine, each feather having a central stripe of brighter blue; scapularies black, washed with rich ultramarine; back very bright ultramarine, becoming silvery blue towards the rump; wing-feathers blackish, the inner web rufous from the base; tail blackish, tinged with ultramarine; throat and a longitudinal patch of feathers on the side of the neck white, the latter tinged with orange; a large spot in front of the eye, and the entire under surface orange, paler on the abdomen; bill and feet rich coral-red. Total length 5·5 inches, of bill from front 1·5, from gape 1·7, wing 2·5, tail 1, tarsus 0·3, middle toe 0·5, hind toe 0·2.

Hab. Amboina (*Wallace*), Ceram (*Wallace*); south and southwest coast of New Guinea (*Wallace*, *Von Rosenberg*).

8. CEYX UROPYGIALIS, Gray. Silvery-backed Kingfisher.

Ceyx uropygialis, Gray, P. Z. S. 1860, p. 348; Sharpe, P. Z. S. 1868, p. 271.

C. capite nigro, cæruleo maculato: dorso postico ultramarino: uropygio lacte argenteo: scapularibus cæruleo lavatis: minor: subtus intense aurantia.

Hab. in insulis dictis "Batchian," "Gilolo," "Ternate," maris Celebensis.

Crown of the head black, minutely spotted with ultramarine, each feather having a very faint stripe of cobalt down the centre; scapularies black, faintly washed with ultramarine; back ultramarine on the upper part and on the tail-coverts; rump silvery blue, with a tinge of greenish in some lights; wing-coverts black, tipped with ultramarine; wing-feathers blackish, the inner web rufous from the base; tail black; throat and a longitudinal patch of feathers on the sides of the neck white; a spot in front of the eye pale orange; under surface with the under wing- and tail-coverts very rich orange; bill and feet coral-red. Total length 5·5 inches, of bill from front 1·3, from gape 1·7, wing 2·4, tail 0·9, tarsus 0·25, middle toe 0·45, hind toe 0·2.

Hab. Batchian, Gilolo, Ternate (*Wallace*).

9. CEYX PHILIPPINENSIS, Gould. Philippine Kingfisher.

Ceyx philippinensis, Gould, P. Z. S. 1868, p. 404.

C. rostro nigro, longiore: capite cyaneo fasciato: gula rufescente: pectore et abdomine intense rufis: pectoris lateribus intense lazulino lavatis.

Hab. in insulis Philippinis.

Head and nape bright indigo, thickly banded with irregular markings of bright cobalt; back very bright shining cobalt, inclining to ultramarine on the rump; scapularies black, washed with bright indigo, and spotted with cobalt; wing-feathers blackish, the secondaries narrowly edged with indigo; throat whitish, tinged with rufous; a patch of feathers on the side of the neck pure white, tinged with rufous on the outer edge; a spot in front of the eye and the entire under surface, as well as the under wing-coverts, deep rufous, the lower part of the abdomen and under tail-coverts slightly tinged with indigo; shoulders, and a spot on each side of the upper part of the breast, shining laguli-blue; upper mandible brownish black, lower mandible pale orange; feet orange. Total length 5·5 inches, of bill from front 1·3, from gape 1·7, wing 2·3, tail 1·1, tarsus 0·3, middle toe 0·5, hind toe 0·2.

Hab. Luzon; Manilla (*Mus. J. Gould*).

10. CEYX SOLITARIA, Temm. Solitary Kingfisher.

Ceyx solitaria, Temm. Pl. Col. 595; Gray, P. Z. S. 1858, p. 172; id. P. Z. S. 1859, p. 155; id. P. Z. S. 1861, p. 433; Rosenb. Journ. f. Orn. 1864, p. 118; Sharpe, P. Z. S. 1868, p. 271; id. Monogr. *Alced.* pt. 2 (1868).

Alcyone solitaria, Gray and Mitch. Gen. of Birds, p. 82 (c. 1844); Bonap. Consp. Gen. Av. i. p. 158 (1859); Reich. Handb. *Alced.* p. 7, t. cccxcviii. fig. 3067 (1851); Bonap. Consp. Vol. Anis. p. 9 (1854).

Alcedo solitaria, Schl. Mus. Pays-Bas, *Alced.* p. 17 (1863); id. Vog. Ned. Ind. *Alced.* pp. 12, 48, pl. 3 (1864).

Therosa solitaria, Müller, MS.

Ceyx meninting, Lesson, Voy. Coq. i. p. 691 (1826); id. *Traité d'Orn.* p. 241 (1831).

C. rostro nigro: capite cyaneo fasciato: omnino minor: pectore et abdomine flavidis: gula alba.

Hab. in Nova Guinea et in insulis adjacentibus.

Head and nape black, banded with bright ultramarine; back and scapularies rich ultramarine; cheeks and wing-coverts black, spotted with bright ultramarine; wing-feathers blackish, the inner web fuscous from the base, the secondaries narrowly edged with blue; tail black, edged with blue; throat white; a spot in front of the eye and a longitudinal patch of feathers on the sides of the neck yellowish white; entire under surface light orange; bill entirely black; feet orange. Total length 5 inches, of bill from front 1·3, from gape 1·6, wing 2·1, tail 0·8, tarsus 0·2, middle toe 0·4, hind toe 0·2.

Hab. New Guinea (*Wallace*), Aru Islands (*Wallace*), Ceram (*Mus. Lugd.*), Mysol (*Wallace*).

The only evidence of the appearance of this species in Ceram is an example in the Leyden Museum, said to have come from that island. Mr. Wallace, whose personal acquaintance with the ornithology of the Moluccas renders him the best authority on the subject, is inclined to doubt the occurrence of the bird in that locality.

I append a few notes on the geographical distribution of the genus *Ceyx*. It will be seen by the table at the end of the present paper that representatives of the genus are found in both the Indian and Australian regions. The four rufous-backed species, however, are almost entirely confined to the former, while the blue-backed species are, on the other hand, with one exception, exclusively inhabitants of the Australian region. In the Philippine Islands one species of each section is met with. *Ceyx tridactyla* enjoys the most extended geographical range; for it is found all over India, and extends down the Malayan peninsula as far as the island of Java. At Malacca it meets with *Ceyx rufidorsa*, which is distributed over the Indo-Malayan Islands and extends a little way into the Austro-Malayan subregion, being found in Lombock, Sumbawa, and Flores. This species is also found in Borneo, and in Labuan the new species *Ceyx dillwynni* is met with. As far as we know, the latter bird is exclusively confined to this island. In the Philippines we find *Ceyx melanura*. This bird is certainly the link connecting the two sections together, as the lilac spots on the head exhibit a tendency towards the blue-backed species of the genus. With the exception of *C. philippinensis*, all the other blue-backed species are confined to the Australian region. *Ceyx wallacii* is apparently confined to the Sula Islands, and *Ceyx cajeli* to Bouru. *C. uropygialis* may be said to be confined to Batchian, Gilolo, and Ternate, though I hear that in the Leyden Museum there are specimens of a *Ceyx* from Morotai, which may ultimately prove to be of this species. *Ceyx lepida* seems to be most plentiful in Ceram and Amboyna, but is also found in New Guinea, though apparently





confined to the south and south-west coast. Here it meets with the range of *C. solitaria*, which is a true Papuan species. I have drawn up a table which will exhibit at a glance the distribution of the various species. In this table I have followed the usual arrangement of Mr. Wallace of the various groups of islands:—

Tabular View of the Geographical Distribution of the Genus Ceyx.

| | Indian Region. | | | | | | | Australian Region. | | | | | | | | | | | | | | | |
|-----------------------------------|----------------|----|---------------------|----------|---------|-------|---------|--------------------|-----------------|--------------|---------------|---------|-----------------|---------|-----------|---------|----------|--------|--------|----------|--------------|--------|-------------|
| | Asia. | | Indo-Malay Islands. | | | | | Timor Group. | Moluccan Group. | | | | Papuan Islands. | | | | | | | | | | |
| | Indian Asia. | | Malacca. | Sumatra. | Bangka. | Java. | Bawian. | | Borneo. | Philippines. | Sula Islands. | Lombok. | Sumbawa. | Flores. | Batchian. | Gilolo. | Ternate. | Bouru. | Ceram. | Amboyna. | Aru Islands. | Mysol. | New Guinea. |
| 1. <i>C. rufidorsa</i> | .. | * | * | * | * | * | * | * | .. | .. | * | * | | | | | | | | | | | |
| 2. <i>C. dillwyni</i> | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | | | | | | | | | | | |
| 3. <i>C. tridactyla</i> | * | * | * | .. | * | | | | | | | | | | | | | | | | | | |
| 4. <i>C. melanura</i> | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | | | | | | | | | | | |
| 5. <i>C. cajeli</i> | .. | .. | .. | .. | .. | .. | .. | | .. | .. | .. | .. | | | | | * | | | | | | |
| 6. <i>C. wallacii</i> | .. | .. | .. | .. | .. | .. | .. | | * | .. | .. | .. | | | | | | | | | | | |
| 7. <i>C. lepida</i> | .. | .. | .. | .. | .. | .. | .. | | .. | .. | .. | .. | | | | | | * | * | .. | .. | .. | * |
| 8. <i>C. uropygialis</i> | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | * | * | * | | | | | | | | |
| 9. <i>C. philippinensis</i> | .. | .. | .. | .. | .. | .. | .. | * | .. | .. | .. | .. | | | | | | | | | | | |
| 10. <i>C. solitaria</i> | .. | .. | .. | .. | .. | .. | .. | | .. | .. | .. | .. | | | | | * | .. | * | * | * | * | * |

8. A Monographic Revision of the Lepidoptera hitherto included in the Genus *Adolias*, with Descriptions of new Genera and Species. By ARTHUR GARDINER BUTLER, F.L.S., F.Z.S., &c.

(Plate XLV.)

The genus *Adolias* was monographed by Mr. Frederic Moore in the year 1859, and again by Dr. Vollenhoven in 1862; but so much has been learnt respecting the sexes and affinities of the species since that time, the species themselves have increased to such an extent, and the difficulty of classifying them has been so universally felt, that a complete revision of the group has become a necessity.

In the present paper I have been obliged to make several new genera, on account of striking differences of structure observed; the species are also arranged in natural groups to facilitate their determination.

The genus as it now stands contains sixty species, sixteen species having been separated from it to constitute new genera, and eight others being removed to the genus *Symphædra*, Hübner.

Genus ADOLIAS (Boisduval), Westwood.

Typical species *A. aconthea*, Cramer.

Sexes differing in form and pattern; the males resembling *Apaturas* or *Paphias*, the palpi always blunt and cuneiform; the middle discocellular of front wing acutely recurved; the first branch of the subcostal in hind wing emitted close to the base, the second some distance beyond.

LUBENTINA group.

1. ADOLIAS ADONIA.

♀. *Papilio adonia*, Cramer, Pap. Exot. iii. p. 109, pl. 255. figs. C, D (1782).

♂. *Adolias lubentina*, Horsfield, Cat. Lep. Mus. E. I. C. t. 5. fig. 5 (1828-29).

North-east of Java (*Cramer*).

Java, ♂ ♀, B.M.

2. ADOLIAS LUBENTINA.

♀. *Papilio lubentina*, Cramer, Pap. Exot. ii. p. 92, pl. 155. figs. C, D (1779).

♂. *P. lubentina*, Donovan, Ins. China, tab. 36. fig. E (1798).

China (*Cramer*).

North and South India, ♂ ♀, B.M.

3. ADOLIAS AMANDA.

♂ ♀. *Adolias amanda*, Hewitson, Exot. Butterf. ii. p. 70, pl. 35. figs. 3, 4 (1861).

Celebes (*Hewitson*).

Celebes, ♂ ♀, B.M.

4. ADOLIAS EVELINA.

♂. *Papilio evelina*, Stoll, Pap. Exot. pl. 28. figs. 2, 2 b (1791).

♂, Bengal (*Stoll*).

♂, Tranquebar, Coll. Banks.

This insect, as represented by Stoll, is of a brilliant bronzy-green colour.

Race *A. derma*, Kollar, H \ddot{u} gel's Kaschmir, iv. pt. 2. p. 436 (1844).

♂ ♀. *A. eva*, Felder, Reise der Novara, iii. p. 432. n. 692 (1867).

India, Celebes, ♂ ♀, B.M.

5. ADOLIAS SOMA.

♀. *Adolias soma*, Felder, Reise der Novara, p. 432. n. 692 (1867).

North India (*Felder*).

Java, ♂, B.M.

May be only a race of *evelina*, which also occurs as *derma* in both the above localities; it scarcely differs except in the differently formed discoidal spots without scarlet centres.

6. ADOLIAS SIKANDI.

♀. *Adolias sikandi*, Moore, Trans. Ent. Soc. London, p. 75, pl. 7. fig. 4 (1859).

Java (*Moore*).

(Horsfield collection) B.M.

This species is allied to Felder's *A. soma*.

7. ADOLIAS TEUTA.

♂. *Adolias teuta*, Hewitson in Gen. Diurn. Lepid. p. 291. n. 5, pl. 44. fig. 2 (1850).
 Silhet (*Westwood & Hewitson*). North India, ♂ ♀, B.M.

8. ADOLIAS DUNYA.

♂. *Adolias dunya*, Hewitson in Gen. Diurn. Lepid. p. 291. n. 6, pl. 44. fig. 2 (1850).
 Borneo (*Wallace*). Borneo, ♂, B.M.
 Seems to come into the *Lubentina* group.

SCHRENKII group.

9. ADOLIAS SCHRENKII.

♀. *Adolias schrenkii*, Ménétriés in Schrenck's Amurland, p. 31. n. 62, tab. 3. fig. 2 (1859).

Mountains of Buriah (*Ménétriés*).

This curious species seems most nearly allied to *franciæ*, but is very distinct from all the known *Adoliades*; on the under surface it resembles *Apatura ambica*, Kollar, and *Athyma chevana*, Moore: the former is probably the species imitated*.

FRANCIÆ group.

10. ADOLIAS FRANCIÆ.

♂. *Adolias franciæ*, G. R. Gray, List. Lep. Nepal, p. 12, t. 14 (1833).

♀. *Adolias raja*, Felder, Wien. ent. Monatschr. iii. p. 397. sp. 40, Taf. 9. fig. 2 (1859).

Darjeeling, ♂, B.M.

Felder's specimen is from Assam; the figure is not very characteristic, being very rough and hard.

11. ADOLIAS SAHADEVA.

♀ as ♂. *Adolias sahadeva*, Moore, Trans. Ent. Soc. London, p. 80. n. 39, pl. 8. fig. 3 (1859).

♂. *Differt forma omnino: alæ minores, anticæ apice, posticæ angulo ani acutis, fasciis omnibus anticarum pallidis viridi occultis, posticarum apud costam concurrentibus distinctissimis, in disco autem reductis et partim nigro oblitteratis: maculis marginalibus obscurioribus.*
 Nepal, ♂ ♀, B.M.

12. ADOLIAS KARDAMA.

♂ ♀. *Adolias kardama*, Moore, Trans. Ent. Soc. London, p. 80, n. 40, pl. 9. fig. 3 (1859).

China (*Moore*).

Coll. J. O. Westwood.

Allied to *sahadeva*.

* The powerful flight of all the members of the *Emperor* group doubtless gives them a great advantage in aiding their escape from all kinds of enemies.

13. ADOLIAS DURGA.

♂ ♀. *Adolias durga*, Moore, Trans. Ent. Soc. London, p. 80, ♀, pl. 9. fig. 2 (1859).

Darjeeling (*Moore*). North India, ♂ ♀, B.M.

14. ADOLIAS IVA.

♂. *Adolias iva*, Moore, Trans. Ent. Soc. London, p. 78, pl. 8. fig. 2 (1859).

Darjeeling (*Moore*). Darjeeling, ♂, B.M.

15. ADOLIAS CONFUCIUS.

♀. *Adolias confucius*, Westwood in Gen. Diurn. Lepid. p. 291. n. 16 (1850).

China (*Westwood*).

Closely allied to *A. epiona*, but larger; the lower spot on hind wing lunulate and reversely curved.

16. ADOLIAS EPIONA.

Aconthea epiona, G. R. Gray, Lep. Nepal, p. 13 (1833).

Adolias doubledayi (Boisd.), Gray, Lep. Nepal. p. 13, t. 13 (1833).

North India (*Gray, Moore, &c.*). North India, ♂ ♀, B.M.

17. ADOLIAS NARA.

♀. *Adolias nara*, Moore, Trans. Ent. Soc. London, p. 78, pl. viii. fig. 1 (1859).

Habitat unknown (*Moore*). Type specimen, ♀, B.M.

18. ADOLIAS SANCARA.

♂. *Adolias sancara*, Moore, Trans. Ent. Soc. London, p. 78, pl. 9. fig. 1 (1859).

♂, Darjeeling, North India (*Moore*).

North India and China, ♂ ♀, B.M.

The sexes of this species scarcely differ.

19. ADOLIAS VASANTA.

♀. *Adolias vasanta*, Moore, Trans. Ent. Soc. London, p. 77, pl. 7. fig. 2 (1859).

♀, Ceylon (*Moore*).

Ceylon, ♀, B.M.

Evidently nearly allied to *garuda*, but with an oblique white bar across the front wings.

20. ADOLIAS AGNIS.

♀. *Adolias agnis*, Vollenhoven, Tijdschr. voor Ent. p. 202. n. 27, pl. 12. fig. 2 (1862).

♀, Java (*Vollenhoven*).

This species is intermediate between *garuda* and *vasanta* of Moore.

ACONTHEA group.

21. ADOLIAS GARUDA.

♂ ♀. *Adolias garuda*, Moore, Trans. Ent. Soc. London, p. 64, pl. 3. fig. 2 (1859).

North and South India (*Moore*). North India, ♂ ♀, B.M.

Subsp. *Alis omnino pallidiores fulvescentes, maculis discalibus sæpe obsoletis* *. North and South India, ♂ ♀, B.M.

22. ADOLIAS LUSIADA.

♂ ♀. *Adolias lusiada*, Felder, Wien. ent. Monatschr. vii. sp. 89 (1863).

Luzon (*Semper*).

Coll. Felder.

Very nearly allied to *garuda*, Moore.

23. ADOLIAS ANYTE.

♂. *Adolias anyte*, Hewitson, Exot. Butterf. iii. p. 59, pl. 30. fig. 5 (1862).

♂. East India.

Coll. Hewitson.

Seems to be most nearly allied to *garuda*.

24. ADOLIAS MERTA.

♀. *Adolias merta*, Moore, Trans. Ent. Soc. London, p. 72, pl. 6. fig. 4 (1859).

China (*Moore*).

♀, Hopeian Coll., Oxford.

Seems to belong to the *Garuda* type.

25. ADOLIAS KANDA.

♂. *Adolias kanda*, Moore, Trans. Ent. Soc. London, p. 69, pl. 4. fig. 2 (1859).

Borneo (*Wallace*).

♂, Coll. Hewitson.

Appears to be nearly allied to *parta*; but in the figure the discal bands are placed nearer together.

26. ADOLIAS PARTA.

♂ ♀. *Adolias parta*, Moore, Trans. Ent. Soc. Lond. (N.S.), vol. v. p. 63, pl. 3. fig. 1 (1859).

♂. *A. apicalis*, Vollenhoven, Tijdschr. voor Ent. p. 186. n. 5, pl. 10. fig. 1 (1862).

Borneo (*Moore & Vollenhoven*); ♂, India; ♀, Borneo. B.M.

The anal angle of the hind wings varies slightly in different individuals of the male.

27. ADOLIAS ACONTHEA.

♂ ♀. *Pap. aconthea*, Cramer, Pap. Exot. ii. p. 60, pl. 134. figs. D-G (1779).

Batavia (*Cramer*).

Java, ♂ ♀, B.M.

* The figure of the female given in Moore's figure is applicable to this form of the species, although the discal spots are here distinct.

Fabricius, in his 'Species Insectorum' (p. 104. n. 458), compares his *P. melissa* to Cramer's figures of *aconthea*; there can, however, be little doubt that *melissa* is a Satyrine of the genus *Æneis*. The species is said to come from Newfoundland, and the description is nearly the same with that of Fabricius's *fortunatus*. The type is said to be in the Banksian collection; but, unless it is identical with the *polixenes* of the same author, it must be lost: there is, however, a specimen of *Adolias kesava*, ♂ (labelled ?*melitta*, Fabr.); the latter, of course, has no connexion with the Fabrician species.

28. ADOLIAS SOMADEVA.

♀. *Adolias somadeva*, Felder, Reise der Novara, p. 432. n. 691 (1867).

North India (*Felder*).

Larger than the Javan *A. aconthea* (Cramer); the inner margin of all the wings longer, the outer margin of the front wings less curved.

29. ADOLIAS ALPHEDA.

♂ ♀. *Adolias alpheda* (Godart), Moore, Trans. Ent. Soc. London, p. 66, pl. 3. fig. 4 (1859).

Java (*Moore*).

Java and North India, ♂ ♀, B.M.

30. ADOLIAS JAMA.

♂ ♀. *Adolias jama*, Felder, Reise der Novara, p. 431. n. 690 (1867).

North India, Assam, Malacca interior (*Castelnau*); Banca (*Felder*).

A local form of the Javan *A. alpheda*.

31. ADOLIAS OCTOGESIMA.

(♂) ♀. *Adolias octogesima*, Vollenhoven, Tijdschr. voor Ent. p. 193. n. 14 (pl. 10. fig. 5), pl. 11. fig. 1. (1862).

♂ ♀. Java and Borneo (*Vollenhoven*).

The (?) male of this species does not appear to differ from *alpheda* ♂, Java; and I question its being distinct from that insect; the female, however, seems rather to belong to the *Apiades* ♀ group.

32. ADOLIAS HESPERUS.

♀. *Adolias hesperus*, Fabricius, Ent. Syst. iii. pt. 1. p. 47. n. 145 (1793).

♂ ♀. *A. phemius* (Hewitson), Moore, Trans. Ent. Soc. London, p. 65, pl. 3. fig. 3 (1859).

Darjeeling (*Moore*); India and China.

♂ ♀, B.M.

33. ADOLIAS ANOSIA.

♂ ♀. *Adolias anosia*, Moore, Trans. Ent. Soc. London, p. 65, pl. 5. fig. 1 (1859).

North India (*Moore*).

North India, ♂ ♀, B.M.

Allied to *garuda*, but very different.

34. ADOLIAS KESAVA.

♂ ♀. *Adolias kesava*, Moore, Trans. Ent. Soc. London, p. 67, pl. 3. fig. 5 (1859).

Silhet, North India (*Moore*).

North India, ♂ ♀, B.M.

Subsp. ♂. *Areis discalibus fusco purpurascentes (nec virescentes) lunula punctoque post cellæ anticarum finem.*

East Indies, ♂, B.M.

35. ADOLIAS SURJAS.

♀. *Adolias surjas*, Vollenhoven, Tijdschr. voor Ent. p. 200. n. 24, pl. 12. fig. 1 (1862).

♀. Java (*Vollenhoven*).

Seems to come near *kesava*, Moore.

36. ADOLIAS MAHADEVA.

♂. *Adolias mahadeva*, Moore, Trans. Ent. Soc. London, p. 68, pl. 4. fig. 1 (1859).

Hab. Unknown (*Moore*).

♂, Coll. W. W. Saunders.

Seems to come near *salia* and *kesava*.

37. ADOLIAS RAMADA.

♂. *Adolias ramada*, Moore, Trans. Ent. Soc. London, p. 69, pl. 4. fig. 5 (1859).

"Malacca." (*Moore*).

Malacca, ♂, Coll. Roberts.

The nebulous gloss on the disk of the wings in this species varies from bluish green to violet grey: the nearest ally of *ramada* is *salia*; but the two insects are abundantly distinct.

SALIA group.

38. ADOLIAS SALIA.

♂ ♀. *Adolias salia*, Moore, Trans. Ent. Soc. London, p. 69, pl. 4. fig. 4 (1859).

Java (*Moore*).

Java, ♂ ♀, B.M.

39. ADOLIAS DECORATUS. (Plate XLV. figs. 2 & 9.)

♂. *Alæ supra fuscae; anticæ costa virescente, characteribus consuetis basalibus, fascia irregulari hastata discali viridi lituras maculares fuscas includente, albo extus limitata et fusco marginata, extra squamis fusco pallidis submarginata; posticæ fascia regulari apud apicem nivea a linea lunulari extus limitata, ad apicem lunulis tribus violaceis extus marginata, area anali quadrata æneo-viridi: subtus omnes flavescentes, fascia communi æneo-albida, apice anticarum æneo-viridi.*

♀. *Alæ multo majores, supra fuscae, fascia multo latiore albicante et in posticis intus magis irregulari; subtus fascia velut supra viridi, opalescente fusco marginata; area basali flava, characteribus nigro-fuscis; margine externo omnino ad fasciam albido opalescente: corpus supra fuscum, subtus album.*

Exp. alar. ♂, unc. $2\frac{5}{8}$, ♀, $2\frac{7}{8}$.

Singapore (six specimens).

♂ ♀, Coll. Roberts.

Allied to *A. salia*, but very distinct; the underside of the male much like that of *A. bipunctata*, Vollenhoven.

40. ADOLIAS BIPUNCTATA.

♂. *Adolias bipunctata*, Vollenhoven, Tijdschr. voor Ent. p. 191, n. 11, pl. 10. fig. 4 (1862).

♂, Borneo (*Vollenhoven*).

Allied to *A. salia*.

CLATHRATA group.

41. ADOLIAS CLATHRATA.

♂. *Adolias clathrata*, Vollenhoven, Tijdschr. voor Ent. p. 105, n. 38. pl. 12. fig. 5 (1862).

♂, Borneo (*Vollenhoven*).

Seems almost to unite the *Salia* and *Cocytus* groups; it comes nearer to the latter.

COCYTUS group.

42. ADOLIAS JAPIS.

♂. *Adolias japis* (Godart), Lucas, Hist. Nat. Lep. Exot. pl. 69. fig. 1 (1835); ♀. Moore, Trans. Ent. Soc. p. 73. n. 21 (1859).

Java (*Moore*).

Java, ♂ ♀, B.M.

Race. *Alæ maris supra fascia communi nivea violaceo partim marginata (nec cæruleo inclusa), feminae obscuriores et fascia communi tenuiore quam in forma typicali.* Java, ♂ ♀, B.M.

43. ADOLIAS ASOKA.

♀. *Adolias asoka*, Felder, Reise der Novara, p. 433. n. 694, tab. 58. fig. 1 (1867).

Malacca interior (*Castelnau*).

Borneo, Coll. Felder.

This species seems nearly allied to *japis*, ♀, of Godart.

44. ADOLIAS VACILLARIA, sp. n. (Plate XLV. fig. 1.)

♀. *Affinis A. asokæ Malaccæ; alæ supra fusca, lineis consuetis basalibus obscurioribus; anticæ fascia sexmaculari nivea, maculaque apud apicem, fascia diffusa obscure fusca ab apice ad marginem anali-internum posticarum currente, in anticis intus squamis cæruleis, extus apud angulum ani maculis squamosis violaceo-albidis marginata; posticæ punctis duobus submediis, linea lunulari discali obscure fusca extus maculas septem violaceo-albidas cingente, intus apud apicem maculis quatuor niveis quadrato-lunatis limitata: subtus omnino pallidiores, area basali flavescente lineis lunulatis distinctis; maculis albis anticarum velut supra, posticarum obsoletis: corpus supra fuscum, subtus pallide flavescens.*

Exp. alar. unc. 3.

Borneo.

♀, B.M.

Allied to *asoka* of Felder, but very distinct.

45. ADOLIAS COCYTUS, sp. n. (Plate XLV. figs. 3 & 10.)

♂. *Pap. cocytus*, Fabricius, Mant. Ins. p. 29. n. 316 (1787).♀. *Affinis* *A. vacillariæ*, at *supra* *characteribus fere aphidæ* (*Hewits.*); *anticæ maculis velut in vacillaria at minoribus et fusciscentibus velut in asoka, linea media velut in vacillaria at distincte nigrescente: area apicali anticarum omnino virescente: posticæ lunulis tribus submarginalibus apicalibus nigris, squamis albidis circumcinctis.**Alæ subtus omnino flavidæ, anticæ disco toto læte flavescente; linea alis ambabus lunulari submarginali nigro-fusca: maculis anticarum supernis niveis fusco cinctis: posticæ linea angulariter arcuata discali fuscescente, characteribus basalibus consuetis: corpus supra fuscum, subtus flavescens.**Exp. alar. unc. 2 $\frac{5}{8}$.*Siam (*a collectione Banksii*).

B.M.

The Fabrician type is in the Banksian collection, and, as I have stated in the 'Annals of Natural History' (Jan. 1868), has no connexion with the *cocytus* of recent authors.♀. Above much like a small *aphidas* in pattern, but with the apical area covered with greenish scales; below it is also somewhat like that species, but the hind wings are differently coloured and the bands distinct. In form it differs considerably, the front wings being strongly falcate and the hind wings with the anal area produced.

46. ADOLIAS GOPIA.

♀ as ♂. *Adolias gopia*, Moore, Trans. Ent. Soc. London, p. 73, pl. 5. fig. 4 (1859). Assam and (?) Fiji Islands, ♂ ♀, B.M.

47. ADOLIAS AMBALIKA.

♀. *Adolias ambalika*, Moore, Trans. Ent. Soc. London, p. 74, pl. 5. fig. 3 (1859).♂. *A. ambalika*, Butler, Ann. & Mag. Nat. Hist. i. p. 98. n. 4 (Feb. 1868).Borneo (*Moore*).

Borneo, ♂ ♀, B.M.

48. ADOLIAS GANDARVA.

♂ ♀. *Adolias gandarva*, Vollenhoven, Tijdschr. voor Ent. p. 199. n. 29, (♀) pl. 11. fig. 4 (1862).*Hab.* —?Allied to *A. diardi*, but seems distinct; the male described probably belongs to another species.

49. ADOLIAS DIARDI.

♀. *Adolias diardi*, Vollenhoven, Tijdschr. voor Ent. p. 188. n. 8, pl. 10. fig. 2 (1862).♂. *A. diardi*, Butler, Ann. & Mag. Nat. Hist. i. p. 98. n. 5 (1868).♀, Borneo (*Vollenhoven*).

Borneo, ♂ ♀, B.M.

50. ADOLIAS BLUMEI.

♂. *Adolias blumei*, Vollenhoven, Tijdschr. voor Ent. p. 204. n. 30, pl. 12. figs. 3, 4 (1862).

♀. *A. blumei*, Butler, Ann. & Mag. Nat. Hist. i. p. 98. n. 2^a (1868).

♂, Java (*Vollenhoven*). Borneo, ♂ ♀, B.M.

51. ADOLIAS COCYTINA.

♂. *Adolias cocytina*, Horsfield, Zool. Journ. p. 67, pl. 4. figs. 3, 3^a (1829-30); ♀. Butler, Ann. & Mag. Nat. Hist. i. p. 99. n. 6 (Feb. 1868).

♂. *A. godartii*, G. R. Gray, List Lep. Nepal, p. 14, tab. 12. fig. 2 (1846).

♀. *A. mitra*, Felder, Reise der Novara, iii. p. 433. n. 695 (1867).

♂, Sumatra (*Horsfield*). Sumatra, ♂ ♀, B.M.

52. ADOLIAS LUDEKINGII.

♀. *Adolias ludekingii*, Vollenhoven, Tijdschr. voor Ent. p. 189. n. 9, pl. 10. fig. 3 (1862).

♀. Sumatra (*Vollenhoven*).

This is a local representative of *monina*, Fabr. (*puseda*, Moore), and comes between it and *cocytina*. The male will doubtless be difficult to determine.

53. ADOLIAS MONINA. (Plate XLV. fig. 4.)

♂. *Pap. monina*, Fabricius, Mant. Ins. p. 51. n. 502 (1787), *linea supramarginali latiore nigerrima*.

East India (*Fabricius*). East Indies, ♂, B.M.

♂ (race). *A. cocyta*, Fabr. Ent. Syst. iii. pt. 1. p. 127 (1793).

♀. *A. puseda*, Moore, Trans. Ent. Soc. p. 71, pl. 6. fig. 5 (1859).

Penang (*Moore*). Singapore, Penang, ♂ ♀, B.M.

I have examined thirty-five specimens of both sexes in Lieut. Roberts's collection. The form *monina*, ♀, only differs in the more strongly marked coloration of the under surface.

54. ADOLIAS LEPIDEA.

♂ ♀. *Adolias lepidea*, Butler, Ann. & Mag. Nat. Hist. i. p. 71 (1868).

♂ ♀, Northern India. ♀ var., Southern India, B.M.

This species has been most minutely described in German by Prittwitz (Stett. ent. Zeit. 1867) as the *cocytus* of Fabricius.

TELCHINEA group.

55. ADOLIAS TELCHINEA.

♂. *Adolias telchinea*, Ménériés, Cat. Léop. Mus. St. Pétersb. pt. 2. t. 9. fig. 3 (1857).

♀. *Adolias aphidas*, Hewitson, Exot. Butterf. iii. p. 60, pl. 30. fig. 8 (1862).

♂, Northern India (*Ménétriés*). Mus. Imp. Acad. St. Petersburg.
 ♀, East India (*Hewits*). Nepal, ♀, B.M.

56. ADOLIAS SEDEVA.

♀. *Adolias sedeva*, Moore, Trans. Ent. Soc. London, p. 68, pl. 4.
 fig. 3 (1859).

♂. *Adolias adima*, id. ibid. p. 76. n. 29 (1859).

♂ ♀, Assam (*Moore*). Assam, ♂ ♀, B.M.
Sedeva is not the female of *apiades*; the latter has no large white spots upon the upper surface of the wings.

57. ADOLIAS SANANDA.

♂. *Adolias sananda*, Moore, Trans. Ent. Soc. London, p. 76, pl. 7.
 fig. 3 (1859).

♂, Assam (*Moore*). Silhet, ♂, B.M.

58. ADOLIAS JAHNU.

♀. *Adolias jahnu*, Moore, Trans. Ent. Soc. London, p. 74. n. 24,
 pl. 7. fig. 1 (1859).

♂. *Adolias belarama*, Moore, Proc. Zool. Soc. London, p. 766,
 pl. 41. fig. 3 (1865).

♀, Darjeeling, ♂, North India (*Moore*). Silhet and Darjeeling,
 ♂ ♀, B.M.

♂ var. *Alæ posticæ maculis subquatuor squamiformibus cæruleis
 marginalibus apud angulum ani.*

Silhet. ♂, B.M.

59. ADOLIAS APIADES.

♂. *Adolias apiades*, *Ménétriés*, Cat. Léop. Mus. St. Pétersb. pt. 2.
 t. 9. fig. 4 (1857); also of Moore.

♀. *Alæ supra fulvo-fuscæ strigis consuetis basalibus, lineis
 duabus subdiffusis fuscis undatis discalibus continuis, ambabus
 apud apicem anticarum albido quadripunctatis: alæ subtus
 fere velut in A. jahnu coloratæ; alæ autem anticæ forma om-
 nino distant.*

Darjeeling (*Ménétriés*). Darjeeling, ♂ ♀, B.M.

60. ADOLIAS XIPHIONES, sp. n. (Plate XLV. fig. 6.)

♂. *Affinis A. apiadi minor, supra obscurior castaneo-fusca lineis
 anticarum discalibus magis approximatis; posticæ fascia mar-
 ginali viridi multo latiore: anticæ subtus basi flavescens,
 punctis apud apicem albicantibus; posticæ fundo toto flavo,
 maculis areæ analis cæruleo cinctis, aliter velut in apiade:
 corpus supra fuscum, subtus albidum.*

Exp. alar. unc. 2 $\frac{6}{8}$.

Moulmein. ♂, B.M.

Allied to *apiades* and *jahnu* ♂, but differing considerably from both.

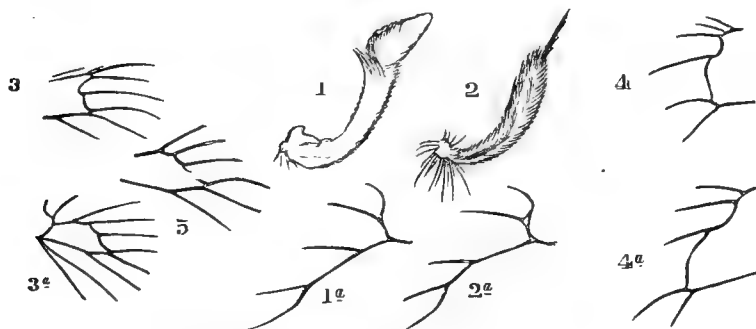


Fig. 1. Palpus of *Adolias aconthea*.

1 a. Subcostal branches of ditto (h. w.).

2. Palpus of *Tanaëcia pulasara*.

2 a. Subcostal branches of ditto (h. w.).

3, 3 a. Neurulation of *Stibochiona*.

4, 4 a. Neurulation of *Neurosigma*.

5. Rudimentary lower discocellular in *D. nesimachus*.

TANAËCIA, g. n.

Typical species *Tanaëcia pulasara*.

Sexes nearly alike; the palpi with a slender bristle-like terminal joint, varying somewhat in length in the different species; the middle discocellular of front wing feebly recurved; the first branch of the subcostal nervure in hind wing emitted at some distance from the base, the second just beyond.

1. TANAËCIA CALLIPHORUS.

♂. *Adolias calliphorus*, Felder, W. e. M. v. p. 302; Hewitson, Exot. Butterf. iii. p. 61, pl. 31. fig. 9 (1863).

Luzon (*Felder*).

Philippines, ♂, B.M.

2. TANAËCIA VALMIKIS.

♂ ♀. *Adolias valmikis*, Felder, Reise der Novara, p. 434. n. 697 (1867).

Borneo (*Felder*).

Id. ? Borneo, ♂ ♀, B.M.

Larger than the nearly allied *arana*, Felder (*pardalis*, Vollenhoven).

3. TANAËCIA APSARASA.

♀?. *Adolias apsarasa*, Vollenhoven, Tijdschr. voor Ent. p. 198. n. 18, pl. 11. fig. 3 (1862).

Borneo (*Vollenhoven*).

Most nearly allied to *A. valmikis*, Felder, but quite distinct.

4. TANAËCIA SUPERCILIA, sp. n. (Plate XLV. fig. 7.)

♂. *Valde affinis* T. *varunæ*; *alæ supra velut in T. pelea coloratæ, at fascia posticarum lunulari magis arcuata et characteribus basalibus punctiformibus: alæ subtus pallide fuscæ, area interno-basali anticarum flavescente, fascia sericeo-albida discali, maculis posticarum latioribus nigris: aliter velut in varuna.*

Exp. alar. unc. 2 $\frac{1}{2}$.

Penang.

♂, Coll. Roberts.

A local representative of *T. varuna*. Lieut. Roberts has assured me that the nearly allied species of the *Adolias* group are quite constant to their localities; otherwise I should have considered this to be a variety of *varuna*.

5. TANAËCIA VARUNA.

♀. *Adolias varuna*, Vollenhoven, Tijdschr. voor Ent. p. 195. n. 16, pl. 10. fig. 6 (1862).

♂. *Ala supra velut in fœmina, subtus fere velut in lutala* ♂.

Java (*Vollenhoven*).

Singapore, ♂, B.M.

This, though very closely allied to *lutala*, seems a good and constant species. In the collection of Lieutenant Roberts there are ten males and five females, not varying at all, from Singapore. The under surface of the wings differs considerably in the opposite sexes.

6. TANAËCIA ARUNA.

♂. *Adolias aruna*, Felder, Wien. ent. Monatschr. n. 24 (1859).

♂. *Adolias pardalis*, Vollenhoven, Tijdschr. voor Ent. p. 197. n. 17, pl. 11. fig. 5 (1862).

♂; Java (*Vollenhoven*); ♂, Malacca (*Felder*).

This seems very nearly allied to *varuna*.

7. TANAËCIA LUTALA.

Adolias lutala, Moore, Trans. Ent. Soc. p. 71, pl. 6. fig. 3 (1859).
Borneo (*Wallace*).

Borneo, ♂, B.M.

8. TANAËCIA TRIGERTA.

♂. *Adolias trigerta*, Moore, Trans. Ent. Soc. London, p. 72, pl. 5. fig. 2 (1859).

Java (*Moore*).

Java, ♂ ♀, B.M.

The third joint of the palpi in this insect is very short, but needle-like as in the other species.

9. TANAËCIA PELEA.

♂. *Papilio pelea*, Fabricius, Mant. Ins. p. 53. n. 523 (1787).

♂. *Adolias palguna*, Moore, Trans. Ent. Soc. London, p. 70, pl. 6. fig. 1 (1859).

♀. *Coloribus fere maris, alis autem forma et magnitudine lutalæ* ♂.
"In India" (*Fabricius*); ♂, Java (*Moore*). Java, ♀, B.M.

10. TANAËCIA PULASARA.

♂ ♀. *Adolias pulasara*, Moore, Trans. Ent. Soc. London, p. 71, (♂) pl. 6. fig. 3 (1859).

Malacca, Singapore, Penang (*Moore*). Malacca, India, ♀, B.M.

I have examined eight specimens of both sexes, taken by Lieut. Roberts in Malacca. The species appears scarcely to vary, although one male individual in this collection has the external area of all the wings unusually white.

♀. *Adolias indras*, Vollenhoven, Tijdschr. voor Ent. p. 194. n. 15, pl. 11. fig. 2 (1862).

♀, Borneo (*Vollenhoven*).

This is only the Bornean form of Moore's *pulasara*, from which it seems to differ in the paler margin to the wings, with one or two other minute and insignificant discrepancies.

11. TANAËCIA VIOLARIA, sp. n. (Plate XLV. fig. 8.)

♀. *Alæ supra fuscæ; anticæ velut in pelea, at margine toto fusco; posticæ fascia lunulari ad angulum ani increscente submarginali apud apicem lunulis niveis, apud angulum ani purpureis, a lunulis fuscis intus limitatis, extus a maculis sagittatis fuscis extra albido terminatis præcipue apud apicem.*

Alæ subtus velut in pulasara, at area basali fusco-flavida (nec ochreo-albida) sagittisque posticarum violaceis et longioribus.

Exp. alar. unc. 3 $\frac{1}{4}$.

Singapore.

♀, Coll. Roberts.

Allied to *vikrama*, Felder, but very distinct.

12. TANAËCIA VIKRAMA.

♂. *Adolias vikrama*, Felder, Reise der Novara, p. 433. n. 696 (1867).

Sumatra (*Wallace*).

Sumatra, ♂, B.M.

Closely allied to *A. pulasara*.

GENUS SYMPHÆDRA, Hübner (1816).

DIRTEA group.

1. SYMPHÆDRA ARETES.

♂ ♀. *Adolias aretes*, Hewitson, Exot. Butterf. ii. p. 69, (♂) pl. 35. figs. 1, 2 (1861).

Celebes (*Hewitson*).

Celebes, ♂ ♀, B.M.

Var. ♂. *Alæ posticæ fascia præocellari discali obsoleta.*

Celebes, ♂, B.M.

2. SYMPHÆDRA CANESCENS, sp. nov. (Plate XLV. fig. 5.)

♀. *Affinis S. areti ♀, minor, fascia autem anticarum discali maculari alba et ad basin continuata, fasciaque postmedia obliqua (in arete, furca solum fasciæ discalis) a punctis duobus albis substituta, fascia marginali ad angulum analem albicante; maculis posticarum majoribus, cincturis tenuioribus flavidis, intus ad angulum ani albicantibus, maculis flavis pallidioribus.*

Alæ subtus multo pallidioribus, aliter velut supra: corpus supra fuscum flavido maculatum, subtus flavido-fuscum.

Exp. alar. unc. 3 $\frac{5}{16}$.

Borneo.

♀, B.M.

Nearly allied to *aretes*, but formerly looked upon as a variety of *dirtea*.

3. SYMPHÆDRA DIRTEA.

♀. *Pap. dirtea*, Fabricius, Ent. Syst. iii. pt. 1. p. 59. n. 184 (1793), but not of Hewitson.

♀. *Adolias boisduvalii*, G. R. Gray, List Lep. Nepal, p. 12, tab. 10. fig. 1, (*dirtea* ♂) fig. 2 (1846).

Bengal (*Fabricius*).

Silhet, Java, Sumatra, ♂ ♀, B.M.

Local race. *Alis minoribus obscurioribus, antennis fulvo acuminatis*.
Borneo. ♂ ♀, B.M.

4. SYMPHÆDRA CYANIPARDUS.

♂. *Alæ supra simillimæ* S. dirteæ, majores, punctis autem anticarum basalibus viridi-albidis nec fulvo-aureis, fasciaque marginali subobsoleta diffusa, punctis duobus distinctis subapicalibus niveis; posticæ fascia violaceo-viridi intus regularius dentata, venis haud cinereo acuminatis: subtus maculis omnibus distinctissimis viridi-albis, fundo olivaceo-viridi nec fulvo-ferrugineo, punctis posticarum obscuris submarginalibus vix distinguendis.

♀. *Adolias dirtea*, Hewitson in Gen. Diurn. Lepid. pl. 44. fig. 1 (1850).

Silhet.

♂ ♀, B.M.

Local race. *Antennæ utroque sexu fulvo acuminatæ; femina alis supra paulo magis virescentibus*.

Borneo.

♂ ♀, B.M.

5. SYMPHÆDRA IMPERATOR.

♀. *Adolias imperator*, Hewitson, Exot. Butterf. iii. p. 62, pl. 31. fig. 10 (1863); *A. imperialis* in Index.

Luzon (*Hewitson*).

♀, Coll. Boisduval.

6. SYMPHÆDRA NINUS.

♀. *Adolias ninus*, Felder, Wien. ent. Monatschr. 1859; Reise der Novara, pt. 3. tab. 58. figs. 4, 5 (1867).

Ambonia (*Doleschall*); Ceram (*Wallace*).

Coll. Felder.

Comes into the *Dirtea* group.

7. SYMPHÆDRA? ACTION.

♀. *Adolias action*, Hewitson, Exot. Butterf. iii. p. 59, pl. 30. figs. 6, 7 (1862).

Aru Islands.

Coll. A. R. Wallace.

Mr. Hewitson says that this species has the discoidal cell of the front wing closed, but that of the hind wing open.

ÆROPUS group.

8. SYMPHÆDRA PANOPUS.

♂. *Adolias panopus*, Felder (W. e. M. v. p. 302, 1861); Reise der Novara, iii. tab. 58. figs. 2, 3 (1867).

Luzon (*Felder*).

♂, Philippines, B.M.

Described originally as a species of *Lexias*, Boisd. Gen. (= *Symphædra*). The structural characters which separate *Symphædra* from *Adolias* are not very considerable, and from their uncertainty seem almost to indicate a state of transition; the style of coloration, however, is quite distinct.

DICHORRAGIA, g. n.

Typical species *Dichorragia nesimachus*.

Most nearly allied to *Apatura* (*A. erminia*), but differing slightly in the neuration, the hind-wing cell being partially closed by an interrupted and rather delicate lower discocellular nervule. In colouring the type more nearly resembles *Symphædra cyanipardus* ♀ than anything else, which probably accounts for its retention in *Adolias*.

DICHORRAGIA NESIMACHUS.

Adolias nesimachus, Boisdual, in Cuvier's Règn. An. édit. Crochard, Ins. t. 139. fig. 1.

Northern India.

♂ ♀, B.M.

STIBOCHIONA, g. n.

Typical species *Stibochiona coresia*, Hübner.

Allied to *Diadema* (*D. alimena*), but differing from it, from *Apatura*, and from *Adolias* in having the discoidal cells of both wings distinctly closed, the middle and lower discocellulars of front wing forming a continuous arch, the upper discocellular of hind wing obliquely arched, the lower a little longer than the upper, slightly arched, and meeting the median nervule somewhat obliquely at the origin of the second and third branches. Colours intermediate between *Adolias cocytus* and *Diadema alimena*.

1. STIBOCHIONA NICEA.

Adolias nicea, G. R. Gray, List Lep. Nepal, p. 13, t. 12. fig. 1 (1833).

Adolias dolope, Felder, Wien. ent. Monatschr. iii. sp. 8 (1859).

Darjeeling (*Moore*).

Northern India, ♂ ♀, B.M.

♂ var. *Minor*, *punctis distincte viridibus nec cæruleis*.

Northern India.

♂, B.M.

2. STIBOCHIONA CORESIA.

♀. *Hypolimnas coresia*, Hübner, Exot. Schmett. Band ii. tab. 46. figs. 3, 4 (1806).

♂. *Adolias apaturina*, Horsfield, Zool. Journ. v. p. 68, pl. 4. figs. 1, 1^a (1835).

Java.

♂ ♀, B.M.

The type of the genus *Hypolimnas* is a *Diadema*, so that that term cannot be adopted.

NEUROSIGMA, g. n.

Typical species *Neurosigma siva*.

Nearly allied to *Romalæosoma*, of which it is probably the eastern representative; it differs, however, in neuration.

Body, palpi, and antennæ formed and coloured as in *Romalæosoma*; the wings coloured as in some Eastern species of *Argynnis*: the discoidal cells closed; the upper discocellular of front wings extremely minute; the middle short and transverse; the lower long, transverse, and gently waved, meeting the third median nervule close to the origin of the second; the upper discocellular of hind wings short and arched inwardly; the lower long, arched outward, slightly angulated in the centre, and meeting the third median nervule just beyond the origin of the second.

NEUROSIGMA SIVA.

Adolias siva, Westwood, Cab. Orient. Ent. p. 76, tab. 37. fig. 4 (1847).

Nepal.

♂ ♀, B.M.

Adolias confinis of Felder (Wien. ent. Monatschr. iii. p. 182, taf. 4, 1859) is identical with *Abrota jumna*, Moore, not *A. ganga*, as stated by Gerstaecker.

DESCRIPTION OF PLATE XLV.

Fig. 1. *Adolias vacillaria*, Butl., p. 606.

2 & 9. — *decoratus*, Butl., p. 605.

3 & 10. — *cocytus*, Fabr., p. 607.

4. — *monina*, Fabr., p. 608.

5. *Symphædra canescens*, Butl., p. 612.

6. *Adolias xiphioncs*, Butl., p. 609.

7. *Tanaëcia supercilia*, Butl., p. 610.

8. — *violaria*, Butl., p. 612.

9. On Pelagic Shells collected during a voyage from Vancouver Island to this country. By Commander HUGH H. KNOCKER, R.N., C.M.Z.S.

Having lately returned, in command of H.M.S. 'Alert,' from the Pacific, where I had been sent to bring home that vessel (I found her at Esquimalt in September 1867), I now beg to send, for the information of the Zoological Society, a sketch of my researches in pelagic shells during my passage home.

I conceived the idea on leaving Vancouver that, as I was going to pass through the four great oceans (viz. North and South Pacific, and South and North Atlantic), I might usefully try by the tow-net if it were possible to determine where the several species began and terminated, or whether they ran throughout the whole, or parts only, of these vast extents of water; and by the Table herewith sent it will be seen with what success.

Table showing the List of Pelagic Shells found during the passage of H.M.S. 'Alert,'

| Date. | Latitude. | | Longitude. | | <i>Hyalea</i> | | | | | | | <i>Cleodora</i> | | | | <i>Creseis</i> | | | <i>Cuviera</i> | | | | | | | | | | |
|---------|-----------|--------------------|------------|----|---|------------------|------------------|------------------|------------------------|-------------------|--------------------|---------------------|---------------------|-------------------|------------------------|--------------------|---------------------|---|--|---|------------------|------------------|------------------|----------------|--------------------|---------------------|------------------|---|---|
| | N. | W. | S. | W. | <i>longirostra</i> , var. ? Rostrum much more compressed. | <i>gibbosa</i> . | <i>labiata</i> . | <i>inflata</i> . | <i>quadridentata</i> . | <i>uncinata</i> . | <i>globulosa</i> . | <i>trispinosa</i> . | <i>tridentata</i> . | <i>angulata</i> . | - ? Name not made out. | <i>cuspidata</i> . | <i>lancoolata</i> . | <i>pyramidata</i> ? var. Much more compressed. | - ? Strongly striated ; spines not similar to <i>cuspidata</i> . | - ? Smooth, glassy, ter- minal point recurved ; or <i>Creseis</i> ? | <i>striata</i> . | <i>virgula</i> . | <i>acicula</i> . | <i>clava</i> . | <i>spinifera</i> . | <i>columnella</i> . | <i>atesana</i> ? | | |
| 1867. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oct. | 16... | 36 0 | 132 0 | | | | | | * | | | | | | | | | | | | | | | | | | | | |
| | 24... | 23 0 | 152 0 | | | | | | | | | | | | | | * | | | | | | | | | | | | |
| Nov. 6, | 7... | | | | * | | * | | | | | | | | | | | | | | | | | | | | | | |
| | 10... | 13 0 | 153 0 | | | | * | | * | | | | * | | | * | | | | | | | | | | | | | |
| | 12... | 11 0 | 152 0 | | | | | | * | | | | | | | | | | | | | | | | | | | | |
| | 17... | 8 0 | 147 0 | | | | | | * | | | | * | | | | | | | | | | | | | | | | |
| | 18... | 6 0 | 147 0 | | | | | | * | | | | | * | | | | | | * | | | | | | | | | |
| | 20... | 3 0 | 149 0 | | | | | | * | | | | | * | | | | | | * | | | | | | | | | |
| | 21... | 2 0 | 150 0 | | | | | | * | * | | | | | | | | | | * | | | | | | | | | |
| | 22... | 0 30 | 149 0 | | * | | | | * | * | * | * | | | | | | | * | * | * | * | * | * | * | * | * | * | * |
| | 23... | 1 30 | 148 0 | | | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 28... | 12 0 | 147 0 | | * | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 29... | 15 0 | 148 0 | | | | | | * | * | * | | | | | * | | | | * | * | * | * | * | * | * | * | * | * |
| Dec. | 30 | Off | | | | | | | * | * | * | | | | | * | | | | * | * | * | * | * | * | * | * | * | * |
| | 4 | Tahiti | | | | * | * | * | * | * | * | | | | * | | | | | * | * | * | * | * | * | * | * | * | * |
| | 11... | 28 0 | 139 0 | | | * | * | * | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 12... | 30 0 | 136 0 | | | | | | * | * | * | * var. | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 14... | 33 0 | 130 0 | | | | | * | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 15... | 33 0 | 129 0 | | | | | * | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 17... | 35 0 | 128 0 | | | | | * | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 18... | 37 0 | 127 0 | | | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 19... | 37 30 | 127 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 20... | 38 0 | 127 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 21... | 39 0 | 126 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 22... | 39 30 | 124 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 24... | 38 30 | 120 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 25... | 40 0 | 119 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 26... | 41 0 | 118 0 | | | | | * | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 27... | 42 0 | 120 0 | | | | | * | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 30... | 43 0 | 112 0 | | | | | | * | * | * | | * | | | | | | | * | * | * | * | * | * | * | * | * | * |
| 1868. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Jan. | 7... | 42 0 | 90 0 | | | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 8... | 41 0 | 88 0 | | | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| | 12... | 35 0 | 76 0 | | | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| Feb. | 15... | 39 0 | 81 0 | | | | | | * | * | * | | | | | | | | | * | * | * | * | * | * | * | * | * | * |
| Mar. | 11... | 40 0 | 44 0 | * | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 12... | 35 0 | 44 0 | | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 14... | 31 0 | 44 0 | | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 17... | 28 0 | 40 0 | | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 18... | 26 0 | 41 0 | | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 19... | Off Rio de Janeiro | | | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| April | 2... | 18 0 | 34 0 | * | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 3... | 17 0 | 34 0 | | | * | * | * | * | * | * | | | | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |

1 Much carinated.

from Vancouver's Island, B. C., to England, 16th October, 1867, to 12th May, 1868.

| Spiralis | | Atalanta | | Ianthina | | Litiopa | | Cheletropis | |
|--|--------|----------|--------|----------|--------|---------|--------|-------------|--------|
| <i>rostralis.</i> |* |* |* |* |* |* |* |* |* |
| <i>trochiformis.</i> |* |* |* |* |* |* |* |* |* |
| <i>ventricosa?</i> |* |* |* |* |* |* |* |* |* |
| <i>bulimoides.</i> |* |* |* |* |* |* |* |* |* |
| Large. |* |* |* |* |* |* |* |* |* |
| Var. |* |* |* |* |* |* |* |* |* |
| Blue. |* |* |* |* |* |* |* |* |* |
| Pink. |* |* |* |* |* |* |* |* |* |
| Black and brown. |* |* |* |* |* |* |* |* |* |
| Diminutive. |* |* |* |* |* |* |* |* |* |
| <i>Orygyrus keradrenit.</i> |* |* |* |* |* |* |* |* |* |
| —? |* |* |* |* |* |* |* |* |* |
| <i>fragilis.</i> |* |* |* |* |* |* |* |* |* |
| <i>exigua.</i> |* |* |* |* |* |* |* |* |* |
| <i>nitida.</i> |* |* |* |* |* |* |* |* |* |
| —? Light mauve-colour, globular. |* |* |* |* |* |* |* |* |* |
| <i>bicolor.</i> |* |* |* |* |* |* |* |* |* |
| 1. —? Dark horn-colour; body-whorl large; spire elevated, striated above the second whorl. |* |* |* |* |* |* |* |* |* |
| 2. —? Light horn-colour; sutures deep; spire less elevated. |* |* |* |* |* |* |* |* |* |
| <i>bombyx.</i> |* |* |* |* |* |* |* |* |* |
| <i>Spirorbis.</i> |* |* |* |* |* |* |* |* |* |
| 1. —? Pale whitish pink, strongly striated. |* |* |* |* |* |* |* |* |* |
| 2. —? Dark brown or horn-colour, striated and granulated. |* |* |* |* |* |* |* |* |* |
| 3. —? Smooth, glassy, white. |* |* |* |* |* |* |* |* |* |
| —? 4. Yellowish, spire elevated. |* |* |* |* |* |* |* |* |* |
| <i>Spirula.</i> |* |* |* |* |* |* |* |* |* |
| <i>Carinaria.</i> |* |* |* |* |* |* |* |* |* |
| —? Like <i>Orygyrus</i> , but strongly striated. |* |* |* |* |* |* |* |* |* |

North Pacific.

South Pacific.

South Atlantic.

² Same.

Table

| Date. | Latitude. | | Longitude. | | <i>Hyalea</i> | | | | | | | | | | <i>Cleodora</i> | | | | <i>Creseis</i> | | <i>Cuviera</i> | | | | | | | | | | | | | | | | | | | |
|-------|-----------|-------|------------|----------|---|------------------|------------------|------------------|------------------------|-------------------|--------------------|---------------------|---------------------|-------------------|------------------------|--------------------|---------------------|---|---|--|------------------|------------------|----------------|----------------|--------------------|---------------------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. | w. | s. | w. | <i>longirostra</i> , var. ? Rostrum much more compressed. | <i>gibbosa</i> . | <i>labiata</i> . | <i>inflata</i> . | <i>quadridentata</i> . | <i>uncinata</i> . | <i>globulosa</i> . | <i>trispinosa</i> . | <i>tridentata</i> . | <i>angulata</i> . | — ? Name not made out. | <i>cuspidata</i> . | <i>lanceolata</i> . | <i>pyramidata</i> ? var. Much more compressed. | — ? Strongly striated; spines not similar to <i>cuspidata</i> . | — ? Smooth, glassy, ter- minal point recurved; or <i>Creseis</i> ? | <i>striata</i> . | <i>virgula</i> . | <i>acuta</i> . | <i>clava</i> . | <i>spinifera</i> . | <i>columnella</i> . | <i>astessana</i> ? | | | | | | | | | | | | | |
| 1868. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 4... | 16 0 | 31 0 | 34 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | | | | |
| | 5... | 15 30 | 34 0 | 34 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | | | |
| | 6... | 15 0 | 34 0 | 34 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | | |
| | 8... | 13 0 | 33 0 | 33 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | |
| | 10... | 12 0 | 32 0 | 32 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | |
| | 11... | 11 0 | 31 0 | 31 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | |
| | 12... | 9 0 | 30 0 | 30 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | |
| | 13... | 7 0 | 30 0 | 30 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | | |
| | 14... | 5 0 | 30 0 | 30 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | |
| | 15... | 3 0 | 30 0 | 30 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | |
| | 17... | 0 0 | 30 0 | 30 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | |
| | | | | Equator. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | N. | W. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 18... | 2 0 | 30 0 | 30 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| | 19... | 2 30 | 31 0 | 31 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| | 28... | 25 0 | 40 0 | 40 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| | 29... | 27 0 | 39 0 | 39 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| May | 30... | 28 30 | 40 0 | 40 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| | 1... | 30 0 | 41 0 | 41 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |
| | 3... | 31 0 | 41 0 | 41 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 4... | 32 30 | 40 0 | 40 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 5... | 34 30 | 39 0 | 39 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 6... | 35 0 | 37 0 | 37 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 7... | 36 30 | 35 0 | 35 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 8... | 39 0 | 31 0 | 31 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 10... | 41 0 | 28 0 | 28 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 11... | 42 0 | 24 0 | 24 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | 12... | 43 0 | 22 0 | 22 0 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |

¹ Much crystalline sand, full of microscopic shells.

Every day, when the weather and the speed of the ship allowed it, I took specimens of each sort I procured and gummed them on cardboard, marking date, latitude, and longitude; thus the Table must be correct.

Respecting the spiral shells (*Cheletropis*, &c.), of which I found many varieties, I only casually notice them, being unable to name them.

I have followed Mons. Rang's nomenclature chiefly, but in a few cases have put "var." (variety) against some of the columns, as the species differ somewhat from those figured in his work.

(continued).

| <i>Spiralis</i> | <i>Atalanta</i> | <i>Ianthina</i> | <i>Liliopa</i> | <i>Cheletropis</i> | North Atlantic. | South Atlantic. |
|----------------------|------------------------------|--|----------------|--------------------|-----------------|-----------------|
| <i>rostralis.</i> | | | | | | |
| <i>trochiformis.</i> | | | | | | |
| <i>ventricosa?</i> | | | | | | |
| <i>bulimoides.</i> | | | | | | |
| Large. | Probably the same. | | | | | |
| Var. | Blue. | | | | | |
| | Pink. | | | | | |
| | Black and brown. | | | | | |
| | Diminutive. | | | | | |
| | <i>Oxygyrus kerandrenti.</i> | | | | | |
| —? | | | | | | |
| | | <i>fragilis.</i> | | | | |
| | | <i>exigua.</i> | | | | |
| | | <i>nitida.</i> | | | | |
| | | —? Light mauve-colour, globular. | | | | |
| | | <i>bicolor.</i> | | | | |
| | | 1. —? Dark horn-colour; body-whorl large; spire elevated, striated above the second whorl. | | | | |
| | | 2. —? Light horn-colour; sutures deep; spire less elevated. | | | | |
| | | <i>bombyx.</i> | | | | |
| | | <i>Spirorbia.</i> | | | | |
| | | 1. —? Pale whitish pink, strongly striated. | | | | |
| | | 2. —? Dark brown or horn-colour, striated and granulated. | | | | |
| | | 3. —? Smooth, glassy, white. | | | | |
| | | 4. —? Yellowish, spire elevated. | | | | |
| | | <i>Spirula.</i> | | | | |
| | | <i>Carinaria.</i> | | | | |
| | | —? Like <i>Oxygyrus</i> , but strongly striated. | | | | |

² Not made out.

The Atalantas I have simply placed in separate columns, not knowing their specific names, but with notes for guidance.

Of the Ianthinas I found several species; one I submitted to Dr. A. Adams, R.N., who informs me it is new (*I. nitida*), and has kindly undertaken to describe it, together with another new shell I procured*.

* "DEAR CAPTAIN KNOCKER,—I think the small *Ianthina*, which occurred somewhat abundantly in your cruise, is a new species, and, on account of its shining appearance, may be named *I. nitida*. It belongs to the same section (*Iodes*, Mörch) as does the pretty *I. exigua*; but the whorls are more finely striated, and

I may, perhaps, be allowed to remark that I found the tow-net but of little service during the daytime, the hours between sunset and sunrise, especially on moonlight nights, being the most favourable. I also remarked, generally, that the *Atalantæ* were the first to come to the surface, the species of *Creseis* next, and lastly the *Hyaleæ* and *Cleodoræ*; these seldom before the sun had set, and usually an hour after.

In submitting this "chain" of Pelagic Mollusca to the Members of the Society, I trust they will make all allowances for imperfections in a first attempt.

I will now proceed with a few observations on the several varieties; but having no microscope on board, and with the number of interruptions which continually occur on board ship, they will be of a very superficial nature.

CLEODORA PYRAMIDATA (Péron).

C. lanceolata (young), Rang.

I believe these species to be different, as I found *C. pyramidata* and *C. lanceolata* equally large. In all cases the characters were distinct, and there were no intermediate forms, *C. pyramidata* being invariably more elongated and compressed, the line from the lateral to the terminal points being nearly straight, whereas in *C. lanceolata* the lateral points diverge much more, are more posterior, and the line from these to the terminal one is much more incurved.

In a work on the natural history of California I found the name *Cleodora exacuta* mentioned as the species of that coast. But I cannot find any difference between it and *C. lanceolata*, and have included them both in the same column.

CLEODORA (not named).

I obtained only three specimens of this shell (18th and 21st November and 11th March), all rather damaged; the lateral points long, attenuated, sharp, and rather inclined forwards; terminal point short and much curved upwards. Shell glassy, very brittle, white, and strongly striated across from dorsal ridge to ventral edge. That obtained on the 11th March has the terminal point less curved, and the lateral ones directed more forwards. I do not find this species described in Rang's work. It appears to differ entirely from *C. cuspidata*.

CLEODORA, or CRESEIS?

On 17th March 1868. A large, long, smooth, glassy shell, rather

the colour is of a uniform violet. The chief peculiarity, however, is its shining appearance.

"IANTHINA NITIDA, A. Ad.

"I. testa subumbilicata, trochoidea, nitida, violacea, oblique crebrilirata, anfractu ultimo convexo in medio valde carinato; apertura subtriangulari, labro in medio profunde sinuato.

"Yours very sincerely,

"ARTHUR ADAMS."

rounded on both surfaces; the terminal point strongly but gradually curved. Being damaged on the anterior part, I cannot describe it further. I do not find anything similar in Rang's work. It is the only specimen I obtained.

HYALEA.

19th April 1868. This is probably a variety of *H. longirostra*; the rostrum much more compressed, more elevated, and curves up sooner than in the true *H. longirostra*.

HYALEA (name not made out).

19th and 30th April. The only two days I got this shell, and I find no *Hyalea* corresponding to it in the work of M. Rang. The terminal and lateral points truncated and very little developed; the dorsal plate prolonged considerably in a gentle curve and forming an obtuse point; dorsal markings three; ventral plate much rounded (globular), striated, nearly square anteriorly. It resembles more *H. quadridentata* in shape, except the points and projecting plate; it is also wider in proportion.

IANTHINA?

3rd and 8th April 1868. Aperture very large; spire depressed, umbilicated; lip reflected over umbilicus; no notch; colour deep blue and strongly striated.

LITIOPA.

29th November and 4th December 1867. Resembles much the *Litiopa bombyx* of the Saragossa weed; and if of this species, it is worthy of notice that it should occur on both sides of the American continent, although not in quite similar latitudes.

LITIOPA.

4th December. Another species, light yellow horn-colour; body-whorl very large; sutures deep and very marked; spire short, mammillated (not acute as in the other); whorls five; aperture nearly complete.

CHELETROPIS, No. 1.

Whitish cream-colour, aperture and sutures brownish; spire short, obtuse; whorls five, the last large, strongly marked spirally, less so but very finely transversely, giving a granulated appearance; claws in three points.

CHELETROPIS, No. 2.

Deep brown or horn-colour. These I found most plentifully near the Line on the Atlantic side.

CHELETROPIS, No. 3.

White, glassy; claws closer and sharper; shell smooth.

CHELETROPIS, No. 4.

Yellow; smooth, spire elevated. Doubtful if a *Cheletropis*.

On 5th May 1868 (lat. 34° N., long. 39° W.) I obtained a yellowish semitransparent shell, somewhat resembling *Oxygyrus*; spire concealed, strongly marked in a line with the whorls.

On the same day the tow-net brought in a considerable amount of extremely fine crystalline sand, which contained numbers of microscopic shells. Some of these I picked out by means of the lens; they appeared mostly to be discoidal, transparent, and white. I am quite unable to account for this singular and unique occurrence.

During the long passage, I need scarcely say, I found many spiral shells, and many of these minute. These being probably the "fry" of larger sorts, I have not described them. Should at some future day any notice of them be desired, I will endeavour to send you a list and short descriptions of them.

December 10, 1868.

Professor Huxley, F.R.S., V.P., in the Chair.

Mr. Sclater called the attention of the Meeting to the following special additions to the Menagerie since the last Meeting:—

1. A pair of Crowned Hornbills (*Toccos melanoleucus*) from South Africa, purchased November 27th, making nine species of this family of birds now living in the Society's Gardens, namely:—

Buceros bicornis.

— *rhinoceros*.

— *pica*.

— *corrugatus*.

— *elatus*.

Buceros atratus.

Toccos erythrorhynchus.

— *melanoleucus*.

Bucorvus abyssinicus.

2. Two Regent-birds (*Sericulus melinus*) from Australia, purchased December 3rd, making three examples of this fine bird now living in the Gardens. One of the last purchases was in full plumage; the two others in the dress of immaturity.

3. Two Temminck's Snappers (*Macroclennmys temminckii*) from the Mississippi, presented December 5th by Mr. C. Hagenbeck of Hamburg.

Mr. Sclater exhibited, on the part of M. Jules Verreaux, Corr.

Memb., two specimens of *Ampeliceps coronatus* of Blyth (J. A. S. B. vol. xi. pt. 1, p. 195, figured in Gray and Mitchell's Gen. of Birds, pl. 81). Mr. Blyth had originally described this bird from specimens from Tennasserim. The present examples were stated to be from the northern part of Cochin-China, where it inhabits the bushy plains in small flocks of seven or eight individuals. Its habits were stated by M. Verreaux's correspondents to resemble those of the genus *Acridotheres*, its food consisting of locusts, grasshoppers, and other insects, which are often sought for in the vicinity of cattle.

Mr. Sclater also exhibited, and made remarks upon, the skin of a male Kaleege (*Euplocamus cuvieri*) from Arracan, which had been presented to the Society by Mr. John Squire, C.M.Z.S., on September 4th last. The specimen appeared to agree well with Temminck's figure (Pl. Col. i.) of *Lophophorus cuvieri*, and was clearly intermediate between *E. lineatus* and *E. horsfieldi*. Mr. Sclater had been informed that all the Kaleeges from Arracan were of this variety, which, if this were truly the case, might be held to constitute a good geographical species.

Mr. E. Blyth exhibited, and made remarks on, some horns of supposed hybrids between the Chamois (*Rupicapra tragus*) and the Domestic Goat.

The following papers were read:—

1. On the Breeding of Mammals in the Gardens of the Zoological Society of London during the past twenty years. By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

The first Table subjoined gives a list of the different species of Mammals that have bred in the Society's Gardens from the commencement of the year 1848 up to the end of 1867 (that is, during a period of twenty years), and the number of instances in which each species has produced living young during the same period. It has been compiled from the "Occurrences," the Annual Reports of the Council of the Society, and from other documents.

The arrangement followed is that of the fourth edition of the 'List of Vertebrated Animals living in the Gardens of the Zoological Society of London' (1866).

The second Table gives the total number of species that have bred in each order of Mammals, and the number of species of the same order that are enumerated in the list of Vertebrates. By this a better idea may be formed of the comparative frequency of breeding in each order, which is indicated in the third column.

| | | No. of instances of breeding in each species during the past twenty years. | No. of ditto in each order. |
|-----------------------------------|--------------------------------------|--|--------------------------------------|
| I. QUADRUMANA. | | | |
| 1. Rhesus Monkey | <i>Macacus rhesus</i> | 11 | 31 |
| 2. Pig-tailed Monkey | — <i>nemestrinus</i> | 1 | |
| 3. Macaque Monkey | — <i>cynomolgus</i> | 2 | |
| 4. Arabian Baboon | <i>Cynocephalus hamadryas</i> | 2 | |
| 5. Vervet Monkey | <i>Cercopithecus pygerythrus</i> .. | 6 | |
| 6. Capuchin Monkey | <i>Cebus capucinus</i> | 1 | |
| 7. Ring-tailed Lemur | <i>Lemur catta</i> | 1 | |
| 8. White-handed Lemur | — <i>albimanus</i> | 2 | |
| 9. Black-fronted Lemur | — <i>nigrifrons</i> | 2 | |
| 10. Yellow-cheeked Lemur | — <i>xanthomystax</i> | 1 | |
| 11. Red-fronted Lemur | — <i>rufifrons</i> | 1 | |
| 12. Maholi Galago | <i>Galago maholi</i> | 1 | |
| IV. CARNIVORA. | | | |
| 1. Common Wolf | <i>Canis lupus</i> | 11 | 85 |
| 2. Indian Wolf | — <i>pallipes</i> | 2 | |
| 3. Common Jackal | — <i>auratus</i> | 2 | |
| 4. Black-backed Jackal | — <i>mesomelas</i> | 1 | |
| 5. Azara's Fox | — <i>azarae</i> | 1 | |
| 6. Silver Fox | — <i>argentatus</i> | 6 | |
| 7. Dingo Dog | — <i>dingo</i> | 1 | |
| 8. Barred Ichneumon | <i>Herpestes fasciatus</i> | 3 | |
| 9. Senegal Genet | <i>Genetta senegalensis</i> | 1 | |
| 10. Tigrid Genet | — <i>tigrina</i> | 1 | |
| 11. Pale Genet | — <i>pallida</i> | 1 | |
| 12. Feline Genet | — <i>felina</i> | 1 | |
| 13. African Civet | <i>Viverra civetta</i> | 2 | |
| 14. Lion | <i>Felis leo</i> | 12 | |
| 15. Tiger | — <i>tigris</i> | 6 | |
| 16. Jaguar | — <i>onca</i> | 3 | |
| 17. Leopard | — <i>leopardus</i> | 8 | |
| 18. Puma | — <i>concolor</i> | 5 | |
| 19. Ocelot | — <i>pardalis</i> | 3 | |
| 20. Otter | <i>Lutra vulgaris</i> | 1 | |
| 21. Badger | <i>Meles taxus</i> | 3 | |
| 22. Polar Bear | <i>Thalassarctos maritimus</i> | 3 | |
| 23. Brown Bear | <i>Ursus arctos</i> | 5 | |
| 24. Black Bear | — <i>americanus</i> | 3 | |
| VI. RODENTIA. | | | |
| 1. American Flying-Squirrel | <i>Sciuropterus volucella</i> | 2 | 33 |
| 2. Prairie Marmot | <i>Arctomys ludovicianus</i> | 1 | |
| 3. Canadian Beaver | <i>Castor canadensis</i> | 1 | |
| 4. Barbary Mouse | <i>Mus barbarus</i> | 4 | |
| 5. Mitchell's Hapalote | <i>Hapalotis mitchelli</i> | 1 | |
| 6. Lemming | <i>Lemmus norvegicus</i> | 1 | |
| 7. Indian Porcupine | <i>Hystrix leucura</i> | 3 | |
| 8. Orange-quilled Porcupine | — <i>malabarica</i> | 1 | |
| 9. Chinchilla | <i>Chinchilla lanigera</i> | 6 | |
| 10. Golden Agouti | <i>Dasyprocta aguti</i> | 11 | |
| 11. Viscacha | <i>Lagostomus trichodactylus</i> .. | 2 | |
| VIII. ARTIODACTYLA. | | | |
| 1. Guanaco | <i>Auchenia huanacus</i> | 4 | 13 |
| 2. Alpaca | — <i>pacos</i> | 10 | |
| 3. Lama | — <i>glama</i> | 7 | |
| 4. Giraffe | <i>Camelopardalis giraffa</i> | 13 | |
| 5. Punjab Sheep | <i>Ovis cycloceros</i> | 8 | |

| | | No. of instances of breeding in each species during the past twenty years. | No. of ditto in each order. |
|--------------------------------------|---|--|--------------------------------------|
| 6. Moufflon | <i>Ovis musimon</i> | 4 | |
| 7. Aoudad | — <i>tragelaphus</i> | 7 | |
| 8. Markhore | <i>Capra megaceros</i> | 3 | |
| 9. Cretan Goat | — <i>agagrus</i> | 3 | |
| 10. Ibex | — <i>ibex</i> | 6 | |
| 11. Nubian Ibex | — <i>nubiana</i> | 2 | |
| 12. Alpine Chamois | <i>Rupricapra tragus</i> | 2 | |
| 13. Philantomba | <i>Cephalophus maxwelli</i> | 1 | |
| 14. Duiker-bok | — <i>mergens</i> | 5 | |
| 15. Burchell's Duiker | — <i>burchelli</i> | 1 | |
| 16. Cuvier's Gazelle | <i>Gazella cuvieri</i> | 1 | |
| 17. Dorcas Gazelle | — <i>dorcas</i> | 7 | |
| 18. Blessbok | <i>Damalis albifrons</i> | 2 | |
| 19. Leucoryx | <i>Oryx leucoryx</i> | 9 | |
| 20. Eland | <i>Oreas canna</i> | 33 | |
| 21. Nylghaie | <i>Portax picta</i> | 11 | |
| 22. Yak | <i>Bos grunniens</i> | 4 | |
| 23. Zebu | — <i>indicus</i> | 13 | |
| 24. Bison | <i>Bison americanus</i> | 2 | |
| 25. Wapiti Deer | <i>Cervus canadensis</i> | 20 | |
| 26. Barbary Deer | — <i>barbarus</i> | 4 | |
| 27. Persian Deer | — <i>maral</i> | 12 | |
| 28. Formosan Deer | — <i>taëvanus</i> | 1 | |
| 29. Japanese Deer | — <i>sika</i> | 11 | |
| 30. Barasingha Deer | — <i>duvaucelli</i> | 3 | |
| 31. Sambur Deer | — <i>aristotelis</i> | 21 | |
| 32. Rusa Deer | — <i>rusa</i> | 6 | |
| 33. Molucca Deer | — <i>moluccensis</i> | 4 | |
| 34. Hog Deer | — <i>porcinus</i> | 20 | |
| 35. Axis Deer | — <i>axis</i> | 11 | |
| 36. Virginian Deer | — <i>virginianus</i> | 5 | |
| 37. Mexican Deer | — <i>mexicanus</i> | 3 | |
| 38. Pampas Deer | — <i>campestris</i> | 1 | |
| 39. Reindeer | <i>Rangifer tarandus</i> | 3 | |
| 40. Collared Peccary | <i>Dicotyles tajaçu</i> | 8 | |
| 41. Wild Swine | <i>Sus scrofa</i> | 1 | |
| 42. Indian Swine | — <i>indicus</i> | 1 | |
| 43. Andaman Pig | — <i>andamanensis</i> | 2 | |
| 44. Pencilled River-Hog | <i>Potamochoerus penicillatus</i> | 5 | |
| IX. PERISSODACTYLA. | | | 300 |
| 1. Burchell's Zebra | <i>Equus burchelli</i> | 3 | |
| 2. Cape Hyrax | <i>Hyrax capensis</i> | 4 | |
| X. EDENTATA. | | | 7 |
| 1. Six-banded Armadillo | <i>Dasypus sexcinctus</i> | 1 | 1 |
| XII. MARSUPIALA. | | | |
| 1. Virginian Opossum | <i>Didelphys virginiana</i> | 2 | |
| 2. Vulpine Phalanger | <i>Phalangista vulpina</i> | 9 | |
| 3. Short-headed Phalanger | <i>Belideus breviceps</i> | 5 | |
| 4. Common Wombat | <i>Phascolomys wombat</i> | 1 | |
| 5. Red Kangaroo | <i>Macropus rufus</i> | 1 | |
| 6. Great Kangaroo | — <i>giganteus</i> | 2 | |
| 7. Bennett's Wallaby | <i>Halmaturus bennettii</i> | 6 | |
| 8. Derbyan Wallaby | — <i>derbianus</i> | 1 | |
| 9. Yellow-footed Rock-Kangaroo | <i>Petrogale xanthopus</i> | 4 | |
| 10. Gray's Jerboa Kangaroo | <i>Bettongia grayi</i> | 6 | |
| 11. Common Jerboa Kangaroo | — <i>penicillata</i> | 5 | |
| | | | 42 |

TABLE II.

| | No. of species in list. | No. of breeding species. | Proportion of breeding species to total number. |
|--------------------------|-------------------------|--------------------------|---|
| I. Quadrumana | 75 | 12 | 1 in 6·2 |
| II. Chiroptera | 1 | | |
| III. Insectivora | 1 | | |
| IV. Carnivora | 74 | 24 | 1 in 3·0 |
| V. Pinnipedia | 3 | | |
| VI. Rodentia | 52 | 11 | 1 in 4·7 |
| VII. Proboscidea | 2 | | |
| VIII. Artiodactyla | 85 | 44 | 1 in 1·9 |
| IX. Perissodactyla | 9 | 2 | 1 in 4·5 |
| X. Edentata | 7 | 1 | 1 in 7·0 |
| XI. Cetacea | 1 | | |
| XII. Marsupialia | 28 | 11 | 1 in 2·5 |
| XIII. Monotremata | 1 | | |
| | 339 | 105 | 1 in 3·2 |

2. On Venezuelan Birds collected by Mr. A. Goering. By
P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN,
F.L.S.—Part II.

Two small collections of birds recently received from our Corresponding Member Mr. Anton Goering (to whose labours in Venezuela we have already once called the Society's attention *) contain specimens of 99 species.

The subjoined Table gives the names of them according to Sclater's 'American Catalogue,' together with the exact localities whenever these are stated on Mr. Goering's labels:—

| | Caracas. | Porto Cabello. | Tucacas. | Cumbre de Valencia. | S. Esteban. |
|--|----------|----------------|----------|---------------------|-------------|
| TURDIDÆ. | | | | | |
| 1. <i>Turdus fumigatus</i> | ... | ... | ... | ... | * |
| 2. <i>Rhodinocichla rosea</i> | ... | ... | ... | ... | * |
| PARIDÆ. | | | | | |
| 3. <i>Polioptila buffoni</i> | * | | | | |
| TROGLODYTIDÆ. | | | | | |
| 4. <i>Campylorhynchus nuchalis</i> | ... | ... | ... | ... | * |
| 5. <i>Thryothorus leucotis</i> | ... | ... | ... | ... | * |
| 6. — <i>rutilus</i> | ... | ... | ... | ... | * |

* See P. Z. S. 1868, p. 165.

| | Caracas. | Porto Cabello. | Tucacas. | Cumbre de Valencia. | S. Esteban. |
|--------------------------------------|----------|----------------|----------|---------------------|-------------|
| SYLVICOLIDÆ. | | | | | |
| 7. Henicocichla noveboracensis | ... | ... | * | | |
| 8. Parula pitaiayumi | ... | ... | ... | ... | * |
| 9. Geothlypis equinoctialis | * | | | | |
| HIRUNDINIDÆ. | | | | | |
| 10. Atticora cyanoleuca | ... | * | | | |
| 11. Progne tapera | ... | * | | | |
| VIREONIDÆ. | | | | | |
| *12. Hylophilus hypoxanthus | ... | ... | ... | ... | * |
| 13. Cyclorhis flavipectus..... | ... | ... | ... | ... | * |
| CEREBIDÆ. | | | | | |
| 14. Diglossopsis cærulescens | * | | | | |
| 15. Dacnis plumbea | ... | | * | | |
| 16. Cereba cyanea | ... | ... | ... | ... | * |
| TANAGRIDÆ. | | | | | |
| 17. Euphonia violacea..... | ... | ... | ... | ... | * |
| 18. ——— xanthogastra..... | ... | ... | ... | ... | * |
| 19. Calliste guttata | * | | | | |
| 20. ——— desmaresti..... | ... | ... | ... | ... | * |
| 21. ——— cyanescens | * | | | | |
| 22. Tanagra melanoptera | ... | ... | ... | ... | * |
| 23. Rhamphocelus dimidiatus | ... | ... | ... | ... | * |
| 24. Eucometes cristata | ... | ... | ... | ... | * |
| *25. Chlorospingus albitemporalis... | ... | ... | ... | * | |
| 26. Buarremon brunneinuchus | * | | | | |
| FRINGILLIDÆ. | | | | | |
| 27. Guiraca cyanea | * | | | | |
| 28. Spermophila minuta..... | ... | ... | ... | ... | * |
| CORVIDÆ. | | | | | |
| 29. Cyanocorax incas | ... | ... | ... | ... | * |
| DENDROCOLAPTIDÆ. | | | | | |
| *30. Sclerurus albigularis..... | ... | ... | ... | ... | * |
| 31. Synallaxis castanea | * | | | | |
| 32. Placellodomus frontalis | ... | ... | ... | ... | * |
| 33. Xenops genibarbis | ... | ... | ... | ... | * |
| *34. Sittasomus olivaceus..... | ... | ... | ... | ... | * |
| 35. Dendroornis susurrans | ... | ... | ... | ... | * |
| 36. Dendroplex picirostris | ... | ... | ... | ... | * |
| 37. Picolaptes lafresnayi..... | * | | | | |
| FORMICARIIDÆ. | | | | | |
| 38. Thamnophilus doliatus | ... | ... | ... | ... | * |

| | Caraccas. | Porto Cabello. | Tucacas. | Cumbre de Valencia. | S. Esteban. |
|---|-----------|-------------------|----------|------------------------|-------------|
| 39. <i>Thamnophilus atricapillus</i> | | | | | |
| 40. <i>Dysithamnus semicinerus</i> | ... | ... | ... | ... | * |
| 41. <i>Herpsilochmus rufimarginatus</i> | ... | ... | ... | ... | * |
| 42. <i>Ramphocænus melanurus</i> | ... | ... | ... | ... | * |
| 43. <i>Formicivora intermedia</i> | ... | ... | ... | ... | * |
| *44. <i>Grallaricula loricata</i> | ... | ... | ... | * | |
| TYRANNIDÆ. | | | | | |
| 45. <i>Sayornis cineracea</i> | ... | ... | ... | ... | * |
| *46. <i>Orchilus ecaudatus</i> | ... | ... | ... | ... | * |
| 47. <i>Euscarthmus impiger</i> | * | | | | |
| 48. — <i>squamieristatus</i> | ... | ... | ... | * | |
| 49. <i>Mionectes striaticollis</i> | ... | ... | ... | ... | * |
| 50. <i>Elainea pagana</i> | ... | ... | ... | ... | * |
| *51. — <i>elegans</i> | ... | ... | ... | ... | * |
| *52. — <i>placens</i> | ... | ... | ... | ... | * |
| 53. <i>Myiozetetes cayennensis</i> | ... | ... | ... | ... | * |
| 54. <i>Empidochanes olivus</i> | ... | ... | ... | ... | * |
| 55. <i>Contopus brachytarsus</i> | ... | ... | ... | ... | * |
| *56. <i>Myiarchus erythrocerus</i> | * | | | | |
| *57. — <i>venezuelensis</i> | ... | ... | ... | ... | * |
| COTINGIDÆ. | | | | | |
| 58. <i>Pachyramphus</i> , sp., ♀ | ... | ... | ... | ... | * |
| *59. <i>Heteropelma stenorhynchum</i> | ... | ... | ... | ... | * |
| 60. <i>Pipra auricapilla</i> | ... | ... | ... | ... | * |
| 61. — <i>flicauda</i> | ... | ... | ... | ... | * |
| 62. <i>Chiroxiphia lanceolata</i> | ... | ... | ... | ... | * |
| 63. <i>Pripreola melanolaema</i> | * | | | | |
| 64. — <i>formosa</i> | * | | | | |
| 65. <i>Chasmorhynchus variegatus</i> | ... | ... | ... | ... | * |
| MOMOTIDÆ. | | | | | |
| 66. <i>Momotus swainsoni</i> | ... | ... | ... | ... | * |
| ALCEDINIDÆ. | | | | | |
| 67. <i>Ceryle americana</i> | ... | ... | ... | ... | * |
| BUCCONIDÆ. | | | | | |
| 68. <i>Bucco bicinctus</i> | ... | ... | ... | ... | * |
| TROGONIDÆ. | | | | | |
| 69. <i>Pharomacrus fulgidus</i> | * | | | | |
| TROCHILIDÆ. | | | | | |
| 70. <i>Glaucis hirsuta</i> | ... | ... | ... | ... | * |
| 71. <i>Phaethornis anthophilus</i> | ... | ... | ... | ... | * |
| 72. <i>Sternoclyta cyanopectus</i> | ... | ... | ... | ... | * |
| 73. <i>Lampornis mango</i> | ... | ... | ... | ... | * |
| 74. <i>Chalybura buffoni</i> | ... | ... | ... | ... | * |
| 75. <i>Florisuga mellivora</i> | ... | ... | ... | ... | * |

| | Caracas. | Porto Cabello. | Tucacas. | Cumbre de Valencia. | S. Esteban. |
|---|----------|----------------|----------|---------------------|-------------|
| 76. <i>Lophornis reginæ</i> | | | | | |
| 77. <i>Chaetocercus rosæ</i> | * | | | | |
| 78. <i>Metallura tyrianthina</i> | * | | | | |
| 79. <i>Chrysolampis moschitus</i> | * | | | | |
| 80. <i>Lampropygia cœligena</i> | | | | | |
| 81. <i>Erythronota feliciae</i> | | | | | |
| 82. <i>Chrysuronia œnone</i> | * | | | | |
| RAMPHASTIDÆ. | | | | | |
| 83. <i>Aulacorhamphus sulcatus</i> | ... | ... | ... | ... | * |
| PICIDÆ. | | | | | |
| 84. <i>Picumnus squamulatus</i> | ... | ... | ... | ... | * |
| 85. <i>Campephilus malherbii</i> | ... | ... | ... | ... | * |
| 86. <i>Dryocopus lineatus</i> | ... | ... | ... | ... | |
| 87. <i>Chloronerpes kirkii</i> | ... | ... | ... | ... | * |
| PSITTACIDÆ. | | | | | |
| *88. <i>Conurus æruginosus</i> | ... | ... | ... | ... | * |
| ACCIPITRES. | | | | | |
| 89. <i>Urubitinga anthracina</i> | ... | ... | ... | ... | |
| 90. <i>Spizaetus ornatus</i> | ... | ... | ... | ... | * |
| 91. <i>Herpetotheres cachinnans</i> | ... | ... | ... | ... | * |
| *92. <i>Accipiter</i> , sp. ? | ... | ... | ... | ... | * |
| 93. <i>Falco deiroleucus</i> | ... | ... | ... | ... | * |
| 94. <i>Cymindis cayennensis</i> | ... | ... | ... | ... | * |
| STRIGES. | | | | | |
| 95. <i>Scops brasilianus</i> | ... | ... | ... | ... | |
| 96. <i>Glaucidium phalænoides</i> | ... | ... | ... | ... | * |
| COLUMBÆ. | | | | | |
| 97. <i>Chamæpelis rufipennis</i> | ... | ... | ... | ... | * |
| LIMICOLÆ. | | | | | |
| 98. <i>Tringoides macularia</i> | ... | ... | * | ... | |
| RALLIDÆ. | | | | | |
| 99. <i>Aramides cayennensis</i> | ... | ... | ... | ... | * |

The following notes relate to the species marked with an asterisk.

12. *HYLOPHILUS HYPOXANTHUS*, Pelz. Orn. Bras. pp. 71, 136.

A single skin of an *Hylophilus* from San Esteban seems to agree very well with Pelzeln's description. Natterer obtained this species on the Rio Icanna and Rio Vaupé, which are on the confines of Venezuela. Selater has a second specimen of this species, received

in a Trinidad collection, as alluded to in his Cat. Am. B. p. 44 (note). *H. insularis* of Leotaud (Ois. de Trin. p. 186) would appear to be referable to this species, and not to *H. insularis*, Sclater, although both of them probably occur in that island.

25. *CHLOROSPINGUS ALBITEMPORALIS* (Laf.); Sclater, Cat. A. B. p. 89.

The Venezuelan skin agrees with a Bolivian skin in Sclater's Collection, and with a specimen from Costa Rica collected by Arcé (*cf.* Lawrence, Ann. L. N. Y. ix. p. 101). It may be true, as Dr. Cabanis has remarked (*J. f. O.* 1866, p. 162), that Lafresnaye's description of *Tachyphonus albitempora* includes the Mexican *C. ophthalmicus* and the present species. But Lafresnaye gives the habitat of his bird as "Columbie;" so that it seems quite fair to restrict his term to the southern species, which is readily distinguishable from the northern form by its small postocular spot, and the brighter yellow of its breast and sides.

We have carefully compared a series of Mexican and Guatemalan specimens of *C. ophthalmicus*, but cannot find differences sufficiently constant to distinguish them. Even if this were the case, Bonaparte's term *olivaceus* (which was founded on a Central-American specimen*) would supersede Dr. Cabanis's proposed new name *postocularis*.

30. *SCLERURUS ALBIGULARIS*.

A single skin of a species most nearly resembling *S. umbretta*, but apparently distinguishable by its white throat, smaller size, greyish abdomen, and brighter rufous crissum. It is probably *S. albigularis* of Swainson's 'Birds of Brazil,' pl. 78, which figure we have never yet succeeded in meeting with. See our remarks, P. Z. S. 1867, p. 574.

34. *SITTASOMUS OLIVACEUS*, Max. Beitr. iii. p. 1146.

After comparing a large number of specimens of this genus together from various parts of America, we have come to the conclusion that there are only two good species, besides *S. stictolæmus* of Pelzeln (which we are not acquainted with). These are:—1. *S. erythacus* (Licht.), from Southern Brazil; and, 2. *S. olivaceus* (Max.), which ranges from Southern Brazil into Southern Mexico. The latter, according to this view, includes *S. amazonus* of Amazonia, *S. griseus* of Tobago, and *S. sylvioides* of Southern Mexico and Central America. These two species are very easily distinguishable, *S. erythacus* being of an ochreous colour beneath, very different from *S. olivaceus*.

44. *GRALLARICULA LORICATA*, Sclater, P. Z. S. 1858, p. 284.

Grallaria loricata, Scl. P. Z. S. 1857, p. 129.

A single skin of this species, originally described by Sclater from Levaud's specimens in the Paris Museum.

* Cf. Sclater, P. Z. S. 1856, p. 90.

46. *ORCHILUS ECAUDATUS* (Lafr. et d'Orb.).

Todirostrum ecaudatum, Lafr. et d'Orb. Syn. Av. p. 47; d'Orb. Voy. Ois. p. 316, t. 33, figs. 1, 2.

Orchilus ecaudatus, Pelz. Orn. Bras. p. 102.

A single skin of this scarce species from San Esteban. We had not previously met with it.

51. *ELAINEA ELEGANS*, Pelz. Orn. Bras. p. 179.

In Sclater's collection there are skins of this species from Bogotá, Cayenne, Pebas in Eastern Peru, and Panama. We have hitherto called it *caniceps*, but now find that it is Pelzeln's *E. elegans* (agreeing with a Nattererian specimen from Borba), which Pelzeln (*l. c.*) considers distinct from *E. caniceps* of Swainson, also collected by Natterer. It is quite certain, moreover, that the present bird does not agree satisfactorily with Swainson's figure (Orn. Dr. t. 49).

52. *ELAINEA PLACENS*, Sclater.

The occurrence of this species as far south as Panama has been already recorded (P. Z. S. 1864, p. 359). Sclater has also recently received Bogotá skins of the same bird. This has led him to re-examine his *E. implacens* from Ecuador (P. Z. S. 1861, p. 408), which he is now convinced is not specifically separable. Pelzeln's *E. implacens*, Orn. Bras. p. 108, is probably the same species.

56. *MYIARCHUS ERYTHROCERCUS*, sp. nov.

Suiriri pardo y roxo, Azara, Apunt. ii. p. 143. no. 195.

Tyrannus crinitus, Hartl. Ind. Az. p. 13; d'Orb. Voy. Ois. p. 306.

Tyrannus irritabilis, Bp. Consp. i. p. 189 (nec Vieill.).

"*Myiarchus ferox* ♂"! Burm. Syst. Ueb. ii. p. 471; Pelzeln, Orn. Bras. p. 116 (partim).

Myiarchus erythrocercus, Sclater, MS.

Similis *M. cooperi*, sed crassitie minore (fere sicut *M. ferocis*), tarsis brevioribus, et alis magis rotundatis distinguendus.

Taking Prof. Baird's division of the *Myiarchi* (Am. B. p. 177), this species, which we introduce under Sclater's MS. name, belongs to the same group as *M. crinitus*, *M. cooperi*, and *M. cinerascens*, in which the broad rufous edgings of the inner webs of the tail-feathers are continued nearly or quite to their termination. It is the *only* species with these broad rufous edgings yet recognized in South America, where it appears to be extensively diffused. Sclater's collection contains examples from Bahia and Tobago; and in the Museum of Copenhagen is one from Venezuela, which has been compared by Prof. Reinhardt with Sclater's skins, and found to be identical. If we are not mistaken in our synonymy, it is also found in Paraguay and Bolivia.

Bonaparte appears to have recognized this bird as *T. irritabilis*; but that name of Vieillot is a mere synonym of *T. crinitus*. Bur-

meister seems to have taken it for the male of *M. ferox*, in which view he is followed by Pelzeln.

Another skin in Sclater's collection from Dominica (*E. C. Taylor*) is probably also referable to this species, but presents some slight points of distinction.

57. *MYIARCHUS VENEZUELENSIS*, Lawr. Pr. Ac. Phil. 1865, p. 38.

In Sclater's collection are skins from Tobago and Bogotá, apparently referable to this species, which is (somewhat doubtfully perhaps) distinguishable from *M. ferox* and *M. swainsoni* by the narrow rufous edgings to the wing- and tail-feathers.

59. *HETEROPELMA STENORHYNCHUM*, sp. nov.

Mr. Goering sends us two skins of a *Heteropelma*, which belongs to the group allied to *H. turdinum*. It is nearly as large as that species, and therefore exceeds in size Sclater's specimens of *H. wallacii** and *H. amazonum*. Below it is pale on the throat, like *wallacii*, but shows on the belly very faint indications of transverse markings, which are not discernible in the latter. Above it is most like *H. amazonum*, but not quite so dark in colour. The bill is narrower, and more compressed than that of any of the allied species, whence we assign it a provisional name. But it must be allowed that all four of these species are very closely allied, and it would be desirable to institute further comparisons between them when more specimens of *H. wallacii* and *H. amazonum* come to hand.

Mr. Goering marks the iris of the bird as "greyish white."

88. *CONURUS ÆRUGINOSUS*.

See our former remarks on this species, P. Z. S. 1867, p. 587. Mr. Goering's skin agrees with specimens of this Parrot living in the Society's Gardens.

92. *ACCIPITER*, sp.?

Mr. Goering's collection contains a single skin of an *Accipiter* belonging to the *erythrocnemis* group. It is very nearly adult, but the sex is not marked. This bird most nearly resembles the Central-American form *Accipiter chionogaster* (figured in Exot. Orn. t. xiv.), being totally without transverse markings below. But it differs from *A. chionogaster* in the deep rufous colour of the tibiæ (in which respect it is more like *A. erythrocnemis*), in the more plumbeous tinge of the upper surface, and in the light-coloured bands of the tail being narrower. We hope Mr. Goering will send us additional specimens of this species, which, for the present, we must leave undetermined.

* *Sci. et Salv. P. Z. S. 1867, p. 579.*

3. Contributions to the Ornithology of the Argentine Republic and adjacent Lands. By Dr. HERM. BURMEISTER, F.M.Z.S.—Part I.

In the second volume of my 'Voyage through the States of La Plata,' and in Cabanis's 'Journal of Ornithology' (vol. viii. p. 241), I have given synopses of all the birds observed by myself during my journey through this country. These synopses were founded principally on observations made in the middle, northern, and western parts of this country, as I had not been long enough in the eastern parts to speak of the ornithology of that side of the republic with good success. Now, resident during the past five years in Buenos Ayres, I have studied the ornithology of this district, and have observed some new species, and others not sufficiently known. These I beg leave to bring to the knowledge of the learned Society which has honoured me by naming me one of its foreign members.

1. HYPOMORPHNUS URUBITINGA, nob., Syst. Ueb. ii. 43.

This remarkable bird I had already seen near Mendoza, but not sufficiently recognized, and therefore not included in my synopsis. Now I know that it is found all over the whole country, and comes also up to Buenos Ayres, where it is observed on the island in the mouth of the river Parana, near Las Conchas, from time to time; but it is always of rare occurrence.

2. NISUS MAGNIROSTRIS, Gm.; *l. c.* ii. 76.

Common in the vicinity of Buenos Ayres, and even on the towers of the churches in the city, where it is seen catching Pigeons.

3. NISUS GRACILIS, Temm.; *l. c.* p. 77.

This handsome bird was brought me two years ago by a French hunter, who had shot it in the vicinity of Buenos Ayres.

4. CYMINDIS BOLIVIENSIS, sp. nov.

C. fusco-nigra, remigibus reatricibusque subtus albo-fasciatis; cera pedibusque croceis: long. 18".

We have of this species one specimen in our museum, which was killed near Santa Cruz de la Sierra, in the woody plains of the interior of Bolivia. As I can find no description of this bird in the works fallen under my inspection, I describe it as a new species.

In size and figure entirely like the common Brazilian species *Cym. uncinata*. The bill not stronger, and of the same form, but rather longer; the upper mandible black, the under mandible whitish. The sides of the face, from the beak to the eyes, naked, with some black bristles in a row from the eye to the nostrils. Iris dark brown. The whole plumage blackish brown, but the bases of the feathers of the vertex, from the front to the occiput, white; the nuchal feathers

elongated, broad, rounded. First primary short, not longer than the secondaries; the second somewhat shorter than the fifth; the third somewhat longer than the same, and the fourth the longest of all; every one with four or five white bands on the inside, of which the exterior is somewhat greyish. Secondaries of nearly equal size, every one with five or six small whitish bands on the inside, which are only clear white in the middle of the plume. Tail two inches longer than the wings in position, black, with two large grey bands on the upperside, and the same white on the underside, and a similar margin at the end of the rectrices. Legs yellow, with black claws, the outer toe of the same length as the inner one; the tarsus covered in front with small hexagonal scales.

Whole length, from the tip of the beak to the end of the tail, 18 inches; beak 1 inch, wing 10 inches, tail 7 inches, tarsus $1\frac{1}{2}$ inch; middle claw without the nail 14 lines, the nail 8 lines.

5. *CIRCUS SUPERCILIOSUS*, Temm.; Syst. Ueb. ii. 116.

Not rare near Buenos Ayres.

6. *COCCYGUS CINEREUS*, Vieill.

Coccygus cinereus, Vieill.; Azara, Apunt. ii. 368. no. 268; Burm. Syst. Uebers. ii. 268. Anm. 2.

This rare Cuckoo has been killed by my hunter sometimes in the vicinity of Palermo, near Buenos Ayres. It is well described by Azara, but the colours are not so clear as Azara says. The whole body is greyish, except the anal portion and the inside of the wings, which are yellowish, the iris red. As the tail is very short in relation to the size of the bird, and the eight inner primaries are equal in length, the bird must make a separate section of the genus *Coccygus*, or a genus of itself. My hunter has also found the nest with the eggs, which are of a uniform whitish green.

7. *DENDROBATES LIGNARIUS*, nob.

Picus lignarius, Mol. Comp. Hist. Nat. Chil. i. 391; Burm. Syst. Uebers. ii. 225. Anm. 1.

This little Woodpecker is found sometimes near Buenos Ayres, in the willow bushes of the "Boca del Riachuelo" of Barracas. It seems to be more fond of the southern parts of the province.

8. *ELAINEA ALBESCENS*, nob.

Pachyrhamphus albescens, Gould, Zool. of the Beagle, iii. 50, pl. 14.

This bird has all the characters of an *Elainea*, and is very nearly allied to *E. modesta*, from which it is only different in its somewhat greater size, clearer colours on the underside, less green colour on the back, and the want of the white colour at the bases of the head-feathers. It is not rare in the vicinity of Buenos Ayres, where it makes its nest in the summer, going during the winter to more

northern districts. We have found its eggs, which are whitish, with grey spots round the middle and at the thicker end.

9. *PACHYRHAMPHUS ALBINUCHA*, sp. nov.

P. supra fusco-cinereus, subtus albus; vertice nigro, nucha alba: long. 4 $\frac{3}{4}$ ".

Fem. mari similis.

Figure and size of *P. mitratus* (Syst. Uebers. ii. 454. 1), *P. cinereus* (Sclat. Cat. 241. 1470), but rather smaller, the beak somewhat slender, and the wings relatively shorter. Upper head black; in the male with a bluish metallic reflex; front and lores white, like the whole underside and a band on the hind neck, which is not so clear in the female as in the male. From this band to the tail is brownish grey; the wings and tail browner, as also the upper back, which is more of a lead-colour. The outer secondaries have whitish borders; and of the same colour also are the outer edges of the exterior tail-feathers. Beak and legs black; iris dark brown. Length 4 $\frac{3}{4}$ inches, beak 4 lines, wing 2 inches, tail 1 inch 7 lines, tarsus 6 lines.

The first exterior tail-feather rather shorter than the others, and narrow and somewhat pointed. The first primary two lines shorter than the second, which is nearly equal to the third.

This small bird lives in the sedge of the shores of the Rio de La Plata, near Buenos Ayres, and has a somewhat melancholy temperament, sitting quite still in the same place a long time. Both sexes are alike in colour; but the colour of the male is much clearer, and the white nuchal band broader and more distinct.

10. *TÆNIOPTERA VARIEGATA*.

Tænioptera variegata, Gould, Zool. of the Beagle, iii. 55, pl. 14.

This beautiful bird is rare in the vicinity of Buenos Ayres, and occurs only at the harvest time (April), when it arrives from the southern plains of Patagonia, to live on the warmer plains of the north during the winter. It walks much on the ground, and is very rarely seen on trees, feeding on grubs and earthworms. I had for a long time only two specimens of this bird in the museum, killed to the south of Buenos Ayres, near Barracas; but in the present year one of my hunters found a flock of nearly twenty individuals near the little town of Moron, to the north-west of Buenos Ayres. Having been informed of the rarity of the species, he returned to the spot, and, having found the flock again, killed the whole of them, so that I have now sixteen specimens before me. This was on the 2nd of April.

Examining this series of specimens, I find that the red colour of the underside, as figured by Gould, is of rare occurrence, and only present in very old males. The females and most of the males are grey on the breast up to the throat, with only a reddish tinge, the lower portion of the body beneath being clear reddish, with a greyish stripe on each feather.

11. ANABATES LOPHOTES.

Anabates lophotes, Bp. Consp. i. 210.

A. cristatus, D'Orb. Voy. Ois. 258.

A. unirufus, Burm. Reise d. d. La Plata-Staaten, ii. 466.

Before I had seen the true *Anabates unirufus*, D'Orb., from the interior of Bolivia, I had taken this bird of the Argentine Republic for that species; but now, having under my inspection two true *A. unirufus*, I see the difference. The *A. lophotes* is larger, not entirely cinnamon red-brown, but more greyish red-brown, and dark brown on the vertex, where the feathers are longer and narrower. Only the tail and the anal portion of the trunk are entirely red-brown.

This species lives in the interior near Cordova, S. Luis, La Rioja, and has never been observed near Buenos Ayres. D'Orbigny shot an individual in the province of Santa Fé; but this, without doubt, is a rare occurrence, as I never observed the bird near Paraná.

12. LIMNORNIS CURVIROSTRIS.

Limnornis curvirostris, Gould, Zool. of the Beagle, iii. 86, t. 25.

Not rare in the sedge of the shores of the Rio de La Plata, near Buenos Ayres.

13. SYNALLAXIS SPIXII.

Synallaxis spixii, Sclater, Proc. Zool. Soc. 1856, p. 98, 1859, p. 192; Cat. A. B. p. 151.

Parulus ruficeps, Spix.

Synallaxis albescens, nob. Syst. Uebers. iii. 39. 2.

This species is also found in the vicinity of Buenos Ayres; but I have never seen it in the interior of the eastern side of the country, near Paraná, where I found *Synallaxis ruficapilla* in abundance.

14. SYNALLAXIS SULPHURIFERA, nob.

S. supra olivaceo-fusca, subtus albido-lutescens; superciliis gulaque albis, hac macula parva sulphurea: long. 6''.

This species has the longer and rather curved beak of *S. striaticeps*, but the broad and long pointed tail-feathers of *S. spixii*. The whole upperside is obscure ochraceous, and over the eyes is a white line. The underside on the throat white, with a small sulphur-yellow spot in the middle; the breast and body beneath pale loamy yellow; the sides of the neck and cheeks striped with white. Wing-coverts red-brown, also the margin of the longer remiges; but the middle ones without these margins, forming a dark stripe over the wings. Tail-feathers ochraceous, the outer ones more of a red-brown; the tip of every one more or less mutilated, rather large, and the two middle elongato-acuminated. Beak and legs brown, the under mandible at the base whitish.

This bird is found near Buenos Ayres, in the sedge of the river-shores.

4. Note on *Xylospongia cookii*, a New Genus of Palmated Sponges in the collection of the British Museum. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

In the British Museum is a very extraordinary, lobed, woody, palmated body, with eight flattened, irregularly netted, strap-like lobes. It has been in the collection for many years, but has not been named; indeed grave doubts have been entertained if it were not the woody skeleton of some vegetable production.

Being without any habitat, it has been left unnoticed, in hopes that a second specimen might occur accompanied by some details of its history.

It was doubtless collected on the sea-coast, as one of its sides is more or less covered with the undervalves of some very young oysters and other attached marine shells.

Being desirous of knowing more of its structure, I submitted a small fragment of it to the examination of Mr. M. C. Cooke of the India Museum, who informs me there can be no doubt of its being a sponge belonging to my family *Halichondriadæ*, the substance of it being studded with abundance of smooth, slender, fusiform, slightly curved siliceous spicules. I have named the species after Mr. Cooke.

XYLOSPONGIA (Fam. HALICHONDRIADÆ).

Frond compressed, fan-shaped, divided above into strap-shaped flat lobes, rather wider at the ends. Root an expanded disk. Stem thick, woody, subcylindrical below, compressed above and expanded into a flat fan-like frond, which is divided above into eight or ten strap-like flat lobes, like the fingers on the hand, the lobes varying rather in width, the outer one on each side being the narrowest. The root and stem are solid, wood-like; the upper part of the broad, expanded, fan-like part of the stem more or less pierced with different-sized perforations, and the part divided into strap-like reticulate lobes, which are generally rather wider at the ends. The expanded part of the stem and the strap-like lobes are all formed of parallel cylindrical filaments, about as thick as twine, which in the upper part of the stem are united together by woody matter, leaving only a few perforations between them; but in the strap-like lobes the filaments are much more distinct, rather flexuous, inosculating where they meet their neighbouring subparallel filaments, united by the woody material, which is not quite so thick as the filaments. The surface is rather rugose, the minute rugosities of the stem and filaments being placed longitudinally and parallel to each other. Spicules of one kind, minute, slender, fusiform, often very slightly curved or arched.

XYLOSPONGIA COOKEI.

Hab. —.

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1868.

- Jan. 8. 1 Grey Parrot (*Psittacus erithacus*). Deposited.
13. 1 Azara's Opossum (*Didelphys azaræ*) and six young. Presented by George Wilks, Esq.
15. 2 Hawk-headed Parrots (*Deroptyus accipitrinus*). Presented by Samuel Booker, Esq.
- 1 Chinese Ape (*Macacus lasiotus*). Presented by Miss C. A. Winckworth.
16. 1 Pig-tailed Monkey (*Macacus nemestrinus*). Purchased.
17. 1 Green Monkey (*Cercopithecus callitrichus*). Presented by Mrs. Macbeth.
20. 1 Tigress (*Felis tigris*). Presented by His Excellency Sir Seymour Fitzgerald, Governor of Bombay.
- 1 Indian Antelope (*Antilope cervicapra*). Presented by Lieut. H. R. Bowlby, 20th Regiment.
24. 1 Brown Capuchin Monkey (*Cebus apella*). Presented by Lieut. Douglas Macneill, H.M.I.A.
27. 1 pair of Black Wombats (*Phascalomys platyrhinus*, var. *niger*). Purchased.
- 2 Common Wombats (*Phascalomys wombat*). Purchased.
- 1 Sing-Sing Antelope, ♀ (*Kobus sing-sing*). Purchased.
- 1 Mangabey Monkey (*Cercocebus æthiops*). Purchased.
28. 1 Mangabey Monkey (*Cercocebus æthiops*). Presented by the Rev. Dan. Greatorex.
- 1 Mealy Amazon (*Chrysotis farinosa*). Presented by E. A. Ommaney, Esq., R.N.
29. 1 Common Fox (*Canis vulpes*). Presented by H. Sykes Thornton Wrench, Esq.
30. 1 Marimonda Spider Monkey (*Ateles belzebuth*). Purchased.
- 2 Brown Capuchin Monkeys (*Cebus apella*). Purchased.
- 2 Whitefronted Capuchin Monkeys (*Cebus albifrons*). Purchased.
31. 1 Common Camel (*Camelus dromedarius*). Purchased.
- 1 Azara's Fox (*Canis azaræ*). Presented by H. Maynard, Esq.

- Feb. 3. 1 young Cheetah (*Felis jubata*). Presented by E. T. Rogers, Esq., C.M.Z.S., H.B.M. Acting Consul at Beyrout, Syria.
- 1 White Pelican (*Pelecanus onocrotalus*). Presented by E. T. Rogers, Esq., C.M.Z.S., H.B.M. Acting Consul at Beyrout, Syria.
4. 1 Long-shielded Cayman (*Jacare longiscutata*). Presented by George Wilks, Esq., C.M.Z.S. From Paraguay.
6. 1 Royal Rock-Snake (*Python regius*). Received in exchange.
- 1 Crested Ground-Parrakeet (*Calopsitta nova hollandiæ*). Presented by H. E. Sharp, Esq.
- 1 White-necked Stork (*Ciconia leucocephala*). Purchased.
- 2 Chameleons (*Chamæleon vulgaris*). Presented by R. McAlpine, Esq.
11. 2 Common Rheas (*Rhea americana*). Purchased.
13. 1 Common Dormouse (*Myoxus muscardinus*). Presented by Sir Hugh Williams, Bart.
- 1 Ring-necked Parrakeet (*Palæornis torquata*). Presented by Mrs. Bruce.
14. 1 Rhesus Monkey (*Macacus erythræus*). Presented by the executors of the late Dr. Daubeny, deceased.
- 1 Macaque Monkey (*Macacus cynomolgus*). Presented by the executors of the late Dr. Daubeny, deceased.
21. 1 Indian Porcupine (*Hystrix leucura*). Born.
- 1 Swinhoe's Deer (*Cervus swinhoii*). Purchased.
- 1 Virginian Opossum (*Didelphys virginiana*). Purchased.
22. 1 Douroucouli (*Nyctipithecus felinus*). Purchased.
- 1 Jerboa (*Dipus ægyptius*). Presented by Capt. R. Donaldson.
23. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Dr. Winn.
25. 1 Sambur Deer (*Cervus aristotelis*). Born.
- 1 Arabian Baboon (*Cynocephalus hamadryas*). Purchased.
- 1 Mandrill (*Cynocephalus maimon*). Purchased.
- 1 Drill (*Cynocephalus leucophæus*). Purchased.
- 1 Brown Spider Monkey (*Ateles hybridus*).
26. 1 Smooth-headed Capuchin Monkey (*Cebus xanthosternus*). Deposited.
- 1 Common Hare (*Lepus europæus*). Purchased.
29. 2 Yellow-shouldered Weaver-Birds (*Euplectes capensis*). Purchased.
- 3 Long-haired Guineapigs—Peruvian variety (*Cavia aperea*, var.). Purchased.
- Mar. 2. 2 Canada Geese (*Bernicla canadensis*). Presented by Charles Anthony, jun., Esq.
- 1 Australian Goshawk (*Astur approximans*). Purchased.
- 2 Nankeen Kestrels (*Tinnunculus cenchroides*). Purchased.
- 1 Short-eared Owl (*Otus brachyotus*). From Natal. Purchased.
- 1 Le Vaillant's Parrot (*Pæocephalus levaillantii*). Purchased.
- 2 Swainson's Lorikeet (*Trichoglossus multicolor*). Purchased.
- 2 Chestnut-eared Finches (*Amadina castanotis*). Purchased.
- 2 Black Bullfinches (*Melopyrrha nigra*). Purchased.
- 1 Pied Crow-Shrike (*Strepera graculina*). Purchased.
- 1 Black-billed Duck (*Dendrocygna arborea*). Purchased.
- 1 Zorilla (*Zorilla striata*). Purchased.
3. 1 Great Kangaroo (*Macropus giganteus*). Born.
- 1 Sarus Crane (*Grus antigone*). Purchased.
5. 2 Touracous (*Corythaix persa*). Purchased.

- Mar. 5. 2 Capuchin Monkeys (*Cebus apella*). Purchased.
 1 Thick-tailed Opossum (*Didelphys crassicaudata*). Presented by Geo. Wilks, Esq., C.M.Z.S. From La Plata.
 1 Grison (*Grisonia vittata*). Presented by Geo. Wilks, Esq., C.M.Z.S. From La Plata.
 1 Coypu (*Myopotamus coypus*). Presented by Geo. Wilks, Esq., C.M.Z.S. From La Plata.
 3 Chimangos (*Milvago chimango*). Presented by Geo. Wilks, Esq., C.M.Z.S. From La Plata.
 1 Burrowing Owl (*Pholeoptynx cucularia*). Presented by Geo. Wilks, Esq., C.M.Z.S. From La Plata.
 1 South-American Barn-Owl (*Strix perlata*). Presented by Geo. Wilks, Esq., C.M.Z.S. From La Plata.
6. 1 Red Deer (*Cervus elaphus*). Purchased.
 10 Smooth Shanny (*Blennius pholis*). Presented by Thomas Cornish, Esq.
7. 1 Sturgeon (*Acipenser sturio*). Presented by Messrs. C. Grove.
9. 1 Common Heron (*Ardea cinerea*). Presented by J. D. Chipchase, Esq.
 1 White Stork (*Ciconia alba*). Presented by J. D. Chipchase, Esq.
 2. Great Black-backed Gulls (young) (*Larus marinus*). Presented by W. Bleat, Esq.
10. 1 Mona Monkey (*Cercopithecus mona*). Purchased.
 1 Marmionda Monkey (*Ateles belzebuth*). Purchased.
 1 Marmoset Monkey (*Hapale jacchus*). Deposited.
11. 2 Malayan Squirrels (*Sciurus nigrovittatus*). Purchased.
12. 1 Fournier's Capromys (*Capromys pilorides*). Born.
13. 3 Virginian Deer (*Cervus virginianus*). Purchased.
 2 Spotted-sided Finches (*Amadina lathamii*). Purchased.
 2 Australian Owls (*Athene book-book*). Purchased.
 2 Cut-throat Sparrows (*Amadina fasciata*). Purchased.
15. 1 Common Boa (*Boa constrictor*). Presented by E. B. Webb, Esq., F.Z.S.
 1 Great Sulphur-crested Cockatoo (*Cacatua galerita*). Presented by G. R. Green, Esq.
 1 Mandarin Duck (*Aix galericulata*). Purchased.
 1 White-billed Parrot (*Tanygnathus albirostris*). Purchased.
 1 Grand Eclectus (*Eclectus grandis*). Purchased.
 6 Common Bluebird (*Sialia wilsoni*). Purchased.
 1 Macaque Monkey (*Macacus*, sp.). Purchased.
16. 1 Green Monkey (*Cercopithecus callitrichus*). Presented by Colonel Addison.
 1 Pine-Marten (*Mustela martes*). Presented by W. Wynne, Esq., F.Z.S.
 1 Golden Pheasant (*Thaumalea picta*). Deposited.
 1 Slow Loris (*Nycticebus tardigradus*). Purchased.
 1 Masked Barn-Owl (*Strix personata*). Purchased.
 2 Cardinal Grosbeaks (*Cardinalis viminalis*). Purchased.
 2 Mouflons (*Ovis musimon*). Presented by Lord Lilford, F.Z.S.
17. 1 Philantomba Antelope (*Cephalopus mazwelli*). Presented by R. W. Tamplin, Esq., F.Z.S.
20. 1 Axis Deer (*Cervus axis*). Purchased.
 1 Green Lizard (*Lacerta viridis*). Presented by G. Gowan, Esq.
 1 Sonnerat's Jungle-Fowl (*Gallus sonneratii*). Deposited.
21. 1 Lyre-bird (*Menura superba*). Purchased.
 2 Masked Parrakeets (*Pyrrhulopsis personata*). Purchased.

- Mar. 21. 2 Grey-headed Parrakeets (*Agapornis cana*). Purchased.
 10 Rain-Quails (*Coturnix coromandelica*). Presented by Dr. Shortt.
 1 Common Quail (*Coturnix communis*). Presented by Dr. Shortt.
 3 Asiatic Quails (*Perdica asiatica*). Presented by Dr. Shortt.
 5 Cambaian Quails (*Perdica cambaiensis*). Presented by Dr. Shortt.
 6 Indian Walkingfishes (*Ophiocephalus gachua*). Presented by Dr. Francis Day, F.Z.S.
 1 Silky Marmoset (*Hapale argentata*). Purchased.
 1 White-backed Piping Crow (*Gymnorhina leuconota*). Presented by Mrs. Cecilia England.
 2 Crimson-eared Waxbills (*Estrela phœnicotis*). Purchased.
 2 Red-tailed Waxbills (*Estrela cœrulescens*). Purchased.
 1 White-eared Bulbul (*Pycnonotus leucotis*). Purchased.
 2 South-African Dormice (*Graphiurus capensis*). Purchased.
 1 Aoudad (*Ovis tragelaphus*). Born.
 22. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Mr. Ross.
 23. 1 Cape Hyrax (*Hyrax capensis*). Presented by Masters Fisher and Leary.
 6 Masked Weaver-birds (*Hyphantornis personata*). From Abyssinia. Presented by Capt. Thomas.
 4 Ringed Seals (*Phoca fœtida*). Purchased.
 27. 3 Sonnerat's Jungle-Fowl (*Gallus sonneratii*). Received in exchange.
 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Received in exchange.
 28. 1 American Shore-Lark (*Eremophila cornuta*). Purchased.
 29. 1 Indian Wild Dog (*Canis primævus*). Presented by J. E. Drummond, Esq.
 1 Maugé's Dasyure (*Dasyurus maugæi*). Presented by Captain Watson.
 3 Common Badgers (*Meles taxus*). Presented by J. G. Topham, Esq.
 30. 1 Australian Wild Duck (*Anas superciliosa*). Presented by the Acclimatization Society, Christchurch, New Zealand.
- April 1. 1 Banded Ichneumon (*Herpestes fasciatus*). Presented by G. W. Craggs, Esq.
 1 Golden Pheasant (*Thaumalea picta*, var.). Purchased.
 1 Common Hare (young) (*Lepus europæus*). Purchased.
 2. 2 Prince Albert's Curassow (*Crax alberti*). Purchased.
 3. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by A. C. Clarke, Esq.
 4. 12 Green Lizards (*Lacerta viridis*). Purchased.
 6. 1 Shining Parrakeet (*Pyrrhulopsis splendens*). Purchased.
 7. 1 Common Hare (*Lepus europæus*). Purchased.
 8. 1 Cashmere Shawl-Goat (*Capra hircus*). Born.
 1 Vulpine Phalanger (*Phalangista vulpina*). Born.
 9. 1 Spur-winged Goose (*Plectropterus gambensis*). Presented by Capt. R. M. Sperling, R.N. From the Shiré River, East Africa.
 1 Egyptian Goose (*Chenalopex ægyptiaca*). Presented by I. M. de Freitas Brance, Esq.
 1 White-faced Tree-Duck (*Dendrocygna viduata*). Presented by I. M. de Freitas Brance, Esq.

- April 9. 4 Souseliks (*Spermophilus citillus*). Received in exchange.
10. 1 Red-billed Hornbill (*Toccus erythrorhynchus*). Purchased.
11. 1 Black Squirrel (*Sciurus niger*). Presented by Admiral E. Ommaney, C.B.
 1 young Cheetah (*Felis jubata*). From Abyssinia. Purchased.
 2 young Syrian Cats (*Felis maniculata*). From Abyssinia. Presented by Lord Ruthven.
13. 1 Mouflon (*Ovis musimon*). Presented by Earl Dudley.
 2 Chipping Sparrows (*Spizella socialis*). Purchased.
 3 American Shore-Larks (*Eremophila cornuta*). Purchased.
 1 Banded Grass-Finch (*Poephila cincta*). Purchased.
 1 Grey Ichneumon (*Herpestes griseus*). Presented by C. J. Briarley, Esq.
14. 3 Blue Jays (*Cyanocitta cristata*). Purchased.
18. 1 Black-faced Spider Monkey (*Ateles ater*). Purchased.
 3 Red-shouldered Starlings (*Agelaius phoeniceus*). Purchased.
 1 Woodlark (*Alauda arborea*). Purchased.
19. 1 Rose-ringed Parrakeet (*Palæornis docilis*). Purchased.
22. 2 Serin Finches (*Fringilla serinus*). Presented by F. Vanzeller, Esq.
23. 1 Serin Finch (*Fringilla serinus*). Received in exchange.
24. 1 Undulated Parrakeet (*Melopsittacus undulatus*). Purchased.
 1 Yellow-fronted Amazon (*Chrysotis ochrocephala*). From Guiana. Presented by J. L. O'Beirne, Esq., M.P.
25. 1 Vervet Monkey (*Cercopithecus lalandii*). Presented by O. Moseley, Esq.
 2 Chinese Porphyrios (*Porphyrio cælestis*). Purchased.
 2 Bamboo Partridges (*Bambusicola thoracica*). Purchased.
 1 Common Paradoxure (*Paradoxurus typus*). Presented by W. T. Fraser, Esq. From Java.
26. 1 Cashmere Shawl-Goat (*Capra hircus*). Born.
 1 Common Adder (*Pelias berus*). Presented by Dr. Brashfield.
27. 1 Wrinkled-bill Hornbill (*Buceros corrugatus*). Purchased.
 1 Bornean Fireback (*Euplocamus nobilis*). Purchased.
 1 Greenland Falcon (*Falco grælandicus*). Purchased.
 1 Philantomba Antelope (*Cephalophus maxwellii*). Purchased.
 2 Fire-tailed Finches (*Erythrura prasina*). Purchased.
 3 Common Sheldrakes (*Tadorna vulpanser*). Purchased.
 1 Squirrel Monkey (*Callithrix sciureus*). Purchased.
28. 1 Black-billed Duck (*Dendrocygna arborea*). Purchased.
 2 Common Buzzards (*Buteo vulgaris*). Purchased.
30. 1 Gray's Jerboa Kangaroo (*Beltongia grayi*). Born.
 1 Jacket-Monkey (*Pithecia satanas* (?)). Purchased.
31. 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Mrs. Dix.
 3 Black Francolins (*Francolinus vulgaris*). Deposited.
 1 Yellow-wattled Lapwing (*Sarciophorus bilobus*). Purchased.
- May 1. 4 Ruddy-headed Geese (*Chloephaga rubidiceps*).
 2. 1 Scarlet Ibis (*Ibis rubra*). Presented by Dr. Palin, C.M.Z.S.
 2 Blue-shouldered Tanagers (*Tanagra cyanoptera*). Presented by Dr. Palin, C.M.Z.S.
 4. 1 Himalayan Bear (*Ursus tibetanus*). Presented by Capt. Butler.
 1 Indian Gazelle (*Gazella bennettii*). Purchased.
 5. 1 Short-headed Phalanger (*Belideus breviceps*). Born.
 1 Guinea Baboon (*Cynocephalus papio*). Deposited.
 1 White-fronted Spider Monkey (*Ateles marginatus*). Purchased.

- May 5. 1 Capuchin Monkey (*Cebus capucinus*). Purchased.
 2 Red-backed Pelicans (*Pelecanus rufescens*). Purchased.
 1 Black Hornbill (*Buceros atratus*). Purchased.
 1 Royal Python (*Python regius*). Purchased.
6. 1 Fournier's Capromys (*Capromys pilorides*). Born.
8. 1 Cape Francolin (*Francolinus capensis*). Purchased.
 2 Double-spurred Francolins (*Francolinus bicalcaratus*). Purchased.
 2 Hyacinthine Porphyrios (*Porphyrio hyacinthinus*). Purchased.
 2 Porto-Rico Pigeons (*Columba corensis*). Purchased.
 2 Picazuro Pigeons (*Columba picazuro*). Purchased.
 2 Cuban Pigeons (*Columba inornata*). Purchased.
 2 Blue-headed Pigeons (*Starnænas cyanocephala*). Purchased.
 2 Mountain-Doves (*Geotrygon montana*). Purchased.
 4 Talpacoti Ground-Doves (*Chamæpelia talpacoti*). Purchased.
 4 Passerine Ground-Doves (*Chamæpelia passerina*). Purchased.
 2 Scaly Ground-Doves (*Chamæpelia squamosa*). Purchased.
 1 Abyssinian Guinea-Fowl (*Numida ptilorhyncha*). Purchased.
 1 Abyssinian Guinea-Fowl (*Numida ptilorhyncha*). From Aden. Purchased.
 1 Rendal's Guinea-Fowl (*Numida rendalli*). Purchased.
 1 Bar-headed Goose (*Anser indicus*). Purchased.
 1 Orinoco Goose (*Chenalopez jubata*). Purchased.
 2 Harnessed Antelopes (*Tragelaphus scriptus*). Purchased.
 1 Ostrich (*Struthio camelus*). Purchased.
 1 Syrian Wild Asses (*Equus hemippus*). Received in exchange.
 5 Purple Pheasants (*Euplocamus horsfieldii*). Hatched.
 3 Swinhoe's Pheasants (*Euplocamus swinhoii*). Hatched.
 1 Peacock Pheasant (*Polyplectron chinquis*). Hatched.
 1 Common Boa (*Boa constrictor*). Purchased.
 1 Greater White-crested Cockatoo (*Cacatua cristata*). Received in exchange.
 1 Mona Monkey (*Cercopithecus mona*). Purchased.
 1 Red-bellied Monkey (*Cercopithecus erythrogaster*). Purchased.
 1 White-throated Sapajou (*Cebus hypoleucus*). Purchased.
 4 Crimson Finches (*Estrela phaeton*). Purchased.
 1 Chilean Conure (*Conurus smaragdinus*). Purchased.
 1 Aztec Conure (*Conurus aztec*). Purchased.
 1 Golden-headed Parrakeet (*Brotogerys tui*). Purchased.
11. 1 Weasel-headed Armadillo (*Dasypus sexcinctus*). Purchased.
12. 3 Fournier's Capromys (*Capromys pilorides*). Born.
 1 Common Trumpeter (*Psophia crepitans*). Deposited.
13. 1 Bennett's Wallaby (*Halmaturus bennettii*). Born.
 1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*). Born.
 1 Gray's Jerboa Kangaroo (*Bettongia grayi*). Born.
 1 Mouflon (*Ovis musimon*). Born.
 1 Vervet Monkey (*Cercopithecus lalandii*). Purchased.
14. 5 Common Wolves (*Canis lupus*). Born.
 1 Nankeen Night-Heron (*Nycticorax caledonicus*). Received in exchange.
 1 Black-necked Stork (*Xenorhynchus australis*). Purchased.
 1 Nankeen Night-Heron (*Nycticorax caledonicus*). Purchased.
 1 Regent Bird (*Sericulus chrysocephalus*). Purchased.
 1 Nicobar Pigeon (*Phlogænas nicobarica*). Purchased.
15. 2 North-African Jackals (*Canis anthus*). Deposited.
16. 5 North-African Jackals (*Canis anthus*). Born.
 7 Ocellated Skinks (*Gongylus ocellatus*). Purchased.

- May 16. 1 Harvest-Mouse (*Mus minutus*). Purchased.
 1 Marmoset Monkey (*Hapale jacchus*). Presented by Miss Allen.
17. 2 Hybrid Goats (between *C. megaceros*, ♂, and *C. ægagrus*, ♀).
 Born.
 1 Malaccan Parrakeet (*Palæornis malaccensis*). Purchased.
 1 Ceram Lory (*Lorius garrulus*). Purchased.
 1 Ursine Monkey (*Colobus ursinus*). Purchased.
20. 1 Cashmere Shawl-Goat (*Capra hircus*). Born.
 7 Ruddy Sheldrakes (*Tudorna rutila*). Hatched.
21. 10 Pallas's Eared Pheasants (*Crossoptilon auritum*). Hatched.
 1 Rose-Hill Parrakeet (*Platyccercus eximius*). Presented by Mrs. Satterthwaite.
 1 Secretary Vulture (*Serpentarius reptilivorus*). Purchased.
 1 Black-breasted Peewit (*Sarciophorus pectoralis*). Purchased.
 1 Graceful Ground-Dove (*Geopelia cuneata*). Purchased.
 1 Australian Goshawk (*Astur approximans*). Purchased.
 2 Red-cheeked Hemipodes (*Hemipodius pyrrhothorax*). Purchased.
22. 1 Rhesus Monkey (*Macacus erythræus*). Presented by H. Thornton, Esq.
23. 2 Marimonda Spider Monkeys (*Ateles belzebuth*). Purchased.
 2 Barred-shouldered Ground-Doves (*Geopelia humeralis*). Purchased.
24. 5 Egyptian Geese (*Chenalopex ægyptiaca*). Hatched.
25. 1 Ashy-headed Goose (*Chloëphaga poliocephala*). Hatched.
 1 Ruddy-headed Goose (*Chloëphaga rubidiceps*). Hatched.
 4 Upland Geese (*Chloëphaga magellanica*). Hatched.
 1 Eland (*Oreas canna*). Born.
 1 Sacred Kingfisher (*Todiramphus sanctus*). Received in exchange.
 1 Red-bellied Wallaby (*Halmaturus billardieri*). Received in exchange.
26. 4 Undulated Grass-Parrakeets (*Melopsittacus undulatus*). Purchased.
 1 Ludio Monkey (*Cercopithecus ludio*). Purchased.
 1 Rhesus Monkey (*Macacus erythræus*). Purchased.
27. 2 Weasel-headed Armadillos (*Dasypus sexcinctus*). Purchased.
 1 Collared Fruit-Bat (*Cynonycteris collaris*). Purchased. From Natal.
28. 8 Barred-tailed Pheasants (*Phasianus reevesii*). Hatched.
 2 Scømmerring's Pheasants (*Phasianus scømmerringii*). Hatched.
 6 Black-backed Kaleeges (*Euplocamus melanotis*). Hatched.
 5 Hybrid Lineated Pheasants (between *E. cuvieri*, ♂, and *E. lineatus*, ♀). Hatched.
 1 Coati (*Nasua nasica*). Presented by J. A. Marshall, Esq.
 1 Indian Leopard (*Felis leopardus*). Presented by Colour-Serjeant Scott.
 1 Aztec Conure (*Conurus aztec*). Purchased.
 1 Orange-winged Conure (*Conurus xanthopterus*). Purchased.
29. 4 Paradise Whydah Birds (*Vidua paradisæa*). Purchased.
 1 Demerara Tiger Cat (*Felis macroura*). Presented by Lieut. W. Duncan Stewart.
 4. Graceful Ground-Doves (*Geopelia cuneata*). Presented by Mrs. Jacobson.
 2 Peaceful Doves (*Geopelia tranquilla*). Presented by Mrs. Jacobson.

- May 30. 20 Hybrid Wild Turkeys (between *Melagris gallopavo*, ♂, and *M. ocellata*, ♀). Hatched.
 2 Tawny Owls (*Syrnium aluco*). Presented by G. Dawson Rowley, Esq., M.A., F.Z.S.
31. 1 Markhoor (*Capra megaceros*). Born.
 8 Sonnerat's Jungle Fowl (*Gallus sonneratii*). Hatched.
- June 1. 1 Sun-Bittern (*Eurypyga helias*). Hatched.
 2 Black Terns (*Hydrochelidon nigra*). Purchased.
2. 1 Arabian Baboon (*Cynocephalus hamadryas*). From Abyssinia. Deposited.
 2 Bonelli's Eagles (*Aquila bonellii*). Purchased.
 2 Hunting Cissas (*Cissa venatoria*). Purchased.
 1 Goffin's Cockatoo (*Cucatus goffini*). Purchased.
 1 Typhon Heron (*Ardea sumatrana*). Presented by A. Grote, Esq., C.M.Z.S.
 3 Indian Geckos (*Gecco verus*). Presented by A. Grote, Esq., C.M.Z.S.
 1 Black Hornbill (*Buceros atratus*). Purchased.
 4 Pied Mice (*Mus musculus*, var.). Presented by Lieut.-Colonel R. Mather, F.Z.S.
 1 Abyssinian Mud-Tortoise (*Pelomedusa gehafica*). Presented by the Hon. Mr. Melville.
3. 2 Raccoons (*Procyon lotor*). Born.
 2 Crowned Hornbills (*Buceros coronatus*). Purchased.
 1 Coromandel Owl (*Bubo coromandelicus*). Purchased.
 2 Wandering Tree-pies (*Dendrocitta vagabunda*). Purchased.
 1 Occipital Magpie (*Urocissa occipitalis*). Purchased.
 4 Golden-eyed Ant-thrushes (*Chrysomma sinense*). Purchased.
 1 Bengal Hemipode (*Turnix bengalensis*). Purchased.
 1 Indian Snake (*Bungarus caeruleus*). Purchased.
 3 Common Thrushes (*Turdus musicus*). Presented by J. R. Scott, Esq., F.Z.S.
4. 1 Common Genet (*Genetta vulgaris*). Presented by A. Pike, Esq.
 2 Egyptian Ichneumons (*Herpestes ichneumon*). Presented by Lord Ruthven.
5. 1 Vervet Monkey (*Cercopithecus lalandii*). Presented by Miss Brown.
 1 Toque Monkey (*Macacus pileatus*). Purchased.
 2 White-fronted Parrots (*Chrysotis leucocephala*). Received in exchange.
6. 1 Green Monkey (*Cercopithecus callitrichus*). Presented by Wm. Smith, Esq.
 1 Bonnet-Monkey (*Macacus radiatus*). Presented by H. A. Forsby, Esq.
7. 1 Mexican Deer (*Cervus mexicanus*). Born.
 4 Cheer Pheasants (*Phasianus wallichii*). Hatched.
 2 Swinhoe's Pheasants (*Euplocamus swinhoii*). Hatched.
8. 1 Rose-hill Parrakeet (*Platycercus eximius*). Presented by Frederick Haines, Esq.
 2 Red and Blue Macaws (*Ara macao*). Deposited.
9. 1 Black-faced Kangaroo (*Macropus melanops*). Born.
 1 Ringed Seal (*Phoca fœtida*). Born.
 1 Barred-tailed Pheasant (*Phasianus reevesii*). Hatched.
 13 Green-breasted Pheasants (*Phasianus versicolor*). Hatched.
 2 Brown Capuchin Monkeys (*Cebus apella*). Deposited.

- June 10. 1 Malbrouck Monkey (*Cercopithecus cynosurus*). Purchased.
 1 Blue-fronted Amazon (*Chrysotis amazonica*). Received in exchange.
11. 1 Ocelot (*Felis pardalis*). Born.
 2 Bronze-winged Figeons (*Phaps chalcoptera*). Hatched.
 24 Short-nosed Seahorses (*Hippocampus brevisrostris*). Purchased.
 2 Razorbills (*Alca torda*). Presented by T. Walker, Esq.
 2 Puffins (*Mormon fratercula*). Presented by T. Walker, Esq.
 4 Rose-ringed Parrakeets (*Palæornis docilis*). Presented by Colonel Ivy.
12. 1 White-fronted Lemur (*Lemur albifrons*). Presented by Major R. Lloyd.
 1 Common Hare (*Lepus europæus*). Purchased.
13. 1 Japanese Deer (*Cervus sika*). Born.
 1 Martinique Gallinule (*Porphyrio martinicensis*). Purchased.
15. 8 Pallas's Eared Pheasants (*Crossoptilon auritum*). Hatched.
 1 Rufous-tailed Pheasant (*Euplocamus erythrophthalmus*). Purchased.
16. 1 Prehensile-tailed Porcupine (*Cercolabes prchensilis*). Presented by O. Wakefield, Esq.
 1 Crab-eating Opossum (*Didelphys cancrivora*). Presented by O. Wakefield, Esq.
17. 5 Swinhoe's Pheasants (*Euplocamus swinhooi*). Hatched.
 2 Hybrid Lineated Pheasants (between *Euplocamus lineatus*, ♀, and *E. curieri*, ♂). Hatched.
 1 Yellow-billed Duck (*Anas xanorhyncha*). Hatched.
 1 Macaque Monkey (*Macacus cynomolgus*). Presented by E. W. Smith, Esq.
 1 Garnett's Galago (*Galago garnettii*). Purchased.
18. 10 Cheer Pheasants (*Phasianus wallichii*). Hatched.
 3 Mandarin Ducks (*Aix galericulata*). Hatched.
 1 Montagu's Harrier (*Circus cinerascens*). Purchased.
19. 2 Orang-Outangs (*Simia satyrus*). Presented by Col. Benson and Mr. Vyapoory.
 1 Azara's Fox (*Canis azarae*). Presented by Mrs. Diggins.
 1 Eye-browed Tanager (*Tanator, sp.*). Purchased.
21. 5 Barred-tailed Pheasants (*Phasianus recresii*). Hatched.
 2 Semmering's Pheasants (*Phasianus semmeringii*). Hatched.
22. 2 Black-necked Swans (*Cygnus nigricollis*). Hatched.
 1 Purple-faced Monkey (*Cercopithecus cephalopterus*). Purchased.
 4 Hoopoes (*Upupa epops*). Purchased.
24. 2 Glaucous Gulls (*Larus glaucus*). Hatched.
 1 Little Tinamou (*Tinamus pileatus*). Received in exchange.
 1 Martinique Gallinule (*Porphyrio martinicensis*). Received in exchange.
 1 Lesser White-nosed Monkey (*Cercopithecus petaurista*). Received in exchange.
 3 Box Tortoises (*Kinosternon pennsylvanicum*). Received in exchange.
 3 Rooks (*Corvus frugilegus*). Presented by H. P. Hensman, Esq.
25. 3 Bahama Ducks (*Percilonetta bahamensis*). Hatched.
26. 1 Red Lynx (*Felis rufa*). Purchased.
 2 Patagonian Cavics (*Dolichotis patagonica*). Presented by Frederick Leybold, Esq., C.M.Z.S.

- June 26. 4 Viscachas (*Lagostomus trichodactylus*). Presented by Frederick Leybold, Esq., C.M.Z.S.
 1 Kinlajou (*Cercoleptes caudivolvulus*). Deposited.
27. 2 Common Kestrels (*Tinnunculus alaudarius*). Presented by Captain Parsons.
29. 1 Silky Monkey (*Hapale rosalia*). Purchased.
30. 2 Bahama Ducks (*Pecilonetta bahamensis*). Hatched.
- July 1. 1 Golden Tiger Cat (*Felis aurata*). Purchased.
 1 Nuthach (*Sitta cæsia*). Purchased.
2. 1 Mexican Deer (*Cervus mexicanus*). Born.
 1 Viscacha (*Lagostomus trichodactylus*). Born.
 1 Nicobar Pigeon (*Culænas nicobarica*). Hatched.
3. 2 Naked-necked Iguanas (*Iguana delicatissima*). Presented by T. Ross, Esq.
 4 Moustache-Monkeys (*Cercopithecus cephus*). Received in exchange.
4. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by H.R.H. The Duke of Edinburgh.
 1 Mauge's Dasyure (*Dasyurus maugei*). Presented by H.R.H. The Duke of Edinburgh.
 1 Smith's Ichneumon (*Herpestes smithii*). Presented by H.R.H. The Duke of Edinburgh.
 1 Australian Fruit-Bat (*Pteropus poliocephalus*). Presented by H.R.H. The Duke of Edinburgh.
 1 Water-Tortoise (*Chelodina longicollis*?). Presented by H.R.H. The Duke of Edinburgh.
 1 Azara's Fox (*Canis azaræ*). Presented by George Wilks, Esq., C.M.Z.S.
 2 Hairy Armadillos (*Dasyppus villosus*). Presented by George Wilks, Esq., C.M.Z.S.
6. 1 Marmoset Monkey (*Hapale jacchus*). Presented by Mrs. Orwin.
 2 Common Kestrels (*Tinnunculus alaudarius*). From Teneriffe. Presented by Capt. T. Waite.
7. 1 Rhesus Monkey (*Macacus erythræus*). Presented by Dr. Turle.
 1 Variegated Sheldrake (*Tadorna variegata*). Presented by Mrs. Prickett.
 1 Arabian Baboon (*Cynocephalus hamadryas*). Presented by The Hon. R. Melville.
8. 1 Negro Tamarin (*Hapale ursulus*). Purchased.
 1 Specious Pigeon (*Columba speciosa*). Purchased.
 1 Coati (*Nasua nasica*). Presented by G. L. Symon, Esq.
 3 Common Kingfishers (*Alcedo ispida*). Presented by Sir Charles Osham.
9. 1 Sapajou (*Cebus*, sp.?). Received in exchange.
10. 1 Nuthach (*Sitta cæsia*). Purchased.
11. 1 Young Common Seal (*Phoca vitulina*). Presented by H. J. Elwes, Esq., F.Z.S.
12. 8 Barred-tailed Pheasants (*Phasianus reevesii*). Hatched.
 7 Green-breasted Pheasants (*Phasianus versicolor*). Hatched.
13. 6 Speckled Terrapins (*Emys guttata*). Purchased.
 1 Blue-crowned Conure (*Conurus acuticaudatus*). Purchased.
14. 2 Spotted Hyænas (*Hyæna crocuta*). Born.
 1 Macaque Monkey (*Macacus cynomolgus*). Born.
15. 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Hatched.

- July 15. 1 Jugger Falcon (*Falco jugger*). Presented by W. Jeffreys, jun., Esq.
16. 1 Koodoo Antelope (*Strepsiceros kudu*). Purchased. From Nubia.
- 1 Indian Leopard (*Felis leopardus*). Presented by H. Morland, Esq.
- 1 Sloth Bear (*Melursus labiatus*). Presented by H. Morland, Esq.
17. 2 Barred - shouldered Ground - Doves (*Geopelia humeralis*). Hatched.
- 1 Common Badger (*Meles taxus*). Presented by W. H. Allies, Esq., F.Z.S.
18. 5 Young Red Grouse (*Lagopus scoticus*). Presented by William Hamilton, Esq.
- 3 Australian Wild Ducks (*Anas superciliosa*). Presented by W. R. Barwood, Esq.
- 3 Peregrine Falcons (*Falco peregrinus*). Presented by The Hon. Charles Ellis.
20. 3 Black Wallabies (*Halmaturus ualabatus*). Presented by the Acclimatization Society of Victoria.
- 1 Grote's Porcupine (*Hystrix grotii*). Malacca. Presented by A. Grote, Esq., F.Z.S.
- 3 Loggerhead Turtles (*Caouana caretta*). Presented by W. K. Taunton, Esq.
21. 1 Formosan Deer (*Cervus taivanus*). Born.
- 1 Hybrid Ibis (between *I. alba* and *I. rubra*). Hatched.
- 1 Marmoset Monkey (*Hapale jacchus*). Presented by H. F. B. Eyles, Esq.
22. 2 Garter Snakes (*Tropidonotus ordinatus*). Purchased.
- 2 Pinche Monkeys (*Hapale ædipus*). Purchased.
23. 1 Gordon's Hydraspis (*Hydraspis gordonii*). From Trinidad. Deposited.
- 1 Kinkajou (*Cercoleptes caudivolvulus*). Presented by The Hon. A. Gordon, C.M.Z.S. From Trinidad.
- 2 Martinique Water-Hens (*Porphyrio martinicensis*). Presented by the Hon. A. Gordon, C.M.Z.S. From Trinidad.
- 3 Duméril's Water-Tortoises (*Podocnemis dumeriliana*). Presented by the Hon. A. Gordon, C.M.Z.S. From Trinidad.
- 1 Common Trumpeter (*Psophia crepitans*). Presented by Lewis Joel, Esq., C.M.Z.S. From Venezuela.
- 2 West-Indian Rails (*Aramides cayennensis*). Presented by Lewis Joel, Esq., C.M.Z.S.
24. 1 Sun-Bittern (*Eurypyga helias*). Hatched.
- 1 Vervet Monkey (*Cercopithecus lalandii*). Deposited.
- 1 Greek Land-Tortoise (*Testudo græca*). Presented by G. Weaver, Esq.
25. 1 Black-necked Swan (*Cygnus nigricollis*). Purchased.
27. 1 Common Seal (*Phoca vitulina*). Purchased.
28. 1 Sun-Bittern (*Eurypyga helias*). Hatched.
29. 1 Vervet Monkey (*Cercopithecus lalandii*). Presented by Miss A. M. Winder.
30. 1 Guinea Baboon (*Cynocephalus papio*). Presented by Dr. Hessel.
31. 6 Green-breasted Pheasants (*Phasianus versicolor*). Hatched.
- 1 Philantomba Antelope (*Cephalophus maxwellii*). Presented by Major Sir Robert Sheffield.
- 3 Silver Pheasants (*Euplocamus nyctemerus*). Deposited.
- 2 Capuchin Monkeys (*Cebus capucinus*). Received in exchange.

- Aug. 1. 1 Electric Eel (*Gymnotus electricus*). Presented by Dr. Palin, C.M.Z.S.
 2 Common Hares (*Lepus europæus*). Purchased.
4. 1 Marmoset Monkey (*Hapale jacchus*). Purchased.
 1 Egyptian Monitor (*Monitor niloticus*). Purchased.
 2 Clapperton's Francolins (*Francolinus clappertoni*). Purchased.
 1 Red Deer (*Cervus elaphus*). Presented by Capt. G. G. Munro.
 1 West-Indian Rail (*Aramides cayennensis*). Deposited.
 1 Martinique Water-Hen (*Porphyrio martinicensis*).
5. 1 Japanese Deer (*Cervus sika*). Born.
6. 1 Bronze-winged Pigeon (*Phaps chalcoptera*). Hatched.
 2 Talpacote Ground-Doves (*Chamaepelia talpacoti*). Hatched.
 4 Palm-Squirrels (*Sciurus palmarum*). Presented by Oswald Howell, Esq.
 1 Whip Snake (*Passerita nycterizans*). Presented by Oswald Howell, Esq.
 3 Chinese Squirrels (*Sciurus castaneiventris*). Presented by George Rapson, Esq.
 1 Vervet Monkey (*Cercopithecus lalandii*). Presented by Lieut. J. W. Browne.
7. 3 Fournier's Capromys (*Capromys pilorides*). Born.
 2 Red-vented Parrots (*Pionus menstruus*). Purchased.
 1 Patu Monkey (*Cercopithecus ruber*). Purchased.
10. 1 South-African Ground-Squirrel (*Xerus setosus*). Presented by E. L. Layard, Esq., F.Z.S.
 1 Spanish Ibex (*Capra pyrenaica*). Presented by Major Howard Irby.
11. 7 Rufous Tinamous (*Rynchotus rufescens*). Hatched.
 1 Magpie Tanager (*Cissopis leveriana*). Purchased.
13. 1 Nicobar Pigeon (*Calenas nicobarica*). Hatched.
 1 Spur-winged Goose (*Plectropterus gambensis*). Received in exchange.
14. 2 Southern Skuas (*Lestris antarctica*). Presented by E. L. Layard, Esq., F.Z.S.
 1 Gigantic Salamander (*Sieboldia maxima*). Presented by A. A. J. Gower, Esq.
 1 Quebec Marmot (*Arctomys empetra*). Presented by Mrs. Bell.
 1 Hoolock Gibbon (*Hylobates hoolock*). Presented by A. Grote, Esq., F.Z.S.
 1 Four-horned Antelope (*Tetracerus quadricornis*). Presented by the Babu Rajendra Mullick, C.M.Z.S.
 1 Large White Crane (*Grus leucogeranus*). Presented by the Babu Rajendra Mullick, C.M.Z.S.
 5 Peacock Pheasants (*Polyplectron chinquis*). Presented by the Babu Rajendra Mullick, C.M.Z.S.
 3 Spotted-billed Ducks (*Anas pœcilorhyncha*). Presented by the Babu Rajendra Mullick, C.M.Z.S.
 1 Black-backed Goose (*Sarcidornis melanota*). Presented by the Babu Rajendra Mullick, C.M.Z.S.
15. 1 Vulpine Phalanger (*Phalangista vulpina*). Born.
 1 Gray's Jerboa Kangaroo (*Bettongia grayi*). Born.
 2 Rufous Tinamous (*Rynchotus rufescens*). Hatched.
 8 Black-headed Gulls (*Larus ridibundus*). Presented by Dr. A. Günther, F.Z.S.
 1 Four-spotted Opossum (*Didelphys opossum*). Purchased.
 3 Golden Tench (*Tinca vulgaris*). Presented by Highford Burr, Esq.

- Aug. 17. 1 Senegal Touracou (*Corythæix persa*). Purchased.
 19. 2 Marmoset Monkeys (*Hapale jacchus*). Deposited.
 2 Common Boas (*Boa constrictor*). Deposited.
 22. 2 Rufous-tailed Pheasants (*Euplocamus erythrophthalmus*). Purchased.
 24. 1 Sea-Lion, ♀ (*Otaria jubata*). Obtained by the Society's collector in the Falkland Islands.
 1 Antarctic Wolf (*Canis antarcticus*). Obtained by the Society's collector in the Falkland Islands.
 2 Forster's Milvagos (*Milvago australis*). Obtained by the Society's collector in the Falkland Islands.
 1 Kelp Goose (*Bernicla antarctica*). Obtained by the Society's collector in the Falkland Islands.
 2 Upland Geese (*Chloephaga magellanica*). Obtained by the Society's collector in the Falkland Islands.
 1 Dominican Gull (*Larus dominicanus*). Obtained by the Society's collector in the Falkland Islands.
 2 Common Marmosets (*Hapale jacchus*). Purchased.
 25. 1 Smooth Snake (*Coronella lavis*). Presented by Wm. Penny, Esq.
 26. 1 Australian Barn-Owl (*Strix delicatula*). Presented by Dr. F. Mueller, C.M.Z.S.
 2 Olive Agoutis (*Dasyprocta acouchy*). Presented by G. H. Hawtayne, Esq.
 27. 1 Springbok (*Gazella euchore*). Presented by H. Somerset Mackenzie, Esq.
 1 Rhesus Monkey (*Macacus erythræus*). Presented by Lieut. J. D. Bulman.
 28. 1 Azara's Agouti (*Dasyprocta azaræ*). Purchased.
 29. 2 Rough-legged Buzzards (*Archibuteo lagopus*). Presented by Captain A. Steuart.
 31. 2 Ospreys (*Pandion haliaetus*). Presented by J. P. Traherne, Esq.
 1 Nylghaie (*Portax picta*). Born.
- Sept. 1. 2 Passerine Owls (*Athene passerina*). Presented by Mrs. Wakefield.
 2. 1 Capuchin Monkey (*Cebus capucinus*). Presented by J. Ramsbottom, Esq.
 3. 1 Little Grebe (*Podiceps minor*). Presented by F. H. Salvin, Esq.
 4. 2 Sykes's Monkeys (*Cercopithecus albogularis*). Purchased.
 1 Common Buzzard (*Buteo vulgaris*). Presented by Theobald Tax, Esq. From Norway.
 2 Cuvier's Pheasants (*Euplocamus cuvieri*). Presented by Dr. John Squire.
 1 Indian Tortoise (*Testudo indica*). Purchased.
 5. 1 Red-backed Shrike (*Enneoctonus collaris*). Presented by Mr. Felkin.
 7. 2 Barred-shouldered Doves (*Geopelia humeralis*). Hatched.
 1 Maugé's Dove (*Geopelia maugéi*). Hatched.
 1 Forster's Milvago (*Milvago australis*). Presented by Capt. Dyer.
 8. 8 Indian Crocodiles (*Crocodilus palustris*). From Cochin. Presented by Capt. Efford.
 9. 1 Yellow-footed Kangaroo (*Petrogale xanthopus*). Born.
 1 Barn-Owl (*Strix flammea*). Presented by John Gould, Esq.

- Sept. 10. 1 Coati (*Nasua nasica*). Presented by J. L. Moore, Esq.
 11. 1 Two-horned Rhinoceros (*Rhinoceros bicornis*). From Upper Nubia. Purchased.
 2 King Parrakeets (*Aprosmictus scapulatus*). Presented by R. M. Way, Esq.
 15. 5 Lemmings (*Lemmus norvegicus*). Presented by Mrs. Wingfield of Onslow.
 16. 1 Brown Capuchin Monkey (*Cebus capucinus*). Presented by Mr. Sandland.
 17. 1 Bennett's Wallaby (*Halmaturus bennettii*). Presented by C. R. Fenwick, Esq.
 1 Common Bittern (*Botaurus stellaris*). Presented by F. C. Capel, Esq.
 2 Bronze-winged Pigeons (*Phaps chalcoptera*). Hatched.
 2 Indian Crocodiles (*Crocodylus palustris*). From Cochin. Presented by Capt. Banks.
 2 Dotted-jawed Caymans (*Jacare punctulata*). From Tobago. Presented by Capt. Spicer.
 19. 1 Persian Deer, ♀ (*Cervus maral*). Born.
 21. 4 Æsculapian Snakes (*Coluber æsculapii*). Received in exchange.
 6 Smooth Snakes (*Coronella lævis*). Received in exchange.
 23. 1 Serval (*Felis serval*). Presented by T. C. Chown, Esq.
 24. 1 Spotted Cavy (*Cælogenys paca*). Presented by W. C. Kelaart, Esq.
 2 Pine Grosbeaks (*Corythus enucleator*). Presented by Robert Honywood, Esq.
 1 Gannet (*Sula bassana*). Presented by G. S. Patey, Esq.
 25. 1 Richardson's Skua (*Lestris parasitica*). Presented by F. Cresswell, Esq.
 26. 1 Indian Antelope, ♂ (*Antilope cervicapra*). Presented by Wm. Phillipps, Esq.
 28. 1 Maugé's Dasyure (*Dasyurus maugæi*). Presented by Capt. Skinner.
 1 Great Eagle-Owl (*Bubo maximus*). Presented by Mrs. Thomas Bell.
 30. 2 Bonnet-Monkeys (*Macacus radiatus*). Presented by Major the Hon. R. Needham, F.Z.S.
 1 Honey-Buzzard (*Pernis apivorus*). Presented by J. G. Topham, Esq.
- Oct. 2. 1 Green Monkey (*Cercopithecus callitrichus*). Presented by Capt. M'Ewen.
 3. 1 Red-crowned Pigeon (*Erythrænas pulcherrima*). Purchased.
 6. 1 White-throated Sapajou (*Cebus hypoleucus*). Presented by Mrs. Fletcher.
 2 Golden Agoutis (*Dasyprocta aguti*). Presented by W. C. Kelaart, Esq.
 1 Brazilian Tortoise (*Testudo tabulata*). Received in exchange.
 7. 2 Eleonora Falcons (*Falco eleonoræ*). From Mogadore. Presented by Capt. Thomas Waite.
 1 Pied Flycatcher (*Muscicapa atricapilla*). Caught near Hampstead. Presented by F. Bond, Esq., F.Z.S.
 2 Golden Pheasants (*Thaumalea picta*, var.). Purchased.
 1 Chestnut Cuckoo (*Centropus philippensis*). Purchased.
 1 Black Cuckoo (*Eudynamys orientalis*). Purchased.

- Oct. 8. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by T. G. Palmer, Esq.
10. 1 Arabian Baboon (*Cynocephalus hamadryas*). Presented by Lieut. A. E. Puzey.
1 Grivet Monkey (*Cercopithecus grisco-viridis*). Presented by E. G. Brietzeke, Esq.
14. 2 Chameleons (*Chamæleon vulgaris*). Presented by Wm. Kirkness, Esq.
15. 1 Demeraran Cock of the Rock (*Rupicola crocea*). Presented by Capt. Coventry.
16. 1 Arctic Tern (*Sterna arctica*). Presented by R. Lawson, Esq.
2 Grey Wagtails (*Motacilla boarula*). Purchased.
3 Leopards (*Felis leopardus*). Born.
17. 1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Miss Mary Drew.
19. 1 Indian Antelope (*Antilope cervicapra*). Presented by G. Y. Mercer, Esq.
1 Pampas Cat (*Felis pajeros*). Purchased.
4 Cuming's Octodons (*Octodon cumingii*). Purchased.
1 Patagonian Conure (*Conurus patagonicus*). Purchased.
1 Darwin's Rhea (*Rhea darwini*). Purchased.
1 Guinea Baboon (*Cynocephalus papio*). Presented by W. H. Roberts, Esq.
20. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by E. Round, Esq.
1 Vervet Monkey (*Cercopithecus lalandii*). Presented by W. H. Allies, Esq., F.Z.S.
4 Mississippi Alligators (*Alligator mississippiensis*). Purchased.
21. 1 Ring-necked Parrakeet (*Palæornis torquatus*). Presented by Mrs. Hodgkinson.
2 Common Ravens (*Corvus corax*). Presented by H. J. Symonds, Esq.
1 Capuchin Monkey (*Cebus*, sp.). Presented by J. W. Bourne, Esq.
1 Harnessed Antelope (*Tragelaphus scriptus*). From Lagos. Purchased.
1 Canadian Lynx (*Felis canadensis*). Presented by H. D. Sheffield, Esq.
22. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by A. Caines, Esq.
1 Pied Rat (*Mus rattus*, var.). Presented by Miss M. Wheeler.
23. 1 Vervet Monkey (*Cercopithecus lalandii*). Presented by E. Gottgetren, Esq.
1 Silver Fox (*Canis argentatus*). Deposited.
1 Cross Fox (*Canis fulvus*, var.). Deposited.
1 Canadian Beaver (*Castor canadensis*). Deposited.
24. 1 Common Chameleon (*Chamæleon vulgaris*). Presented by T. C. Read, Esq.
1 Common Chameleon (*Chamæleon vulgaris*). Presented by — Wyatt, Esq.
26. 1 Spur-winged Goose (*Plectropterus gambensis*). Purchased.
1 Egyptian Goose (*Chenalopex ægyptiacus*). Purchased.
2 Black-billed Sheathbills (*Chionis minor*). Presented by E. L. Layard, Esq., F.Z.S.
1 Aard-Wolf (*Proteles lalandii*). Purchased.
27. 1 African Wood-Ibis (*Tantalus ibis*). Purchased.
28. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by Dr. J. C. Hornsby Wright.

- Oct. 28. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by Dr. J. C. Hornsby Wright.
 1 Tuatera Lizard (*Hatteria punctata*). Deposited by Sir George Grey, K.C.B.
29. 1 Hybrid Gayal (between *Bos indicus* and *Bos frontalis*). Born.
 1 Yarrell's Curassow (*Crax carunculata*). Deposited.
30. 1 Brown Capuchin Monkey (*Cebus apella*). Presented by J. Clarke, Esq.
- Nov. 1. 1 Red Kangaroo (*Macropus rufus*). Born.
2. 1 Wedge-tailed Eagle (*Aquila audax*). Presented by C. J. Trendell, Esq.
 1 Long-eared Owl (*Otus vulgaris*). Presented by A. F. Barrant, Esq.
3. 2 Passerine Parrakeets (*Psittacula passerina*). Presented by Miss Bruce.
 2 Herring-Gulls (*Larus argentatus*). Presented by W. Jeffreys, jun., Esq.
 3 Ringed Seals (*Phoca fœtida*). Purchased.
 2 Whiting-Pouts (*Gadus luscus*). Presented by Mons. Lennier.
6. 1 Aurochs (*Bos bison*). Bred in the Royal Zoological Society's Gardens at Amsterdam, July 14th, 1865. Purchased.
8. 1 Eland, ♀ (*Oreas canna*). Born.
9. 1 Assamese Monkey (*Macacus assamensis*). From Bhootan. Deposited.
10. 2 Eider Ducks (*Somateria mollissima*). Purchased.
 1 Green Monkey (*Cercopithecus callitrichus*). Presented by Thomas Hayes, Esq.
12. 1 Marmoset Monkey (*Hapale jacchus*). Presented by Mrs. Boswell.
 2 White American Cranes (*Grus americana*). Purchased.
14. 2 Crested Pigeons (*Ocyphaps lophotes*). Presented by O. W. Brierly, Esq.
15. 2 Common Terns (*Sterna hirundo*). Presented by Mr. A. A. van Bemmelen.
16. 1 Moustache-Monkey (*Cercopithecus cephus*). Presented by Dr. Dyer.
18. 2 Red and Yellow Macaws (*Ara chloroptera*). Presented by J. Morris, Esq.
 3 Greek Tortoises (*Testudo græca*). Presented by Capt. T. Waite.
 2 Sandwich-Island Geese (*Chloëphaga sandwichensis*). Purchased.
 1 Javan Peafowl (*Pavo muticus*). Purchased.
 1 Black-winged Peafowl (*Pavo nigripennis*). Purchased.
19. 1 Demoiselle Crane (*Anthropoides virgo*). Presented by Mrs. J. Williams.
 2 Leopards (*Felis leopardus*). Deposited.
23. 1 Emu (*Dromæus novæ-hollandiæ*). Presented by H.R.H. The Prince of Wales.
 1 Australian Crane (*Grus australasiana*). Presented by H.R.H. The Prince of Wales.
26. 1 Gray's Jerboa Kangaroo (*Bettongia grayi*). Born.
27. 2 Stanley Cranes (*Tetrapteryx paradiseus*).
 2 Crowned Hornbills (*Toccos melanoleucus*). Purchased.
 1 Grand Galago (*Galago crassicaudatus*). Purchased.
28. 2 Black Rats (*Mus rattus*). Presented by J. M. Needham, Esq.

- Dec. 1. 1 Varying Hare (*Lepus timidus*). Presented by Miss Sybil Drummond.
2. 1 Cuming's Octodon (*Octodon cumingi*). Born.
3. 11 Bahama Ducks (*Pecilonetta bahamensis*). Purchased.
1 Bonnet-Monkey (*Macacus radiatus*). Presented by J. May, Esq.
1 American Hawk-Owl (*Surnia ulula*). Purchased.
2 Regent Birds (*Sericulus chrysocephalus*). Purchased.
4. 2 Crested Pelicans (*Pelecanus crispus*). Received in exchange.
2 Temminck's Snappers (*Macrolemmys temmincki*). Presented by Herr G. Hagenbeck.
5. 1 White Goshawk (*Astur nova-hollandiae*). Deposited.
8. 1 Placid Ground-Dove (*Geopelia placida*). Presented by G. Waugh, Esq.
1 Arctic Wolf (*Canis occidentalis*). Deposited.
2 Rooks (*Corvus frugilegus*). Deposited.
10. 4 Summer-Ducks (*Aix sponsa*). Received in exchange.
1 Peewit (*Vanellus cristatus*). Presented by Mrs. H. Roach.
11. 1 Redshank (*Totanus calidris*). Presented by the Hon. Mrs. Cresswell.
3 Knots (*Tringa canutus*). Presented by the Hon. Mrs. Cresswell.
9 Dunlins (*Tringa variabilis*). Presented by the Hon. Mrs. Cresswell.
15. 1 Common Macaque (*Macacus cynomolgus*). Presented by Dr. E. Blennerhassett.
19. 2 Mangabey Monkeys (*Cercocebus athiops*). Presented by Dr. Leared.
20. 1 Temminck's Tragopan, ♂, (*Cerionis temmincki*). Received in exchange.
1 Indian Mynah (*Acridotheres fuscus*). Purchased.
24. 1 Vervet Monkey (*Cercopithecus lalandi*). Presented by Col. Tower.
2 Javan Chevrotains (*Tragulus javanicus*). Presented by Russell Sturgis, Esq., F.Z.S.
27. 1 Rhesus Monkey (*Macacus erythraeus*). Born.
28. 2 Summer-Ducks (*Aix sponsa*). Received in exchange.
29. 2 Fieldfares (*Turdus pilaris*). Purchased.
30. 1 Barred-shouldered Dove (*Geopelia humeralis*). Hatched.
31. 1 Malbrouck Monkey (*Cercopithecus cynosurus*). Presented by David Thompson, Esq.
2 Cape-Doves (*Œna capensis*). Presented by Miss L. Saunders.
2 Great Black-backed Gulls (*Larus marinus*). Presented by F. Roxburgh, Esq.
2 Kittiwakes (*Rissa tridactyla*). Presented by F. Roxburgh, Esq.

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