



PROCEEDINGS

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SCIENTIFIC MEETINGS

28

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FOR THE YEAR

1862.



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FELLOW OF CORPUS CHRISTI COLLEGE, OXFORD,

SECRETARY OF THE ZOOLOGICAL SOCIETY OF LONDON, F.L.S., ETC.

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PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1862.

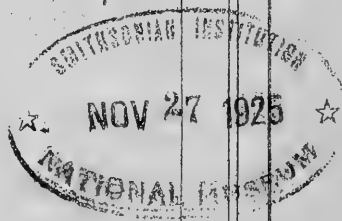
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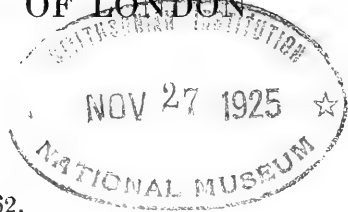
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PROCEEDINGS
OF THE
SCIENTIFIC MEETINGS
OF THE
ZOOLOGICAL SOCIETY OF LONDON



January 14, 1862.

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

Dr. P. L. Slater exhibited, on behalf of Mr. E. Blyth, Corr. Memb., a tracing of the outline of a skull of the adult male *Rhinoceros sumatranus*, from a specimen in the possession of Lieut.-Col. Fytch, Commander of the Martaban and Tenasserim provinces, Maulmein. The animal had been killed in the province of Tavoy, near the Siamese frontier. The outline of the skull was reduced in the drawing to one-fourth of the original. Mr. Blyth stated that another example, sent to England by Col. Fytch, had the anterior horn more curved and about 3 inches longer, and that this was the horn he was inclined to believe *Rhinoceros crossii* of Dr. Gray (P. Z. S. 1854, p. 250) had been founded upon.

Extracts were read from a letter addressed to the Secretary by Dr. George Bennett, F.Z.S., dated Sydney, Nov. 20th, 1861, referring to the proposed establishment of a Society of Acclimatisation at Sydney, and regretting the failure of his attempt to keep living in captivity specimens of the Koala (*Phascolarctos cinereus*) destined for the Society. Dr. Bennett also stated that the Aviary in the Botanic Gardens at Sydney then contained a pair of the Mooruk (*Casuarus bennettii*), Albatrosses of two species (*Diomedea exulans* and *D. melanophrys*), and a Regent-bird (*Sericulus aureus*) in full plumage.

Dr. A. Günther called the attention of the Society to the fact that a
Proc. Zool. Soc.—1862, No. I.

female Python, in the Reptile-house in the Society's Gardens (*Python sebae*), had on the previous day deposited a large number of eggs, and had commenced to sit upon them, guarding them with great care. A sketch by Mr. Wolf was exhibited, illustrative of the Python as she appeared in this position.

Dr. Cobbold exhibited a preparation of the remarkable pouched Peyerian gland from the intestine of the young Giraffe which had recently died in the Society's Gardens.

Mr. Alfred Newton exhibited a nest containing seventeen hatched-out eggs of *Ortyx virginianus*, which had been sent to him from New York by Mr. George N. Lawrence, C.M.Z.S., and read from a letter of that gentleman's the following extract:—

“Of course eggs of this species are abundant enough; but this is the only nest that ever came under my own observation. It was obtained in the garden of a place occupied by me during the summer, near the sea-shore at Rockaway, Long Island.

“The eggs, as you will notice, are chipped round at the largest diameter, with almost mathematical exactness, leaving a part of the shell adhering to one side. The fact of this being left to act as a hinge strikes me as peculiar, but it may not be unusual in birds of this family.”

Mr. Newton stated that the very curious and regular mode in which the shells of these specimens had been almost entirely, yet not quite, severed was a circumstance he had never before observed in the eggs of any other species. In the European wild *Gallinæ*, especially in *Perdix cinerea*, the fracture of the shell, caused by the escape of the young birds, generally takes place nearer the middle of the axis major, and, so far as he knew, was always complete; that is, there was no “hinge” left joining the two parts. Indeed, in partridges' eggs which have been hatched out, the two portions of the shell were most frequently found lying the one encased in the other. He forbore offering any suggestions as to the manner in which the very curious appearance in the eggs exhibited had been produced, but considered it quite worthy the attention of naturalists.

The following papers were read:—

1. DESCRIPTIONS OF THREE NEW SPECIES OF SHELLS BELONGING TO THE FAMILY OF CYCLADES. BY TEMPLE PRIME, OF NEW YORK.

1. *BATISSA SPHÆRICULA*, Prime.

Cyrena violacea, Lam., var. *Javanica*, Mousson, Moll. Java, 88, pl. 15. f. 1, 1849.

B. testa subrotunda, æquilaterali, depressiuscula, epidermide atro-virescente vestita, antice sulcis transversis remotis ornata, intus albo-violacea; latere antico dilatato, postico obtuso; lamina cardinali angusta; dentibus primariis inæqualibus, subcanali-

culatis; lateralibus elongatis, angustis, æqualibus; umbonibus inclinatis, erosis.

Long. $2\frac{2}{3}$, lat. $2\frac{1}{2}$, diam. $1\frac{1}{3}$ poll.

Hab. In flumine Palembang prope Pardana, in insula Java (*Coll. Prime*).

2. *BATISSA SOLIDULA*, Prime.

B. testa ovato-orbiculari, æquilaterali, crassa, solida, latere antico dilatato, postico latiore, epidermide polita atro-fuscescente vel olivacea vestita; valvis intus albis, ad margines inferne posticeque violaceis; cardine incrassato; dentibus cardinalibus subæqualibus; lateralibus elongatis, angustis, serrulatis; umbonibus prominentibus, integris, antice inclinatis.

Long. $2\frac{2}{3}$, lat. $2\frac{1}{3}$, diam. $1\frac{1}{3}$ poll.

Hab. —? (*Coll. Cuming et Prime*).

3. *PISIDIUM NOVÆ ZELANDIÆ*, Prime.

P. testa minuta, ovali, valde obliqua, tenui, fragili, postice subtruncata, umbonibus obtusiusculis, approximatis, epidermide corneo-flavescente vestita.

Long. $\frac{1}{2}$, lat. $\frac{1}{4}$, diam. $\frac{1}{10}$ poll.

Hab. In Nova Zelandia (*Coll. Cuming et Prime*).

2. DESCRIPTIONS OF TWO NEW SPECIES OF HELICTER (*ACHATINELLA*, SWAINS.), FROM THE SANDWICH ISLANDS, WITH A HISTORY OF THE GENUS. BY W. HARPER PEASE.

We venture to add two species to the above genus, and to adopt the generic name given to this group by Férussac, as having priority over that of *Achatinella* of Swainson. The history of the genus will, we think, justify us in so doing. Not having met with any account of it in a connected form, we offer the following to be filled out hereafter by those abroad who have within their reach materials we cannot command in this corner of the world.

It is not probable that any specimens of this genus were collected by Capt. Cook, or those attached to the expedition under his command, as they anchored on their first visit at the most leeward island of the group, Kauai, and, on their return from the north-west coast of America, at the most windward, Hawaii, having but little or no communication with the intermediate islands. With the exception of one species, rarely met with on the mountains in the interior of Hawaii, none but small ground species inhabit either of the above islands, the true *Helicteres* being confined to the central islands of the group.

The earliest notice we find of any species of this genus is in the narrative of the first commercial expedition that visited the islands after their discovery by Capt. Cook. It consisted of two vessels, the one under command of Capt. Portlock, the other under Capt. Dixon :

each of these officers published a narrative of his voyage, in London, 1789, in a separate volume.

The latter purchased from the natives at Oahu a necklace made of the *H. lugubris*. In an appendix to his narrative he gives descriptions of several objects of natural history collected in the Pacific, including the above species, under the name of "*Helix apexfulva*," illustrated by a good figure. In the year 1795 Chemnitz closed his great work with descriptions of a number of new species of shells from the Pacific, many of which had been lately purchased by Spengler (whose collection was considered the largest in Europe, and afforded Chemnitz many rare species) from a dealer in London. They included the shell described by Capt. Dixon; and, without much doubt, the specimens were from the necklace brought home by him. Chemnitz named it "*Turbo lugubris*." It is the oldest recognized species of the genus. In 1801 Lamarck described the same species in his 'Animaux sans Vertèbres' as "*Monodonta seminigra*," having also purchased specimens from a dealer in London. He was misinformed as to the locality (Tahiti), and adds that "La reine de cette île en fait des boucles d'oreille." The dealer might have supposed that he would enhance their value by representing them as having ornamented a queen; he received two guineas for them. Delessert figures the specimen from Lamarck's collection on plate 37. fig. 2, and, quoting the locality from Lamarck, adds "Il a été rapporté par le capitaine Cook," also an error. Up to this date but one species was known. The several specimens described and figured can all be traced without much doubt to Capt. Dixon's necklace, which, having been purchased for a nail at Oahu, was sold (at the rate of those purchased by Spengler and the Paris Museum) for several hundred dollars in Europe.

Twenty years passed by before any other specimens found their way to Europe, although in the meantime the islands became the winter resort of the fur-traders from the north-west coast of America, and were visited by the French Expedition under La Pérouse, and that of the English under Vancouver. In 1820 the expedition under De Freycinet returned from the Pacific. Férussac having commenced that year the publication of his great work on land-shells, all the species collected by Quoy and Gaimard during their voyage were passed over into his hands for examination and description. Eight species appeared in a 'Prodrome' published by Férussac in 1821, their generic character being well and accurately defined, under the name of *Helicter*, and were placed by him in his system under a subdivision (*Cochlogena*) of the *Helices*, it having been reported to him that the animal was similar to those of that family. The genus must therefore date 1821, not 1819, as noted by Drs. Gray and Herrmannsen. The copy of the 'Prodrome' in our library has no date on its title-page; but we find at the commencement of the 'Tableau Systématique' the date 1821, June, which we adopt, and which is probably correct, as the expedition from which his specimens were obtained did not reach Europe until 1820. Three years later, 1824, the 'Zoology of the Voyage of De Freycinet' was published, in which

Férussac gives a monograph of the genus also under the name of *Helicter*, correcting the synonymy of the original species by Chemnitz, and adding two more from the collection of Quoy and Gaimard. In the year 1827 two of the above species were redescribed by Dr. Green in the 'Collection of the Maclurian Lyceum,' Phil. U. S.

In the 'Quarterly Journal of Science, Literature, and Art of the Royal Institution of Great Britain' for the year 1828, Mr. Swainson published descriptions of seven species, one of which was a synonym of the original species by Chemnitz, and one of a species by Férussac. He also defines their generic character, and establishes the genus *Achatinella*. No reference is made to previously described species, excepting that by Dixon and the "*seminigra*" of Lamarck, which he adopts as the type of his genus. His descriptions are introduced by a few remarks on the difficulty of determining generic characters from shells alone, and he reflects on continental authors for not adopting a more artificial system. He refers to the genus *Helix* as an example. We quote his words:—"The truth of these remarks will appear very obvious on looking to the genus *Helix*, as it was left by Linnæus, and as it was considered only a few years back, when the French writers still considered it only in the light of a genus, containing many hundreds of species. * * * The peculiar views of M. Férussac led him, in the first instance, to return to the old arrangement, so far as to consider these shells merely as a genus divided into subgenera, sections, &c. This view, however, he seems at length to have gradually abandoned, and virtually to admit, what indeed is quite obvious, that they constitute a family, and a very extensive one, comprising numerous minor groups or genera, many of which rest on striking dissimilarities in their animals, and all on certain and obvious characters in the shell." * * * * "To characterize a new form, and to give it a name, is no longer looked upon as a dangerous innovation." Mr. Swainson appears to have carried out this idea in his latest systematic work on shells ('Treatise on Malacology'), as he there arranges the Testaceous Gasteropods under 360 genera and subgenera, 161 of which are his own.

H. and A. Adams (who cannot be accused of restricting the number of genera) reduce about seventy-two of them to the rank of synonyms.

In his latest work Mr. Swainson does not refer to the genus *Helicter*, but merely remarks that "we adopt M. Férussac's names whenever they have a right to priority, and are classical."

In the January number of the 'Bulletin des Sciences Naturelles,' of the following year (1829), M. Férussac published a rejoinder to the above article by Mr. Swainson, and claimed priority for his genus *Helicter*. We quote his words:—"Nous croyons devoir rappeler à M. Swainson que la gloire ne s'acquiert pas en donnant des noms nouveaux que personne ne respecte quand ils sont donnés sans motifs, mais en établissant des coupes fondées sur des caractères bien observés et réellement distinctifs, en saisissant les véritables rapports naturels des êtres, et en respectant ces rapports dans l'établissement des coupes de tous les degrés; nous ajouterons que, pour

l'honneur de la science et des savans anglais, nous sommes très-éloignés de penser que les naturalistes de cette nation aient abjuré les principes qui prévaudront toujours chez tous les bons esprits—ceux de ne reconnaître comme coupes méthodiques du système que celles qui sont fondées sur des caractères organiques, bien tranchés et de même valeur dans chaque ordre ou chaque famille naturelle. M. Swainson, s'il ne craint pas d'établir de mauvais genres, devrait au moins craindre que l'on ne l'accuse, ou d'ignorer ce que les autres ont fait, ou de passer leurs travaux sciemment sous silence, en établissant des divisions méthodiques et des espèces déjà instituées avant lui. Son genre *Achatinella* n'est que la copie, sous un autre nom, de notre groupe des *Helicteres*, établi d'abord dans notre 'Prodrome' et ensuite dans 'Le Voyage de M. de Freycinet.' Il eut été convenable de nous citer et de proposer alors franchement l'établissement de genre distincte de notre groupe des *Helicteres*, en discutant les raisons qui nous ont porté à le laisser parmi les *Helices*, notamment l'identité de leurs animaux."

This genus, so clearly established and justly contended for by Férussac, passed out of sight. The only authors, so far as we are aware, who have adopted it are Drs. Gray, Beck, and Herrmannsen. M. Deshayes has refused to acknowledge it, as well as *Partula* and other genera now universally adopted; but that should not lessen M. Férussac's claim, more particularly as the reason he alleges (a want of a knowledge of the animal) has been set aside by Eydoux and Souleyet in the 'Voyage de Bonite.' The name is classical and appropriate ("a drawn-out or extended coil"), and does not of necessity connect the genus with the family of *Helices*.

The next monograph following that by Férussac is from Dr. Pfeiffer in the 'Proceedings of the Zoological Society of London,' 1845, in which the Doctor not only adopts the generic name of Swainson, but also his specific names for those species which are synonymous with the earlier species described by Férussac. In subsequent monographs, however, by the same author, in his great work 'Monographia Heliceorum Viventium,' priority is assigned to the specific names given by Férussac.

In 1850 Mr. Reeve published a monograph in his 'Conchologia Iconica,' under the name *Achatinella*. All future describers follow Dr. Pfeiffer and Mr. Reeve's example. A full monograph and history of the species would require several years' laborious study and research. The most perfect list of synonyms that has appeared, more particularly of the earlier-described species, is that by Dr. Newcomb in the 'Annals of the New York Lyceum,' 1858.

The number described is about 325, of which (according to Dr. Newcomb) more than three-eighths are synonyms. We follow the rule laid down by Mr. Swainson, and adopt the name *Helicter* for this genus, being convinced that it is classical and has priority, and proceed to add two species as follows:—

HELICTER PROXIMUS.

H. testa sinistrorsa, imperforata, oblongo-ovata, ventricosa;

subtiliter transversim striata, striis subflexuosis, interruptis, juxta suturas conspicuis; anfractibus sex, convexis, superne marginatis, ultimo plano-convexo, oblique producto; apertura obliqua, oblongo-ovata, plica columellari valida: colore castaneo, albido et fusco irregulariter strigato, columella et aperturae margine intus purpureo-rubentibus.

Shell sinistral, imperforate, oblongo-ovate, ventricose, rather solid, finely striated transversely; striæ somewhat flexuous, granulose, and interrupted, more regular and conspicuous beneath the sutures. Whorls six, convex, marginated, the last being somewhat produced obliquely and flattened on the middle, so as to give in some specimens a subangulated appearance at the base. Aperture somewhat oblique, of an oblong-ovate form; columellar fold strong. Colour chestnut-brown, striped and mottled irregularly with darker brown and white; columella and inner edge of aperture purplish red.

Hab. Island of Molokai.

The above species from the island of Molokai appears to represent the *H. marmoratus* and its varieties of the island of Maui. It is, however, larger and heavier; the last whorl has also a peculiar shape, in common with that of several of the larger species found on Molokai. All the specimens I have seen are sinistral, and the columella and edge of the aperture of a deep red.

HELICTER HUTCHINSONII.

H. testa acuminato-turrita, sinistrorsa, imperforata; anfractibus septem, plano-convexis, longitudinaliter rugosis et irregulariter striatis, non marginatis; sutura bene impressa, subrudi; apertura ovata; columella subplicata tortuosa; epidermide fictili-brunnea induta, apice fusco; apertura et columella peralbidis.

Hab. Maui, Sandwich Islands.

Shell acuminately turreted, sinistral, imperforate. Whorls seven, flatly convex, coarsely and irregularly striated longitudinally, not marginated; sutures somewhat rude, well impressed. Aperture ovate, about two-fifths the length of the shell; columellar fold slight, oblique, and tortuous. Shell covered with an earthy-brown epidermis; apex of a darker colour; aperture and columella white, shining.

This shell appears to be the analogue of *H. obscurus* (Newc.) from the island of Lanai. The latter differs in many respects, more particularly in the colour of its aperture, which is of a purplish red, and also in the shape of its columella, which has a character in common with other species found on Lanai. The above species is sinistral; *H. obscurus* is dextral. We have attached to this species the name of the Honourable F. W. Hutchinson, Judge of the Circuit Court, to whom we are indebted for several rare shells.

3. DESCRIPTION OF SPHYROCEPHALUS LABROSUS*, A NEW BAT FROM OLD CALABAR RIVER, WESTERN AFRICA. BY ANDREW MURRAY, ASS. SEC. R. HORTICULTURAL SOCIETY.

(Plate I.)

PTEROPINI.

SPHYROCEPHALUS, nov. gen.

Dental formulary:—

Incisors.	Canines.	Molars.	
		Premolars?	True molars?
$\frac{4}{4}$	$\frac{1}{1}$	$\frac{1}{2}$	$\frac{2}{3}$

Head very large and oblong; the lips largely developed and expanded. Ears rather large, without tragus. Thumb and index-finger of hand unguiculate, the other fingers without claws. Tail wanting.

SPHYROCEPHALUS LABROSUS, sp. nov.

Brown, with a few whitish hairs at the base of the ears. The head very large, massive, half as long as the whole body, oblong, and as broad at the muzzle as at the top of the head, with some resemblance to a hammer, whence the name hammer-headed (*Sphyrocephalus*), rather more than twice as long as deep; ears rather large, destitute of tragus; eyes rather large; eyelids provided with eyelashes; nostrils large and tubular; lips extraordinarily developed; both upper and lower lips of a very smooth semi-muco-membranous texture, corrugated and tuberculated at the margins; the upper lip with a tuberculated prominence in the line of the two outer incisors, and a more elongated tuberculated ridge further up, in the line of the two inner incisors; the external lateral margin expanded into a sort of stiff semi-cupshaped flap with a tuberculated edge, rising to meet the nostril and then descending, following its lower edge, and terminating in a curved scroll-like coil in the nostril.

The same semi-muco-membranous lip is spread over the front of the lower jaw, forming a sort of chin. The skin in the neighbourhood of the lips, and extending upwards and backwards along the nasal bones, is covered with the same sort of fine velvety down which surrounds a horse's nostrils; the hair on the rest of the head is flocky; on the downy portion there are on the sides of the upper

* Since this paper was in print, the last number of the 'Proceedings of the Academy of Natural Sciences of Philadelphia' has been received in this country (the first copies arrived on 19th February, 1862); and in it I find a description of a new Bat, which probably belongs to this species, by Dr. Harrison Allen (Proc. Acad. Nat. Sc. Phil. July 1861, p. 156). It is said to be taken from a specimen collected by M. Du Chaillu, and is named by Dr. Allen *Hypsignathus monstrosus*. If it is the same species, of course Dr. Allen's name must take precedence. His description does not quite correspond with mine, but, judging from the description of the nose, may, perhaps, have been taken from a dried skin, whereas mine is from a fine example in spirits. M. Du Chaillu has exhibited no specimen of this Bat in England.

lip three rows of papillæ, each with a long whisker-hair springing from it. In the specimen before us these papillæ are arranged four in the two first rows and three in the last; similar papillæ and hairs run up the downy space covering the long nasal bones, in three rows, past the eyes and quite to the forehead, numbering each nine or ten papillæ, the middle row being shorter than the two others. The gape of the mouth is large, extending back fully a third of the head; the lip does not encroach on the outside of the face along the gape; it is only directly in front that it is so much developed; the upper lip is connected with the gum by a broad thick ridge uniting them together in the line of the symphysis of the intermaxillary bones.

The disposition of the teeth is as follows:—

They are all well separated from each other, none touching each other except, perhaps, the last molars; the incisors of the upper jaw are minute rounded points; in the lower jaw they are equally minute, but transversely oblong and bilobed. The canine teeth in both are well developed and of the usual form; beyond the canine there is a minute tooth (a mere point) in the lower jaw which is wanting in the upper jaw; the next tooth beyond it is almost exactly of the form of the canine, and is probably a pre-molar; the remaining teeth, two in the upper and three in the lower jaw (probably true molars), have their crown divided longitudinally; in the upper jaw each ridge slopes backwards, in the under jaw the external ridge is bilobed. The palate has strong, elevated, transverse ridges running across from interspace to interspace between each tooth. The tongue is rather large, and covered with a sort of tessellated pavement of large flat papillæ; it is free very far back. Under it and lying in the hollow of the mouth, occupying the whole breadth for a short space in front between the rami of the lower jaw, is a very curious membrane fringed with slips or plaits—a sort of second tongue, calling to recollection a somewhat similar organ or structure under the tongue of the *Loris* and *Lemur*. In these it assumes the form of an aponeurotic lamina, which is divided at its anterior thinner end into filaments or slips. “This arrangement (a development of the frenum of the tongue),” says Van der Hoeven, “has been described incorrectly, in my judgment, as though the tongue were double, or even as if a bird’s tongue were under the mammalian tongue.” It may be a development of the frenum, because two things connected together, although at opposite ends, may always be said to be parts of the same thing however distant they may be. But I would only observe that in the present instance the frenum of the tongue is situated very far back, and it seems to me that it may just as possibly be a development of the floor of the mouth as of the frenum of the tongue. I do not suppose that Dr. Van der Hoeven would think it necessary to look elsewhere than to the walls of the œsophagus to find the structure from which the elongated papillæ lining the œsophagus, in the hawk-billed turtle for instance, had been developed. There is a tendency to similar structure in other parts than the tongue in many animals—on the palate and back of the mouth, for example; and I should not be disposed to seek further than the place from

which it springs for the source of this development. It does not extend much further back than the lower canine teeth; but there is a slight plait or perceptible line running on each side all the way to the back of the mouth, giving the appearance of a second thin flat tongue lying in the hollow of the mouth, tied down like the tongue of a crocodile; but the separation here is a mere trace, and it is only the fringed margin in front which is free.

The neck is distinct, and the skin has the appearance of having some cellular space between it and the muscles.

The body is oblong and compact; the ribs descend far, and the lower ribs are very large; the stomach is moderate in size, furnished internally with several large transverse folds; the small intestines are not very long; there is no cæcum.

The arms have the thumb and index unguiculate, the rest of the fingers are without claws; the thumb has two phalanges, the rest have three phalanges. The thumb is united to the wing by a membrane stretching on both sides over the whole of the proximal and half of the distal phalanx; the proximal phalanx of the thumb is shorter than the distal. The winged membrane is not extended across the back, but is very ample; the winged space between the third and fourth fingers, and between the fourth and the body, has in its middle numerous longitudinal bundles of muscular fibre interwoven without attachments, and one or two similar transverse bundles; these are probably for the purpose of assisting in the folding of the wing. Along these bundles of muscular fibre the membranous wing is closely wrinkled; and there is little doubt that they will also strengthen the membrane where they occur.

The hind feet are uniform and all unguiculate; they are united to the body by an interfemoral membrane, which has a single large bundle of muscular fibres stretching obliquely across from the foot to the coccyx.

The testicles are situated under the skin on each side of the male organ, and are round.

There is no tail.

The length of the whole body, in the specimen from which the above description is taken, is nearly 7 inches; the length of the head $3\frac{1}{4}$ inches, its depth about $1\frac{1}{4}$ inch. The stretch of wings is 28 inches across.

The most remarkable features in this animal are its large hammer-shaped head, and the great external development of its lips. Its whole structure is essentially that of a Pteropine Bat, with some modifications showing a tendency towards the *Rhinolophi*. No species having any of the nasal appendages peculiar to that section of the Bats has yet been found among the Pteropine Bats. They are strictly frugivorous, and have the nose like that of a fox or dog. The present species, although it has not any nasal appendages, has labral expansions which may possibly be analogous to them, and the animal may possibly have peculiar habits to which the structure of these organs is especially adapted.

Unfortunately, in the only specimen yet received, the stomach and

intestines were wholly empty; so that we cannot speak of its food with positive certainty. The teeth are Pteropine in character, but not so absolutely so as to preclude the possibility of this creature being at least partially insectivorous, the molars showing a tendency to mammillation on the external side of the longitudinal ridges into which they are separated. The large folds in the interior of the stomach seem to point to a vegetable diet.

The sublingual fringed membrane is also an interesting peculiarity, not only on account of its rarity, but because one of the few other instances where it has been noticed is in an animal having no one thing in common with the present, except that of living in the same country. We sometimes see this happen; an abnormal structure or peculiarity occurring in an animal restricted to one country will be found repeated in some other animal of that country no way connected with or allied to it.

This Bat was sent to me by my excellent friend, the Rev. Wm. C. Thomson, one of the missionaries of the United Presbyterian Church of Scotland, stationed at Old Calabar—a true Christian, an excellent naturalist, and one whose devotion to the cause he has undertaken, viz. the amelioration of the African negro, has been proved by the greatest sacrifices from his youth upwards.

Prof. Owen communicated the first part of his paper on the Aye-aye (*Chiromys madagascariensis*, Cuv.), including an introductory historical sketch of its discovery and the various opinions respecting its nature and affinities set forth by naturalists from Buffon to the present time. After commenting on the chief of these, the author proceeded to narrate the circumstances under which the subject of his descriptions, a nearly full-grown male, had been obtained from Madagascar, and prepared for dissection, by the Hon. H. Sandwith, M.D., C.B., whilst Colonial Secretary at the Mauritius. The habits of the Aye-aye during the period in which it lived a captive at the Mauritius with Dr. Sandwith, and also the habits of other individuals that for a time were kept alive in the island of Reunion, by MM. Lienard and Vinsor, in 1855, were next noticed. The specimen submitted to Prof. Owen, having been transmitted well preserved in spirit, afforded the means of a minute external description. The extremities were described as follows:—"The fore leg turns freely in the prone and supine position; it is pentadactyle: the innermost digit stands out at an acute angle with the index, and is opposable to the other digits, making a prehensile hand, but in a less perfect degree than in the old-world or 'catarrhine' quadrumania. The second, fourth, and fifth digits have the ordinary thickness,—the fourth being almost twice the length of the second. The third or middle finger is singularly attenuated, is rather shorter than the fourth digit, and is terminated by a slender curved claw. It is this seemingly atrophied digit which the Aye-aye inserts into the burrows of the wood-boring caterpillars, after it has gnawed down to and exposed them by its strong fore teeth, in order to extract the

grub. The hind limb is longer than the fore limb, and is terminated by a more perfect hand—the ‘hallux’ or thumb being stronger, and set at a more open angle with the other toes, and these being more similar to each other in length and thickness: the thumb has a flat, broad nail.” Prof. Owen observed that, from the external characters of the Aye-aye, it might be inferred that it was of arboreal habits, the limbs being constructed chiefly for grasping, especially the hinder pair, as in all good climbers. The circular open eye, large iris, and wide pupil, reducible to a minute point when contracted, indicated a climber of nocturnal habits. The large and perfect ears bespoke the acuteness of their sense. The tail, long and bushy, but not prehensile, might add to the protective non-conducting covering of the well-clothed body during sleep. Prof. Owen then proceeded to describe the skeleton of the Aye-aye.

The reading of the conclusion of this paper was adjourned until the next meeting, to take place on the 28th instant.

January 28, 1862.

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

Dr. P. L. Sclater stated that he had received under his care a second collection of specimens of natural history forwarded by Capt. J. H. Speke, Commander of the East-African Expedition, from his camp at Duthumi, October 22nd, 1860. The contents of the collection were as follows:—

1. Heads of the following Antelopes:—The Pallah (*Antilope melampus*); the Waterbuck (*Antilope ellipsiprymna*); the Brindled Gnu (*Catoblepas gorgon*); and the Reed Antelope (*Heleotragus reduncus*).

2. Head of a Wart-hog (*Phacochoerus aliciani*).

3. Portions of the skin of a Monkey (*Cercopithecus*, sp.) in a bad state, not determinable.

4. Skins of birds:—

Ixos aurigaster, Vieill.

Turtur delalandii.

Coracias caudata.

Peristera chalcospilos.

Treron delalandii.

Numida mitrata.

5. Two skins of fishes—a species of *Clarias* and a fish belonging to the family *Characini*.

The following note was sent with them:—

“These were all shot in the countries of Uzaramo and Ukutu, near the junction of the Kurgun with the Mgeta rivers.

“Note.—Great numbers and varieties of animals are to be found in these districts, as also to the northward and southward, where the

rivers escape from the hill-range facing the Sea of Zanzi. Birds and reptiles, especially snakes, are interesting and numerous.

(Signed) "J. H. S."

A letter was read from E. H. Rodd, Esq., dated Penzance, January 7th, announcing the recent occurrence in Cornwall of a female specimen of *Scolopax sabini* in very perfect plumage.

Professor Owen concluded the reading of his memoir on the Aye-aye (*Chiromys madagascariensis*), which had been adjourned from the last meeting of the Society. The portions of the structure of this animal successively examined were the dentition, the muscles, the brain, the digestive organs, the organs of circulation and respiration, and the renal and genital organs. The author then proceeded to the comparison of its external characters, its osteology, and its internal structure with those of the Lemurs and Rodents, and showed that in a variety of particulars its nearest approach was to members of the lemurine group. In ordinary zoological or external characters its nearest allies were certain Galagos of Africa (*Otolienus crassicaudatus* and *O. alleni*). In conclusion, he entered into the evidence afforded by the peculiarities of this animal on the question of the origin of species, and, after showing the arguments in favour of the derivative hypothesis and those against its mode of operation, as propounded by Buffon, Lamarck, and Darwin, came to the conclusion that, whilst the general evidence on this subject was in favour of creation by law, he was compelled to acknowledge ignorance as to the mode in which such secondary causes might have operated in the origin of *Chiromys*. At the same time he fully admitted that the attempts to dissipate the mystery which environed the origin of species, whether successful or not, could not but be fraught with great collateral advantages to zoological science*.

The following papers were read :—

1. ON THE SKULL OF THE JAPANESE PIG (*SUS PLICICEPS*).
BY DR. J. E. GRAY, F.R.S., &c.

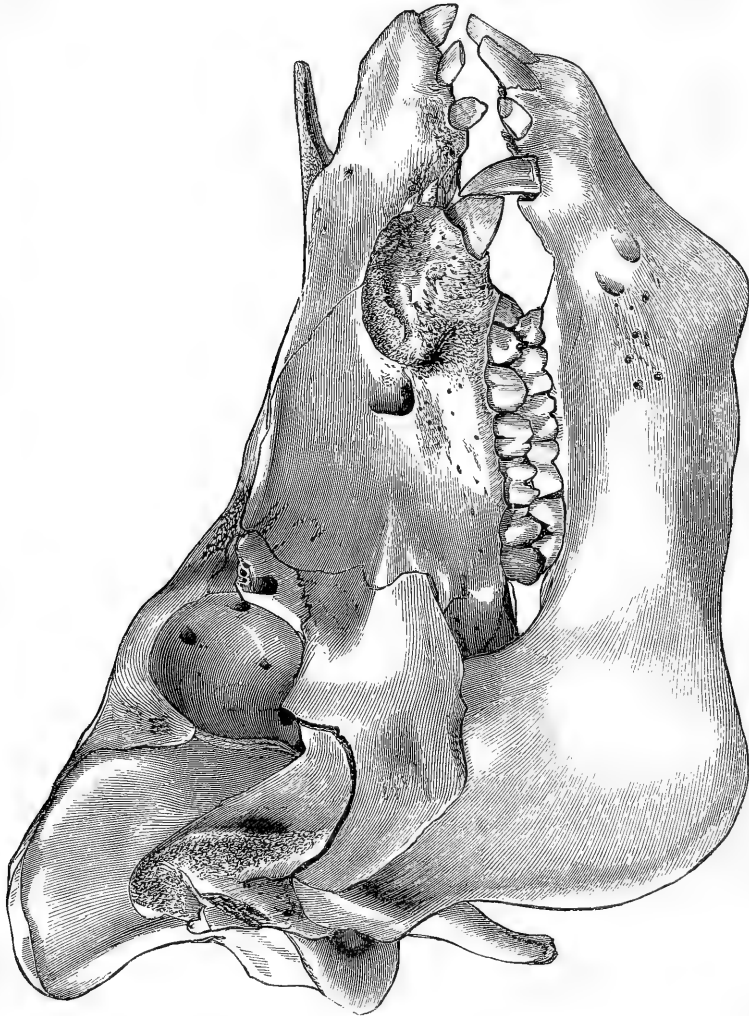
I have lately had the opportunity of examining the skull of this animal, and now lay before the Society the reasons which induce me to believe that it is a distinct species—and a hitherto undescribed species—of the genus *Sus*, which has as yet only been observed in its domesticated state.

Some time ago, when Mr. Bartlett showed me the Japanese Pig which he had purchased, I was convinced of its belonging to a distinct species, and urged him to send an account of the animal, illustrated with a portrait of its very curious and characteristic face, to the 'Proceedings' of the Society.

The skulls of the domestic varieties of the common Pig, which are bred in Europe, differ but little from the skull of the European Wild Boar.

* This Memoir will be published in full in the Society's 'Transactions,' accompanied by appropriate illustrations.

The skulls of the common domestic Pig, which we have in the British Museum, for example, chiefly differ from the skull of a Wild Boar from Germany in the same collection in being smaller and considerably shorter, and in the angle of the forehead being much more acute and sudden, caused by the back of the two skulls being nearly of the same height, while that of the domestic one is generally much the shortest in length. The position and size of the holes for the blood-vessels and nerves are nearly the same in all these skulls. The underside of these two skulls and the forms of the palates are also



Skull of *Sus ploiceps*.

very similar. The lower jaws are equally similar. Cuvier, in his 'Ossements Fossiles' (vol. iii. Cochon, pl. 1. f. 1, 2, figure of the skull), well represents the skull of our domestic Pig. Blainville, in his 'Ostéographie des Mammifères' (Genus *Sus*, pl. 14), figures the skulls of three male Wild Boars, and of a male and female domestic Pig, and on pl. 5. two skulls of *Sus indicus*, one from Malabar and the other from Siam, and one of the *Sus vittatus* from Java. These skulls all have very much the same appearance, and bear no relation to the skull of the Japanese Pig under consideration.

The skull of the Japanese Pig chiefly differs from the skull of the Wild Pigs of Europe, India, and Java, above referred to, and from

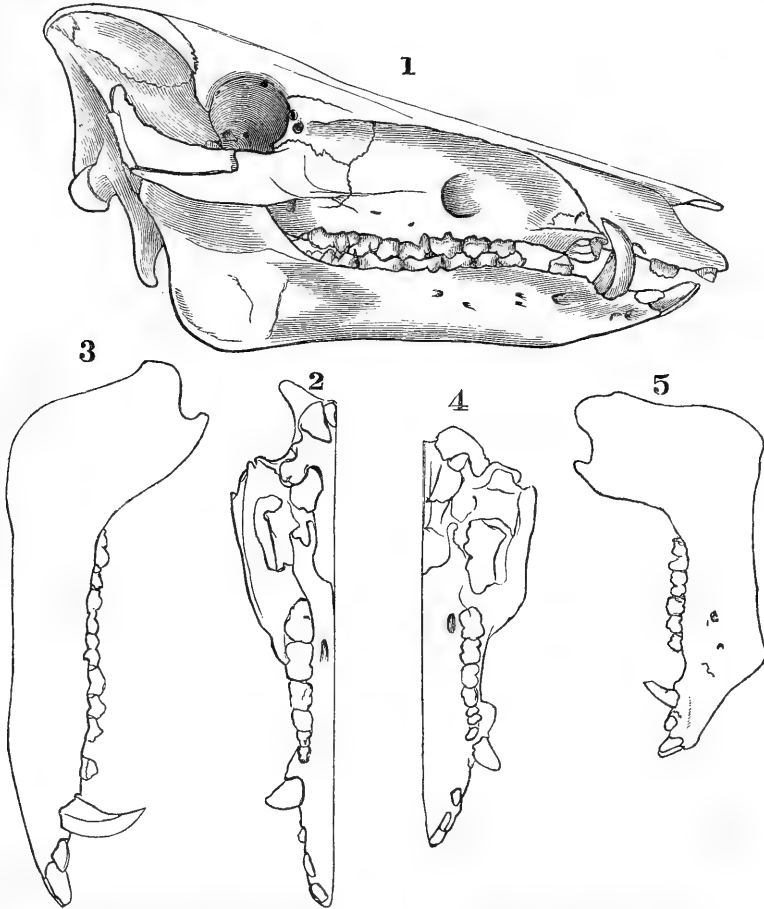


Fig. 1. Skull of *Sus scrofa ferus*.
 2. Palate of *Sus scrofa ferus*.
 3. Lower jaw of *Sus scrofa ferus*.

Fig. 4. Palate of *Sus pliciceps*.
 5. Lower jaw of *Sus pliciceps*.

that of the common domestic Pig, in being shorter, and much higher in front, especially from the greater height of the front of the lower jaw at the gonyx; in the forehead of the skull being rather concave before the orbits, flattened, and furnished with a sharp-keeled edge on each side, producing a deep concavity on each cheek in front of the orbit; in the palate being much broader for its length, and the series of the teeth wider apart and rather arched.

In the height of the front of the skull, in the flatness of the nose in front of the orbit, in the concavity of the cheek, and in the broadness of the palate, the skull of the Japanese Pig bears some relation to the skull of the *Potamochoerus penicillatus*; but the lateral ridges of the nose are not so dilated, while the skull is higher in front, and the palate is wider in the Japanese Pig than in the same parts of *Potamochoerus*.

In the wild Pigs of Europe, India, and Java, and in the European domestic varieties, the nose of the skull is always narrow and rounded on the sides, and the palate is narrow.

Under these circumstances, I am induced to regard the Japanese Pig as a distinct type, and propose to call it *Sus pliciceps* until we receive further information respecting it.

We have in the Museum a very large and a moderate-sized skull of the domestic Pig, slightly differing from the others, and from those figured by Cuvier and De Blainville, in the frontal bone being rather depressed and concave in front of the eyes; but we do not know the particular variety to which these skulls belong. Though they agree with the Japanese Pig in these two circumstances, they differ from it and resemble the skulls of the common Pigs and the Wild Boars of Europe and Asia in all other particulars, and show no other character in common with the Japanese Pig, which is also characterized by its peculiarly wrinkled face, well represented in the figures of these animals published in the 'Proceedings of the Zoological Society' 1861, p. 263, and the 'Illustrated News' January 11, 1862, p. 49.

The species at present is only known in its domesticated state. It may perhaps be the descendant of a species found wild in the valleys of the islands.

In both these skulls of the domestic Pigs the lower jaws are rather higher than usual, particularly at the gonyx; and this is especially the case with the largest skull, which is said to be that of an old Boar. Can the size of the lower jaw be a peculiarity of the male sex? We have not sufficient materials to determine this question, either in the Museum or in the plates that have been published of the skull of the genus *Sus*.

I may further observe, there is considerable difference in the occiput between the European and the Japanese Pig; the processes of the back of the palate are much more erect in the Japanese Pig than in the European and Asiatic Pigs, wild and domesticated.

Though I have only described this animal as a species, it evidently forms a section in the genus by itself. The restricted genus *Sus* may be divided thus:—

1. Face smooth, or nearly so; skull conical; the upper part of the nose rounded; palate narrow. SUS.

Sus scrofa, Sus indicus, Sus vittatus.

2. Face deeply and symmetrically furrowed; the skull flattened on the forehead; the upper part of the nose flattened, keeled on the sides; palate broad. CENTURIOSUS.

Sus pliociceps.

I regard the facts contained in this paper as very interesting—first, as adding a new kind of domestic animal to our list (and I do not think that any has been added since the introduction of the Turkey from Mexico); and secondly, as showing, from a domestic animal, that there must be a wild species which has not yet been brought into our catalogues.

I may observe that, like many other very distinct species of certain genera of domesticated or semi-domesticated Mammalia, as the Horse, Ass, and Zebra, the Ox, the Dog, &c., the fact of interbreeding is no proof that a kind is not a species; for no one would argue that an Ass and a Horse are the same species, or a Zebra and Quagga, or *vice versa*.

The Japanese Pig breeds with facility with the common domestic Pig. We have not had time to observe whether the offspring is prolific. The half-breed of the Japanese Boar with a common Sow retains almost all the external characters of the male parent well developed. I have not yet had the opportunity of observing what effect the crossing has on the osteological characters of the species.

I think that no one who will take the trouble to compare the skulls of the different varieties of domestic Pigs which are usually found in England, with the skull of the European Wild Boars and the Wild Pigs of Asia and the Island, can doubt for a moment the derivation of the domestic breeds from the wild type*. Indeed, the change in form is so slight as to be scarcely perceptible, and the gradation between the most abnormal form to the wild animal so gradual as to be sufficient to show that even the most abnormal state is due only to a gradual change of form.

Mr. Eyton, in a paper printed in the 'Proceedings,' has shown that a Chinese Pig which he examined had a different number of vertebræ from another domestic Pig; but the skull of a Chinese Pig I have examined shows no characters to separate it from the Common Pig. Its head is a little shorter than usual, but not so short as that of a Berkshire Pig.

* See Bartlett, Proc. Zool. Soc. 1861, pp. 263, 264; Ann. and Mag. N. H. 1861, 501; 1862, 162.

2. ON SOME BIRDS RECENTLY COLLECTED BY M. BOUCARD IN SOUTHERN MEXICO. BY PHILIP LUTLEY SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate III.)

I am again indebted to M. Auguste Sallé for his kindness in sending me for examination a series of 110 skins of birds, belonging to about 68 species, which he has selected, as likely to be of interest, out of the extensive collections lately forwarded to him by his correspondent, M. Adolphe Boucard, in Southern Mexico. The ground having been already so ransacked by M. Sallé himself, M. Boucard, Signor Botteri, and Señor R. Montes de Oca (whose respective labours in Mexican ornithology I have already had, on several occasions, the pleasure of bringing before the notice of this Society), it is not to be expected that many novelties remain ungathered. But there are, nevertheless, one striking new species and a few others of great interest among the present results of M. Boucard's recent explorations, concerning which I beg leave to offer the following remarks.

1. *HARPORHYNCHUS OCELLATUS*, sp. nov. (Pl. III.)

Brunnescenti-cinereus, alis et cauda nigricantioribus, hujus rectricibus et illius tectricum apicibus albo terminatis: loris et regione oculari sordide albis: subtus albus, abdomine nigro conspicue ocellato, gutture puro immaculato, hypochondriis et capitis lateribus paulum rufescentibus: rostro nigro, pedibus fusco-nigris.

Long. tota 13·5, alæ 4·1, caudæ 5·6, rostri a rictu 1·5, tarsi 1·5 poll. Angl. et dec.

Hab. In Mex. merid., prov. Oaxaca.

This fine bird is one of the most distinctly marked of the group to which it belongs. Whilst in colour it comes nearest to the recently discovered *H. cinereus** of Lower California, in the shape of the bill it rather resembles *H. curvirostris*, and so serves to link together the two sections of the genus, as they are arranged in my 'Synopsis of the Thrushes of the New World' †. The large round black spots on the clear white under-surface render it easily distinguishable from every known member of the group. The single example sent me by M. Sallé, which I have retained for my own collection, was procured at Oaxaca by M. Boucard in November 1860, and is marked "male."

2. *TROGLODYTES HYPAËDON*, Sclater, P. Z. S. 1861, p. 128.

M. Boucard has sent examples of this species, which I have lately distinguished from the N. American *T. aëdon*, from Totontepec and Capulalpam, as also of *T. brunneicollis*, mihi (P. Z. S. 1858, p. 297), from La Parada.

3. *POLIOPTILA MEXICANA* (Bp.).

Males of this species have no appearance of the black frontlet, and

* Xantus in Proc. Acad. Philad. 1859, p. 298.

† P. Z. S. 1859, p. 339.

M. Sallé assures me that they are correctly marked. It is therefore still possible that this species may be distinct from *P. cærulea*.

4. *DENDRÆCA CHRYSOPARIA*, Sclat. et Salv. P. Z. S. 1860, p. 298.

This beautiful Wood-warbler was originally discovered by Mr. Salvin in Guatemala. See 'Ibis,' 1860, p. 273. M. Sallé now sends me three examples from La Parada; and I have found a female already in my own collection, which I had previously mistaken for the female of *D. townsendii*. I have, however, no doubt of the species being really distinct from both *D. townsendii* and *D. maculata*.

5. *DENDRÆCA MACULOSA* (Gm.).

A bird in winter plumage, obtained in February at Cosamaloapam.

6. *OPORORNIS FORMOSA* (Wils.).

Playa Vicente.

7. *HELMINTHOPHAGA CELATA* (Say).

Example of both sexes from La Parada.

8. *VIREO HUTTONI*, Cassin, Proc. Acad. Philad. 1851, p. 150, et 1852, pl. 1. fig. 1; Baird, B. N. Am. p. 339.

Example of both sexes of this *Vireo*, which I have not previously seen in Mexican collections from Cosamaloapam.

9. *VIREOLANIUS MELITOPHRYS*, Bp. Consp. p. 330.

One specimen of this beautiful but apparently scarce Mexican bird is in the collection obtained at Capulalpam.

10. *PYRANGA LUDOVICIANA* (Wils.).

One example from La Parada.

11. *EMPIDONAX OBSCURUS*, Baird, B. N. Am. p. 200.

La Parada. M. Boucard has obtained specimens of a bird of this perplexing group, which I refer to *Empidonax obscurus*, as distinguished by Prof. Baird, as also of another nearly allied but apparently distinct species, to which at present I am unable to find any reference.

12. *TYRANNUS CRASSIROSTRIS*, Sw.

Oaxaca. I believe this Tyrant is exclusively a western species; at least I have never seen it in any collections from the eastern parts of Mexico.

13. *HETEROPELMA VERÆ-PACIS*, Sclat. et Salv. P. Z. S. 1860, p. 300.

Playa Vicente. A Guatemalan species, new to the Fauna of Mexico.

14. CAÏCA HÆMATOTIS.—*Pionus hæmatotis*, Sclat. et Salv. P. Z. S. 1860, p. 300; *Ibis*, 1860, p. 401, pl. 13.

Playa Vicente. These are the only examples of this Parrot I have seen, except those obtained by Mr. Salvin, who discovered the species in Vera Paz in 1860.

15. SPATULA CLYPEATA (Linn.).

Cosamaloapam. Noticed by Mr. Salvin as far south as Dueñas. (See 'Ibis,' 1859, p. 231.)

16. FULIGULA RUFITORQUES, Bp.

Examples in undress plumage, from Oaxaca. I believe that the birds in Señor R. Montes de Oca's collection, which I referred (P. Z. S. 1859, p. 369) to *F. affinis*, were really of this same species.

3. DESCRIPTION OF TWO NEW SPECIES OF CESTOID WORMS, BELONGING TO THE GENUS TÆNIA. BY W. BAIRD, M.D., F.L.S.

(Plate II.)

1. TÆNIA AMMONITIFORMIS. (Pl. II. figs. 1-7.)

Head small, somewhat quadrangular; mouth circular, armed with a single circlet of recurved hooklets; neck nearly of the same size as the head. Body increasing gradually in size as it descends from the neck, with numerous indistinctly formed segments, and remaining of nearly uniform size till it reaches the lower extremity, where it again contracts in dimensions, the segments then becoming regularly tæniiform and flat.

At first sight this entozoon presents a singular and anomalous appearance. When first taken it was found rolled up in the form of a double helix, with a peculiar hollow in the middle (fig. 1). Each of these helicoid portions, when examined by a low power, presented the appearance of an ammonite (fig. 3). When partially unrolled, it assumed the form of the shell of a species of *Siliquaria* (fig. 2). The whole body of the animal is hard and rigid, and partially incurved at the edges, giving the under surface a hollow appearance. The divisions or rings seen on the body are not distinctly formed segments till near the lower extremity, when three or four regular tæniiform segments show themselves, as in other species of the genus *Tænia*. The structure of the centre portion of the body is exhibited at fig. 4, but the segmented lower extremity has not been represented. No trace of genital organs was observed. The head (figs. 5 and 6) is somewhat tetragonal in shape, and beset on its edges with sparsely scattered and small protuberances. The bothria or suckers are of moderate size, and the mouth is terminal, and surrounded with a single crown of amber-coloured recurved hooklets, presenting the appearance of siliceous spicula (fig. 7).

At first sight it is difficult to imagine this anomalous-looking entozoon to be a *Tænia*; but the four bothria or suckers, and the

circlet or corona of hooklets round the mouth, with the distinctly formed segments of the lower extremity of the body (unfortunately not represented in the plate), compel me to refer it, for the present at least, to that genus. I am not aware of any Cestoid Worm having been described which presents anything like the form of this curious parasite: and I have been very much assisted by the intelligent aid of the draughtsman, Mr. Jennens, who executed the accompanying plate, in making out the anatomy of its head and mouth.

This parasitic Worm was taken from the rejectamenta either of the stomach or intestines of a Puma which lately died in the Gardens of the Society in Regent's Park.

Hab. Stomach? or intestines? of the Puma (*Felis concolor*).

Mus. Brit.

2. *TÆNIA SEMITERES.* (Pl. II. figs. 8-12.)

Head rounded; neck and body continuous, the former differing only slightly in circumference from the head. The whole body of the Worm is very rigid, and the greater portion of it is cylindrical in shape, only the last third of its length becoming flattened and slightly larger than the upper two-thirds. The first segments or joints are very narrow, gradually becoming a little broader and losing their rounded form. The last ten or eleven joints exhibit the genital orifices irregularly alternate—at first two or three occurring on the same side, then two or three on the opposite side, and the last three or four regularly alternate. The lower edges of the upper articulations are somewhat vandyked or scolloped (fig. 11). The neck is not distinguishable from the body. The head (fig. 9) is rounded, and the four bothria or suckers are circular in shape. The mouth is also circular, and is beset with a crown or circlet of pretty strong amber-coloured hooklets, curved inwardly (fig. 10).

This is an anomalous-looking *Tænia*, the body being rigid and hard, and for the greater portion of its length quite cylindrical.

Length about $4\frac{1}{2}$ inches, breadth of upper portion $\frac{1}{2}$ a line, middle of lower portion 1 line.

For this species we are indebted to Mr. Baker, of the British Museum, who took it from a Persian Cat. It was alive when he first found it.

Hab. Stomach of the *Felis catus*, var. *persica*.

Mus. Brit.

EXPLANATION OF PLATE II.

- Figs. 1-7. *Tænia ammonitifformis*. 1. Nat. size. 2. Ditto, partially unrolled. 3. Portion of body magnified. 4. Ditto, still more highly magnified. 5, 6. Head. 7. Circlet of hooks round the mouth.
- Figs. 8-12. *Tænia semiteres*. 8. Nat. size. 9. Head. 10. Mouth and circlet of hooklets. 11, 12. Portions of upper and lower part of body magnified.
-

The following list of additions made to the Menagerie during the months of November and December, 1861, were read to the Meeting :—

NOVEMBER.

		Presented by	
1 Hartebeest	<i>Antilope caama</i>	His Excellency Sir George Grey, K.C.B., F.Z.S.	
1 Reh-bok	<i>Antilope capreola</i>		
1 Four-horned Sheep.....	<i>Ovis aries</i> , var.		
1 Ratel	<i>Ratelus capensis</i>		
3 Ostriches.....	<i>Struthio camelus</i>		
2 Stanley Cranes	<i>Grus paradisea</i>		
2 Jackal Buzzards	<i>Buteo jacal</i>		
2 Acouchys.....	<i>Dasyprocta acouchi</i>		Alfred Akin, Esq.
1 American Grey Squirrel...	<i>Sciurus cinereus</i>		H.R.H. Prince of Wales.
1 Warning-Lizard	<i>Monitor niloticus</i>		G. H. Horsfall, Esq.
1 Rhesus Monkey	<i>Macacus rhesus</i>	Adm. Sir Geo. Sartorius.	
2 Piping Crows	<i>Gymnorhina tibicen</i>	Mrs. Hawker.	
2 Rosehill Parakeets	<i>Platycercus eximius</i>	G. H. Parkinson, Esq.	
1 Common Macaque Monkey	<i>Macacus cynomolgus</i>	— Marsh, Esq.	
1 Ratel	<i>Ratelus capensis</i>	G. Wemyss, Esq.	
1 Barbary Ape	<i>Inuus syloanus</i>	J. B. W. Crewe, Esq.	
6 Australian Waxbills	<i>Estrellda temporalis</i>	} Purchased.	
3 Booted Eagles	<i>Aquila pennata</i>		
1 Yarra Bream	<i>Galaxias scriba</i>		
1 Little Wht.-fronted Goose	<i>Anser erythropus</i> , Linn.		

DECEMBER.

		Presented by
1 Common Macaque Monkey	<i>Macacus cynomolgus</i>	Mrs. S. C. Hall.
3 Box Tortoises	<i>Cistudo clausa</i>	G. N. Lawrence, Esq., Corr. Mem.
6 Terrapins	{ <i>Malcolemmys concentrica</i> <i>Emys guttata</i>	} G.C.Taylor, Esq., F.Z.S.
2 Rock Pigeons		
1 Musk Deer	<i>Moschus stanleyanus</i>	J. W. P. Orde, Esq., F.Z.S.
1 Formosan Deer	<i>Cervus taëvanus</i>	T. L. Mears, Esq.
1 Kangaroo	<i>Halmaturus</i> — ?	R. Swinhoe, Esq., Corr. Mem.
1 Vulpine Phalanger	<i>Phalangista vulpina</i>	} James Selfe, Esq.
1 Vulpine Phalanger	<i>Phalangista vulpina</i>	
1 Black Kite	<i>Milvus ater</i>	Mrs. Cockburn.
4 American Ruffed Grouse...	<i>Tetrao umbellus</i>	Hon. Mrs. Stuart.
1 Tawny Eagle, from Suez...	<i>Aquila nevioides</i>	Andrew Downs, Esq.
1 Vervet Monkey	<i>Cercopithecus lalandii</i> ..	Thomas Newall, Esq.
1 Hog Deer (male).....	<i>Cervus porcinus</i>	} Mr. Douglas.
1 Female Eland	<i>Oreas canna</i>	

February 11, 1862.

Dr. J. E. Gray, V.P., in the Chair.

Mr. Gould exhibited a specimen of a Lyre-bird (*Menura*) from Port Philip, and pointed out the characters in which it differed from the closely allied *Menura superba* of New South Wales. Mr. Gould proposed the name *Menura victoriae* for this new species.

The Secretary called the attention of the Society to the fine series of Snakes recently received from their Corresponding Member, Dr. Wucherer, of Bahia. It embraced specimens of the following species, as determined by Dr. Günther:—

*Epicrates cenchris.**Scytale coronatum.**Xenodon typhlus.**Philodryas reinhardtii.**Xenodon rhabdocephalus.*

The following papers were read:—

1. ON THE ASSUMPTION OF THE MALE PLUMAGE BY THE FEMALE OF THE COMMON PHEASANT. BY EDWARD HAMILTON, M.D., F.Z.S., F.L.S., ETC.

The late Mr. Yarrell, in a communication read before the Royal Society in 1827, "On the Assumption of the Male Plumage in Female Pheasants," drew attention to the fact that this anomaly was not necessarily the accompaniment of age—*i. e.*, in old hen-birds which had done laying; but states that it may occur sometimes from an original internal defect, sometimes from subsequent disease, and sometimes from old age. Dr. Butter, who had written previously on this subject, had stated that this peculiarity only occurred in old birds; and John Hunter, in "An Account of an Extraordinary Pheasant," had the same opinion. He considers that in such cases the female puts on the *secondary* properties of the male, and observes that some classes are more liable than others to this change. He goes on to state "that in animals just born, or very young, there are no peculiarities to distinguish one sex from the other, exclusive of what relates to the organs of generation, which can only be in those who have external parts; and that towards the age of maturity the discriminating changes before mentioned begin to appear, the male then losing that resemblance he had to the female in various secondary properties: this particularly applies to birds. It is evidently the male which at this time recedes from the female, every female being at the age of maturity more like the young of the same species than the male is observed to be; and if the male is deprived of the testes when growing, he retains more of the original youthful form, and therefore more resembles the female. From hence it might be supposed that the female character contains more truly the specific properties of the animal than the male; but the

character of every animal is that which is marked by the properties common to both sexes, which are found in a natural hermaphrodite, as in the snail, or in animals of neither sex, as the castrated male or spayed female. They are curious facts in the natural history of animals, that by depriving either sex of the true parts of generation they shall seem to approach each other in appearances."

In some species of animals, that have the secondary properties we have mentioned, there is a deviation from the general rules by the perfect female, with respect to the parts of generation, assuming more or less the secondary character of the male. John Hunter, like Butter, considers that this does not arise from any action produced at the first formation of the animal, nor grows up with it, but seems one of those changes which happen at particular periods. He goes on to describe some hen-pheasants having the plumage in part of the male, and says, "I found the parts of generation to be truly female, they being as perfect as any hen-pheasant that is not in the least prepared for laying eggs, and having both the ovary and oviduct." He says, "From what has been related of these birds we may conclude that this change is one of the effects of age, and obtains to a certain degree in every class of animals. We find something similar taking place even in the human species; for that increase of hair observable on the faces of many women advanced in life is an approach towards the beard, which is one of the most distinguishing properties of man. Thus we see sexes, which at an early period had little to distinguish them from each other, acquiring about the time of puberty secondary properties which clearly characterize the male and female,—the male at this time receding from the female, and assuming the secondary properties of the sex. The female at a much later time of life, when the powers of propagation cease, loses many of her peculiar properties, and may be said, except from mere structure of parts, to be of no sex, even receding from the original character of the animal, and approaching in appearance towards the male."

In the years 1858, 1859, and 1860 this peculiar alteration of structure in the female organs of generation in the Pheasants was particularly prevalent in some parts of England. I had the opportunity of examining many specimens, and was able completely to confirm Mr. Yarrell's views on this subject. Indeed, the majority of the birds were young females, many of them being birds of the year, some being in their first moult. I found also that the plumage varied and approached that of the male, not in accordance with the age of the bird, but with the amount of disease of the generative organs. The greater the destruction of the ovarium and oviduct, the nearer the plumage assimilated that of the male.

For example, in birds with the hen-plumage predominating, the ovarium and oviduct exist as in the fecundating hen, the small ova lying in considerable numbers in the ovarium, the ovarium and oviduct showing dark lead-coloured masses of disease.

In birds with the plumage of the male in a measure exceeding that of the female, the ovarium is considerably diminished in size, dark-

coloured, and containing only a few blackened ova; the oviduct is spotted with dark patches, and considerably contracted.

And thirdly, in birds with the male plumage predominating over that of the female, the ovarium is reduced to a small dark amorphous mass, resembling coagulated blood, the presence of ova cannot be detected, and the oviduct is almost entirely obliterated at its junction with the ovarium. Thus it seems that there are three distinct phases in this peculiar abnormal state of the generative functions.

I have also noticed that, in most cases where the male plumage is in excess of the female, the tail-feathers are particularly long, some being as much as 19 inches in length.

Although Mr. Yarrell states that this condition of the female generative organs is not confined to the *Phasianidæ*, and that it has occurred in the gold and silver pheasants, partridges, pea-fowl, common fowl, common pigeon, king-fisher, and common duck, and that other classes of animals are liable to an influence similar in kind, particularly among insects and Crustacea, yet this disorganization is rarely observed except among the *Phasianidæ*, and particularly when these birds are produced in a domestic state, *i. e.* on the present system of breeding pheasants in preserves. Very few *battues* take place in which some of these birds (generally designated mules) are not killed and mixed indiscriminately with the heaps of the slain.

As to the cause of this disorganization, if it occurred only in the old female, or if it were a common occurrence among birds either of different genera or of the same genus, it could be easily accounted for; but when it is generally found existing among a class of birds which are bred in vast numbers in a particularly artificial manner, it leads one to suppose that the cause must be connected with this condition. Whether the eggs laid by a number of females—to whom perhaps, from circumstances, too few males have been admitted—have been imperfectly fecundated, and therefore the chick improperly formed, remains a subject for future consideration.

2. NOTE ON THE GIGANTIC EARTH-WORM (*MEGASCOLEX CÆRULEUS*) FROM CEYLON. BY SIR JAMES EMERSON TENNENT, K.C.B., V.P.Z.S., ETC.

[In 1853 the British Museum received, through Mr. Hugh Cuming, two specimens of a large Earth-worm from Ceylon, which is evidently the *Megascolex cæruleus* described by Dr. Templeton in the 'Proceedings of the Zoological Society' for 1844, p. 89.

A few days ago Sir James Emerson Tennent kindly procured from Ceylon, and sent to the British Museum, a specimen of the same worm, and, in reply to my inquiries respecting the habits and vernacular name of the animal, sent to me the following letter, which, with his permission, I lay before the Society.—JOHN EDWARD GRAY. *British Museum*, Feb. 11, 1862.]

“ Board of Trade, Feb. 10th, 1862.

“ MY DEAR SIR,—The large Annelid which I sent to the Museum a few days ago was recently forwarded to me by the Principal Civil Officer in charge of the North-eastern Province of Ceylon; it was obtained by him from the vicinity of Trincomalie.

“ My attention had frequently been attracted, during my rides through the forests in the north of Ceylon, by the heaps of earth in the shape of “ castings ” thrown up and piled on the surface, often to the height of 12 or 18 inches. These occurred in low and moist ground, and chiefly in the beds of dried-up tanks shortly after they had been deserted by the subsidence of the waters. The natives assured me they were the products of huge earth-worms, which I was told often grew to the length of 2 or 3 feet, with a proportionate thickness.

“ I made some efforts to obtain specimens, but, owing to the apathy of the Singhalese and their indifference to anything illustrative of animated nature, I could not succeed. One reason why I was myself less likely to come on these creatures during my rides was that the traces I saw were fresh only at the early dawn, showing that the worm worked chiefly during the night.

“ Some months ago I wrote to Mr. Morris, the gentleman I allude to, at Trincomalie, and by him I have been supplied with the specimen which I have sent to the Museum. It is cut into two parts, together about 22 inches long.

“ The vernacular name for them I do not know, nor is it probable that the Singhalese have given them any specific designation, other than the general term equivalent to *vermin*, which they apply to the whole tribe of minor reptiles and Annelids.

“ The existence of these very large earth-worms appears to have been known to some of the French naturalists; for in D’Orbigny’s ‘ Dictionnaire d’Histoire Naturelle ’ I find he has noticed the Ceylon species in the following terms, under the designation of *Megascolex* :—‘ On sait qu’il en existe d’assez grandes, et l’on en a rapporté des parties chaudes de l’Amérique qui n’ont pas moins d’un mètre de longueur*. Il en existe de semblables dans l’Inde; et il a été trouvé dans l’île de Ceylan une grande espèce de *Ver de terre* dont on a proposé de faire un genre sous le nom de *Megascolex*.’—*D’Orbigny, Dict. Univ. d’Hist. Nat.* vol. vii. p. 431.

“ Faithfully yours,

“ J. EMERSON TENNENT.

“ Dr. J. E. Gray, F.R.S., &c.

“ I expect another and, I hope, a larger specimen from another district of Ceylon, which I shall be happy to submit to you on its arrival.”

* A metre is $39\frac{37}{100}$ inches.

3. DESCRIPTION OF SOME NEW SPECIES OF SPOGGODES AND OF A NEW ALLIED GENUS (MORCHELLANA) IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., ETC.

(Plate IV.)

The genus *Spoggodes* was established by Lesson on a coral that was described by Esper under the name of *Alcyonium floridum*. It is characterized by the whole of its substance being membranous, very loosely cellular within, and covered externally with a layer of fusiform spicula which are most abundant round the cells.

M. Milne-Edwards, in his 'Coralliaires,' only describes a single species.

The species of the genus in the British Museum may be divided into two groups or subgenera.

I. *The polypes crowded together at the end of the branchlet, and the groups more or less surrounded by larger spicula of the branchlet.* Spoggodes.

1. SPOGGODES FLORIDA. (Pl. IV. figs. 1, 2, 3, 4.)

The coral pale purplish-red (in spirits); stem thick, much branched, strengthened with very slender elongate purple spicules; the branchlets short, clustered at the end of the branches, and forming convex heads or cells; cells fringed with the very slender elongated spicules, and furnished with white, only partially contracted, polypes.

Alcyonium floridum, Esper, Pflanz. iii. 49, *Alcy.* t. 16, dry.

Xinia purpurea, Lamk. Hist. A. s. V. ii. 401, from Esper.

Neptea florida, Blainv. Man. Act. 523, from Esper.

Spoggodes celosia, Lesson, Ill. Zool. t. 21; M.-Edwards, Coralliaires, i. 129, t. B 1. f. 1.

Spoggodea celosia, Dana, Zoophytes, 626, t. 59. f. 4.

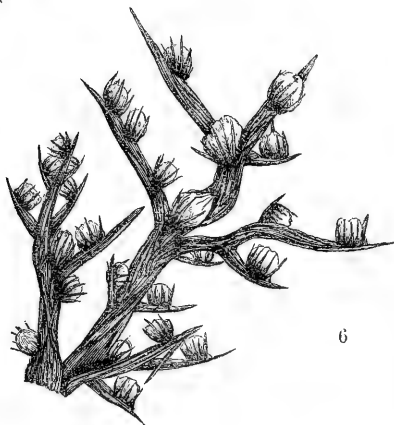
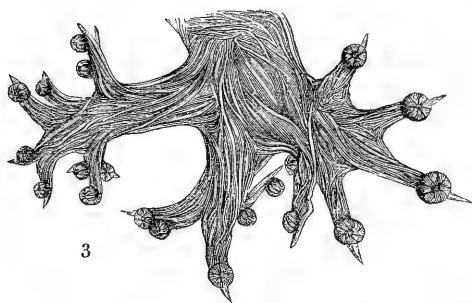
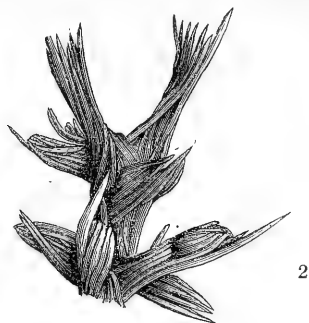
Hab. Australia; Sharks' Bay (*Mr. Rayner*); Philippine Islands (*H. Cuming, Esq.*).

2. SPOGGODES SPINOSA. (Pl. IV. figs. 5, 6, 7.)

The coral whitish, forming roundish spinose masses; the stem thick, slightly branched, with very numerous short branchlets; the spicules white, very unequal, some large and thick; the terminal branchlet furnished, on the inner upper edge, with curved (in spirits) partly retracted purple polypes, which are surmounted and protected by the large opaque-white spicules of the branchlets.

Hab. New Guinea.

This species is easily distinguished by the large size and opaque-white colour of the spicula and the purple colour of the polypes.



II. *The polypes isolated in the prominent isolated spiculose sub-cylindrical cells, scattered on the sides, or forming tips of the branchlets.* Spoggodia.

3. SPOGGODES UNICOLOR. (Woodcut, figs. 1, 2.)

The coral uniform, pale yellowish (in spirits); the spicules very slender, whitish yellow; stem erect; with branches scattered in all directions, spreading, tapering, with few short tapering branchlets; cells distinct, distant, spreading, subcylindrical, sometimes very slightly contracted at the base; mouth surrounded by five or six unequal prominent spicules, the one on the outer side of the cell being generally the longest; polypes retractile.

Hab. Bellona Reefs, in 17 fathoms (*Rayner*).

4. SPOGGODES DIVARICATA. (Woodcut, figs. 3, 4.)

Coral pale whitish (in spirits); stem thick, slightly branched, with very numerous crowded ramuli forming roundish lobes; the ramuli divided at the top into three or five diverging cylindrical cells; the cells of the several branchlets forming a sort of roundish-topped cyme; polypes contracted (in spirits), rose-coloured.

Hab. New Guinea (*Capt. Sir Edward Belcher, R.N., C.B.*).

5. SPOGGODES RAMULOSA. (Woodcut, figs. 5, 6.)

The coral dark brown-red (in spirits); stem thick, much branched, strengthened by slender, elongated, fusiform, dark-brown-red spicules; the branchlets numerous, elongate, slender, much branched, with the cells scattered on their sides; cells distant, subcylindrical, and fringed on the edge with unequally prominent spicules, the outer spicules being generally the longest and most prominent; the polypes pale yellowish, being generally nearly contracted into the cells, rarely prominent.

Hab. Bellona Reefs, at 17 fathoms.

Some of the polypes on the lower part of the branchlets seem to be somewhat crowded. This species is easily known from *S. florida* and *S. unicolor* by the general colour of the coral and by the slenderness and length of the branchlets. It agrees with the former in the coral and spicules being red, and the polypes being more or less prominent and of a different colour from the coral, and with the latter in form of the cell; but the cells are very differently disposed, and of a slender, attenuated form.

We have in the British Museum a new form of the "Alcyoniens armés" of M. Milne-Edwards (*Coralliaires*, vol. i. p. 127), which, in my idea, form a family that may be called *Nepthyadæ*.

This coral differs from the three genera of this family mentioned by Milne-Edwards, in the lower part or stem being coriaceous and destitute of any spicules, and in the upper part being spiculose, and furnished with short clusters of polype-cells, giving it much the appearance of the *Fungi* called *Morchella* and *Helvella*.

MORCHELLANA.

The coral subclavate, coriaceous, subcalcareous, and loosely cellular within; the stem subcylindrical, elongate, hard, coriaceous, and minutely granular on the surface.



The head formed of numerous, irregularly dispersed, short-lobed prominences, which are covered at the end with diverging conical prominent polype-cells,—the lobes and cells being strengthened with superficial fusiform spicules, slightly covered with the skin of the coral; the polypes entirely retractile.

The whole substance of the coral is loosely cellular, and the lobes of the head are brittle and easily broken off when in spirits. The base of the stem is furnished with some large tubular fibres, which seem to act as roots to attach it to rocks.

The spicules on the edge of the polype-cells are rugulose or spinulose.

MORCHELLANA SPINULOSA. (Woodcut, p. 30.)

Hab. Indian Ocean.

4. NOTES ON SOME SPECIMENS OF CLAVIFORM PENNATULIDÆ (VERETILLEÆ) IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

Since my paper, entitled "Revision of the Family *Pennatulidæ*," with description of some New Species in the British Museum," was printed in the 'Annals and Magazine of Natural History' for January 1860, we have received several specimens of club-shaped Sea-Pens (*Veretilleæ*) which further illustrate the species of this group.

Professor Milne-Edwards, in the first volume of his 'Coralliaires,' published in 1857, divides the Claviform *Pennatulæ* into three genera, thus—

1. LITUARIA, with a distinct, well-developed, quadrangular central stony axis.
2. VERETILLUM, with a rudimentary hard central axis.
3. CAVERNULARIA, without any hard central axis, but with four large longitudinal central cells.

Dr. Herklots, in his "Monograph of the *Pennatulidæ*," in the 'Bijdragen tot die Dierkunde' for 1858, divides them into four genera, adding the genus *Sarcobelemnon* to the above list. The species of *Lituaria* and *Sarcobelemnon* are found in the Indian and Australian Oceans, and those of *Veretillum* and *Cavernularia* are confined to the Mediterranean.

The *Veretilleæ* in the British Museum appear to belong to only two genera, viz.—

1. VERETILLUM. The club with a short thick base, with four more or less large longitudinal cells in the centre.
2. LITUARIA. The club with an elongated base, and with a strong, subquadrangular, central, more or less stony axis.

The former group seems to be synonymous with the genera *Veretillum* and *Cavernularia* of Milne-Edwards and *Sarcobelemnon* of Herklots. I call the first genus by the name *Veretillum*, because I find that the specimen of *Pennatula cynomorium* which we have in the British Museum does not appear to have any rudiment of an axis, and has the four large longitudinal cavities in the centre of the coral

which are described as characteristic of *Cavernularia* and *Sarcobelemnon*. Can the septa between these cells have been considered as the rudimentary axis?

VERETILLUM.

The pen club-shaped, with a short, thick, fleshy base; the upper part of the club short and thick, or more or less tapering, covered with close longitudinal rows of polypes; the interspaces between the polypes marked with very close, opaque, imbedded granules; the opening of the polype-cells, when contracted, transverse; the middle of the coral furnished with four quadrangular tubes, and without any hard central axis.

1. VERETILLUM CYNOMORIUM.

Veretillum cynomorium, Pallas, Spic. Zool. t. 13. f. 1-4.

We have a single specimen of this species in the British Museum, which I believe is the specimen described by Ellis, on the Sea-Pens, as *Cynomorium* (Phil. Trans. 1765, vol. liii. 434, t. 13. f. 3); for it has the label on it, written by my late uncle who died in 1806, like the label on the specimen of *Siren* which was presented by Ellis. It certainly has no appearance of any hard central axis, unless the rather hard septa between the central cells may be considered as an axis; if they are, then the same kind of axis is found in each of the other species which I have referred to this genus.

2. VERETILLUM AUSTRALASIÆ.

Sarcobelemnon australasiæ, Gray, Ann. and Mag. N. H. v. 1860, 24, t. 4. f. 1.

The polypes far apart.

Hab. Australia; Port Essington (*J. B. Jukes, Esq.*).

This specimen chiefly differs from the *V. cantoriæ* in the substance of the coral being harder, and in the cells of the polypes being further apart and more scattered, not appearing to be placed in such regular and close longitudinal rows. The specimen seems to have been placed in very strong spirits when first collected, as almost all the polypes are retracted, and the base of the club is wrinkled, as if strongly contracted, and the cavities in the axis are smaller; but all this may have been produced by the sudden and great contraction of the animal at the time it was preserved.

3. VERETILLUM CANTORIÆ.

Cells of polypes close together, in regular longitudinal series.

Hab. Penang (*Dr. Cantor*).

We have a large series of specimens of this species from Penang, where, I am told, they are collected for food. They differ exceedingly from each other; and if they are all of the same species, as I suspect is the case, it shows how difficult it is to give a character that shall define the species of the genus. Some are short, thick, oblong, rounded at each end, varying from $2\frac{1}{2}$ to 3 inches long, with

a short thick base to the club of about half an inch long. In most of the specimens of this form, the polypes are retracted; but in one, some of them are expanded.

In the second group the club is much larger, varying from 3 to 7 or 8 inches long, and is attenuated upwards. The base of the club is short and thick, as in the former group of specimens. The polypes are generally expanded; they are much more slender and more elongate than the polypes of *Lituaria australis*.

Probably the length and tapering form of these specimens may be dependent on their having been placed originally in weaker spirits. The size of the cavities or tubes in the specimens also differ; they are largest in the short broad specimens, but very distinct in all. I am therefore inclined to believe that there are only two distinct genera of the Claviform Sea-Pens.

LITUARIA.

The pen elongate, the upper part slender, tapering, with close longitudinal rows of polypes; the interspace between the polypes covered with close longitudinal rows of distinct circular pores; the opening of the polype-cells, when contracted, longitudinal; the lower part elongate, subcylindrical, smooth; the axis hard, stony, distinct, well developed, quadrangular.

The lower part of the coral, which is destitute of polypes, is elongate, often one-third and rarely nearly half as long as the upper polype-bearing portion of the club; but the length of the stem, as compared with the club, appears to differ, within certain limits, in the different specimens of the same species from the same locality, but they are always larger and more slender than the same part in the genus *Veretillum*.

The specimens of this genus in the British Museum appear to separate themselves into two very distinct groups, which may represent so many species, or may only depend on the manner in which the specimens have been preserved, or even on the strength of the spirit into which they were at first immersed.

In four specimens from Penang, collected by Dr. Cantor, which are slender and white, all the polypes are entirely contracted, leaving a compressed slit over the cell, except in one of the small specimens, where a few of the polypes are partly exerted; they are pale brown. In one of the specimens the fleshy part of the base is thickened, and has contracted so much that the hard axis is exerted nearly an inch beyond the base. In this specimen the base of the club is much shorter and thicker than in the others. From this specimen I am led to believe that the length and slenderness of the club in the genus, when in spirit, is preserved by the rigidity of the internal axis. These specimens are probably the *Lituaria phalloides* of Milne-Edwards (Coralliaires, vol. i. 217), founded on the *Pennatula phalloides* of Pallas (Misc. Zool. t. 13. f. 5, 6, 7, 8).

The second group of specimens were collected by Mr. Rayner in Sharks' Bay, Australia. They are three in number; they are softer

and less contracted than the preceding; the pores on the surface are more distinct, and are furnished with more or less dark polypes, which are all expanded. The polypes in one specimen (which is in the most perfect condition) are all entirely of a uniform black-brown colour. In one of the other specimens (also in a good condition) the polypes are pale brown, with a broad black lower ring at the upper part of the tubular body, near the base of the arms. In the other specimen (which is imperfect) the polypes are all pale brown, like the coral.

In all the three specimens the polypes at the lower half of the club are further apart than they are at the tip; this is especially the case in the specimen which has the dark ring on the polypes, where the polypes in the lower part of the club are very far apart and few in number, and appear as if placed in longitudinal lines. I should propose to call this species provisionally *Lituarua australis*.

5. DESCRIPTION OF TWO NEW GENERA OF ZOOPHYTES (SOLENOCAULON AND BELLONELLA) DISCOVERED ON THE NORTH COAST OF AUSTRALIA BY MR. RAYNER. BY DR. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., ETC.

Among the numerous interesting animals collected by Mr. Rayner during the voyage of H. M. S. 'Herald' is a new form of coral, nearly allied to *Gorgonia*, and especially to the coral called *Cælogorgia* by M. Milne-Edwards, but very distinct from it. I therefore send a description of it to the Society for publication in the 'Proceedings.'

SOLENOCAULON.

The coral coriaceous, tubular, circular, and simple below, compressed, subquadrangular, tortuous, and more or less branched above, the branches being similar in size and form to the main stem. The main stem and branches furnished with more or less elongate, subsolid, slender branchlets, which are placed on the edge of the large holes in the main stem and branches which communicate with the main tube. These branchlets (and sometimes the branches at the base of them) are furnished with large cells for the polypes, which are placed in one (more frequently in two) series on each side of the branchlets, and sometimes the series are continued on the main stem or branches at the bottom of the branchlets. The polype-cells are rather large, circular, nearly superficial, and furnished with a cup divided into eight conical, connivent lobes, each lobe being formed of some transverse spicules at the base and some obliquely-placed spicules diverging from each lateral edge towards the top above.



1. SOLENOCAULON TORTUOSUM.

Hab. North Australia.

This genus seems to form a particular group of the *Alcyonaires*, which may be called after this genus *Solenocaulonidæ*, characterized by the tubular form of the axis, the tubes being formed of a thin coriaceous substance. The smaller branches are subsolid and cellular within, but they soon become hollow. It has been said that the tubular form arises from the abortion of the epithelic tissue of the centre of the axis. This may be true if we can regard the large lax cells in the interior of the young branchlet as epithelic tissue; but the inner surface of the tube of the axis is quite smooth and simple, and the branchlets never become large like the main stem.

This coral cannot be considered as a solid stem becoming hollow, as the last-formed (younger) parts at the end of the branches are in the form of a foliaceous expansion, which gradually folds up together on itself, coalesces, and forms a tube nearly of the same diameter as the main stem. The large apertures which occur in the stem and base of the branches, and communicate with the central cavity, are the parts of the expanded lamina which have not been closed in when the other portions of the tube were formed.

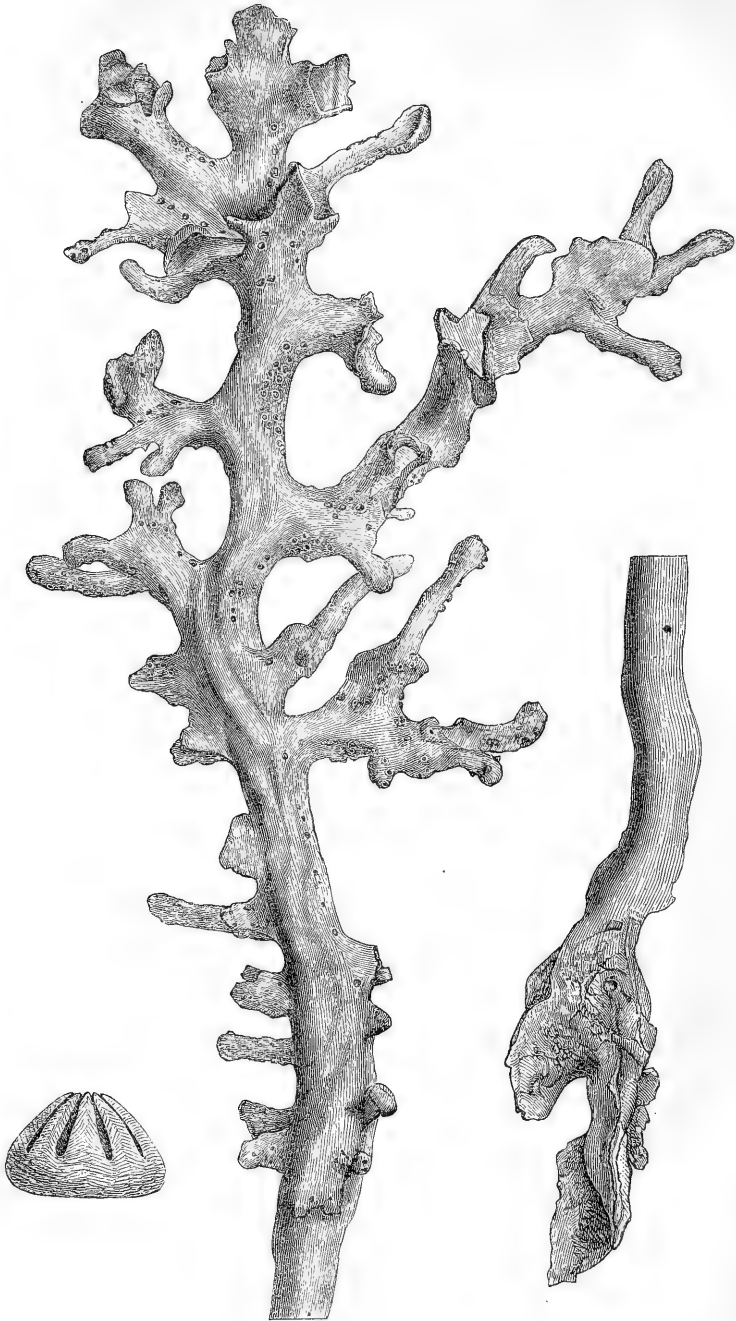
The specimen described evidently grew in a nearly horizontal position; for one side of the main stem and branches is entirely without any cells, and the branchlets on the same side are fewer than on the other, showing that this part was beneath, and not exposed to the light. I do not give this as the generic or specific character, as it may be only incidental to the specimen—a fact that can only be determined by the examination of a larger number of examples. Mr. Holdsworth has suggested that it may be the same as or allied to *Gorgonia trichostemma* of Dana (*Zoophytes*, 665, t. 59, f. 3); but Dana does not describe the main stem as tubular. But the coral is, like many others in his work, so badly figured and described that it is impossible to determine with any certainty what it is intended to represent. Milne-Edwards seems to have been equally doubtful (see *Coralliaires*, i. 154) as to its affinities.

The genus *Cælogorgia* of Milne-Edwards (*Coralliaires*, vol. i. p. 191) should be placed in the same family. It is described as arborescent, very branching, and with slender cylindrical branches with scattered, subcylindrical, elongate polype-cells. Only one species is known, viz. *G. palmosa*, from Zanzibar.

Among the specimens preserved in spirits in the same collection there is also a new form of *Alcyon*, which seems to me to be a type of a new genus allied to *Xenia*, but quite distinct from it both in the form of the cells and in the polypes being completely retractile. It has some characters in common with my genus *Nidalia*, described in the 'Proceedings of the Zoological Society,' 1835, p. 6, and figured, *Radiata*, Pl. III. fig. 2, but differs from it in the surface of the coral being minutely granular, and not spiculose.

BELLONELLA.

Coral cylindrical, formed of a number of subcylindrical tubes agglutinated together and forming at the top a hemispherical head of subcylindrical prominent cells, which are angular at the tip. The



outer surface of the coral is minutely granular. The polypes are completely retractile; the base of their tubes is strengthened with very minute spicula, placed in a longitudinal series parallel to each other.

1. *BELLONELLA GRANULATA*. (Woodcut, p. 36.)

Hab. Bellona Reefs, 17 fathoms (*T. M. Rayner, Esq.*).

6. CONTRIBUTION TO THE KNOWLEDGE OF THE BRITISH CHARRS.
BY DR. ALBERT GÜNTHER.

(Plates V., VI., VII.)

The production of the following paper has been induced by two specimens of the so-called Freshwater Herring of Lough Melvin in Ireland, which were procured by Joshua Walker, Esq., and submitted to my examination. The differences from the allied Continental species were so striking, that from the first moment I could scarcely doubt that I had a species before me which I had never seen before. In the first place it appeared necessary to compare it with specimens from other localities of Great Britain—with the true British Charr; but, although the period of the year (November and December) appeared to be the most favourable for the capture of those fishes, as they approach the shores to spawn, afterwards returning to the deepest parts of the lakes, I have been only partly successful in obtaining more specimens, and I particularly regret not having been able to examine specimens from Scotland, either in a fresh state or preserved in spirits*. I have obtained, however, materials sufficient for the determination of the Charrs of three localities, by the kind assistance of the gentlemen who will be mentioned hereafter. Our knowledge of the representatives of the Charr on the Continent is chiefly due to Heckel, Nilsson, and Rapp, in whose descriptions due attention has been paid to those characters by which the species may be distinguished; and for a comparison of the British Charrs with those of the Continent I have had to rely chiefly on them. My materials were the following:—

a. *Freshwater Herring of Lough Melvin.*

Two fresh specimens, mature males; by the kindness of J. Walker, Esq.

One specimen (dried skin) in the British Museum.

b. *Welsh Charr, or Torgoch.*

Nearly twenty specimens from Llanberris, all mature males; received by the kindness of S. P. W. Ellis, Esq., Chief Constable of Carnarvonshire, and G. Ellis, Esq.

Four young specimens from the lake Coss-y-gedawl, transferred

* Dried and stuffed specimens of Charr are of little or no use.

with Mr. Yarrell's collection to the British Museum (*S. salvelinus*, Jenyns).

c. *Charr of the Lake of Windermere.*

Two mature males, procured by the kindness of Sir J. Richardson.

For further comparison I had the "Röthel" of the Lake of Constance, the "Ombre chevalier" of the Lake of Geneva, four specimens of a Charr from Iceland, and twelve without known locality.

Before we enter into a historical account of our knowledge of the British Charrs, we must consider the question, what fishes have been originally intended by the Linnean denominations of *Salmo umbla*, *Salmo salvelinus*, and *Salmo alpinus*—names with which the British Charrs have been designated by the various authors.

The original descriptions themselves are too short and too general to give anything like specific distinctions; but fortunately we see that question settled, once and for ever, by the very names of the fishes and by the localities from which the typical specimens had been procured. J. Heckel has made inquiries into this subject with regard to the *Salmo salvelinus* of South Germany*, and the following is the result:—

a. *Salmo salvelinus*, L. Linnæus has founded this species on the tenth species of *Salmo* in Artedi's 'Genera,' or on the eleventh in his 'Synonymy'; and Artedi had derived the whole of his knowledge of this fish from Willoughby, who (p. 195) gives a description of the "Salvelin" from a specimen captured near the Austrian town of Linz. Therefore there cannot be the slightest doubt that the Linnean denomination is intended for the South-German fish, which, up to the present day, is called *Sälbling* at various localities.

The best account of the *Sälbling* has been given by Heckel, who says that they are found in several lakes of South Germany, Tyrol, and Switzerland. First (*l. c.*) he distinguished three species according to the different arrangement of the small teeth on the vomer; afterwards†, having convinced himself that this character is subject to some variation, he reunited those three forms, stating at the same time that those fishes from different localities of Central Europe considerably differ in their *forms*. And it is not at all improbable that there are really several species confounded by him, but differing and distinguishable by other, more constant, characters than by that of the arrangement of the vomerine teeth. Be this as it may, it suffices for our purpose that Heckel distinguishes those fishes of Central Europe by the considerable breadth of the interorbital space, which is twice the diameter of the eye. Also the figure‡ (which is rather indifferent) represents a remarkably small eye; the pectoral fin occupies only one-half of the distance of its root from that of the ventrals; and when we compare the British specimens, we find that their head is much narrower, their eye much larger, and their pectoral

* Reisebericht, p. 89, in Sitzungsber. Akad. Wiss. Wien, 1851, July.

† Süßwasserf. Oestr. p. 280.

‡ Süßwasserf. fig. 155.

fins much longer than in the fishes described by Heckel, and consequently that none of them can be identical with the South-German Süßling or with the *Salmo salvelinus* of Linnæus.

b. *Salmo umbla*, L. Linnæus has founded this species on the ninth species of *Salmo* in Artedi's 'Genera,' or on the seventh in his 'Synonymy,' the latter ichthyologist following Rondelet, who described the "*Salmo Lemani lacus, seu Umbla**," or the "*Ombre (chevalier)*" of the Lakes of Geneva and Neuchatel. Jurine† and Agassiz‡ have given figures of this fish. Far superior to them is that published by Rapp§, who has identified the "*Röthel*" of the Lake of Constance with the *Salmo umbla*, L.

This species never assumes the red colours of the *S. salvelinus*, or of the Charrs of Windermere and of Wales. It could be compared in this respect only with the "*Freshwater Herring*" of Lough Melvin, from which it is readily distinguished by its much larger teeth, by its wide mouth, the maxillary extending to behind the orbit, by its much more elongate body, and by the proportions of its fins. *Salmo umbla* of Linné differs from the British Charrs (as far as we treat of them in this paper) in nearly every one of the external characters, and agrees with the Irish species only in its plainer coloration and in the size of its scales.

c. *Salmo alpinus*, L. Linnæus, on his tour through Lapland, discovered in the mountain-lakes of that country a species of Charr, which he described in the '*Fauna Suecica*,' p. 117, no. 310, and which he named *S. alpinus* in the '*Systema Naturæ*.' He adopts the opinion of Artedi in referring the British Charr (which he knew from Willoughby's description) as a synonym to this *S. alpinus*. Even the few details which are given in his and Nilsson's descriptions do not admit of an identification of those species. Linné says that the length of the head of the typical specimen was $1\frac{1}{2}$ inch, and the distance from (the front margin of) the dorsal to the adipous fin 3 inches: in the British Charrs the head is much longer. He found the length of the head equal to that of the base of the dorsal fin: in British Charrs the base of that fin is much shorter. Nilsson describes the *S. alpinus*, L., as a distinct variety of *S. salvelinus*, distinguished by short fins; but *S. salvelinus*, Nilss., has shorter fins than any of the British Charrs.

We are, therefore, not justified in admitting one of those Linnean denominations for the British species which will be described in this paper. This view being in contradiction with that of all former writers, I think it necessary to give a *historical review* of what has been done on the subject. Not a love of starting novel views, much less an ill feeling towards any of the previous inquirers, but the plain necessity of supporting the truth of my opinion forces me to show where observations have been imperfect, or where they do not agree with nature. Conscious of the imperfectness of my own labour, I

* Rondel. ii. p. 160.

† Poiss. du lac Léman, pl. 5.

‡ Poiss. d'eau douce, pls. 10 & 11 (but not pl. 9).

§ Bodensee-Fische, p. 32. taf. 5.

should not be wise to provoke just retribution by unfair severity towards others.

1685. WILLOUGHBY is the first who with the practised eye of an ichthyologist examined the Charrs of England and Wales, devoting a separate article to their description*. He recognizes their affinity to the Sälbling (*S. salvelinus*), and lets the descriptions of the German and British fishes follow one another; but the "Torgoch" of Wales and the "Red Charre of Winander-mere" appear to him to be the same species, with which he unites even the "*Reutele*" or Röthel of South Germany—a fish which, however, appears to have been known to him rather by name or by recollection than by actual examination and by comparison with the British fish.

At a time when naturalists were only beginning to advance beyond the individual specimen to the conception of classification, and to form the ideas of species and genera, it was creditable enough to note the British Charrs on the whole as different from the Sälbling, and, at the same time, to indicate their affinity.

Willoughby mentions the *Gilt Charr* beside the Red Charr, also from the lakes of Westmoreland, considering it identical with Salviani's *Carpione* from the Lago di Garda†. In the description of the latter he says (p.197), "*In palato quinque dentium areolæ*," whilst he expressly and correctly mentions that the middle of the palate is toothless in the Sälbling as well as in the Red Charr. Therefore the *Gilt Charr*, as it is understood by Willoughby, cannot be a true Charr without teeth along the middle of the vomer (*Salmo, sensu stricto*); but it is a species of Salar or Fario, with five series of teeth along the roof of the mouth, viz. two along the maxillaries, two along the palatines, and one along the vomer.

We shall see that Pennant and Yarrell mention the *Gilt Charr* (of which I have not seen an example) as a variety of the common Charr; but what Pennant says about its habits and propagation tends to show that Willoughby was perfectly right in referring it to (or near to) a very different species.

1738. The confusion commences with ARTEDI and LINNÆUS, who, without knowing the British fish, refer Willoughby's Red Charre to the *Salmo alpinus* from Lapland.

1755. FARRINGTON, in a letter printed in the 'Philosophical Transactions' of that year, gives some notes about the general appearance and the habits of the Torgoch. He very truly remarks that the fish is "slimy, nearly allied to the eel and the tench." From the specimens which I have examined I cannot confirm his observation that "the male is not adorned with the beautiful red hue of the female;" "yet," he continues, "he is finely shaded and marbled upon the back and sides with black streaks." "The Turgoch makes its appearance at the shores of the Llanberris lakes about the winter solstice; the whole number annually taken in the two pools of Llanberris does not amount to a hundred dozen."

* Will. Hist. Pisc. p. 196.

† See Heckel, Reisebericht, p. 98 (*Salmo carpio*, L.; *Fario carpio*, Heck.).

1776. PENNANT knows that the Charr occurs not only in England and Wales, but also in Scotland, whilst he had not received any evidence of its existence in Ireland. He first mentions the fact, which is repeated in all other works, that the Charrs of the Lake of Llanberris were entirely destroyed by noxious waters flowing from copper-mines in the neighbourhood*. He has examined the *Red or Case-Charr* and the *Gilt Charr*, but considers both as the same species, although the former spawns about Michaelmas, ascending the River Brathay, whilst the spawning-season of the latter extends from the month of January to that of March, the fishes remaining in the sandy parts of the lake. If this Gilt Charr (Pennant's) is identical with that of Willoughby, and if the observations of both these naturalists really refer to the Gilt Charr of the present day, it is clear that it is not a variety of the common Charr, but a species widely different from it.

1802. The knowledge of those fishes is considerably advanced by DONOVAN, who well perceives the differences between the Torgoch and Charr, but is unable to fix the distinctive characters in specific terms, resorting for the purpose of diagnosis to the differences in colour, which in his figures are much exaggerated and untrue. In his description, he is quite right in directing particular attention to the slender form of the Torgoch, and he might have added another important character which is indicated in the figures, namely, that whilst in the Charr the root of the pectoral is quite free, and not overlapped by a prolonged suboperculum, the latter is produced backwards and downwards in the Torgoch. The physiognomy of the fishes has lost much by representing the eye too small; whilst the differences in the structure of the nostrils apparently have been noticed by him. He employs for the Charr the Linnean name of *S. alpinus* (pl. 61), and for the Torgoch that of *S. salvelinus* (pl. 112).

1807. TURTON follows Donovan, and evidently has examined the Torgoch, as he gives the correct number of the dorsal rays, viz. thirteen. The statements of the different authors, especially of the earlier, with regard to the fin-rays, can be used only with great caution,—first, because they had only partly recognized the value of that character; and secondly, because they counted them in different ways, frequently omitting the small rays in front of the fins.

1812. The first definite notice of the occurrence of a Charr-like fish in Ireland appears to be due to DUBOURDIEU, who, in his 'History

* This fact is doubted by Mr. S. P. W. Ellis, who writes, in answer to my inquiry on this subject, "Llanberris Lake is three and a quarter or four miles long; the width varies, the greatest width being about three-fourths of a mile; the greatest depth is said to be 40 fathoms. The quantity of water coming from copper-works is not more than one-tenth part of the whole volume, and this portion flows about five miles before falling into the lake, and, besides, passes through a mountain lake after having left the mine. Below this mountain-pool the water is not poisonous to fish. The quantity of water from copper-mines has decreased in this valley, owing to the stoppage of works. I cannot think there ever were mines worked to any such extent as seriously to injure fishes. The chief works are slate-quarries." J. Petherick, Esq., who has a thorough knowledge of these mines, a part of which are worked by himself, also is of the same opinion.

of the County of Antrim' (vol. i. p. 119), in a list of the fishes of Lough Neagh, enumerates the *Whiting*, which by a friend of the author, Mr. Templeton, is declared to be the *S. alpinus*. A rough drawing is added. As the description does not give any specific characters, we are left in doubt about the correctness of the determination. It is probable that the Whiting of Lough Neagh is now extinct.

Thompson* says that, when visiting Lough Neagh in 1834, he was assured by the fishermen that they had not known of any of those Whittings being taken in that lake for at least ten years previously. This is confirmed by R. Patterson, Esq., of Belfast, in a letter addressed to me, in which he states that the Charr "has been believed to be extinct in that lake for more than thirty years." Therefore, the question whether the Whiting of Lough Neagh was identical with one of the other species, or whether it was a distinct species, will remain unsolved. Surely, if any group of fishes requires particular care in collecting and preserving its representatives at different localities, it is that of the Charrs, which, confined to very limited localities, and extremely susceptible to the changes of their element, are exposed to the danger of easy destruction: the Torgoch of Llanberris disappears for a series of years, (as it is said) in consequence of the poisonous fluids carried down from the copper-mines of the neighbourhood; the Charr of Lough Neagh becomes extinct, from reasons unknown. We are afraid there are other similar instances, but unrecorded in natural history.

1834. AGASSIZ, engaged in the examination of some of the continental *Salmonidæ*, and having compared them with those in Great Britain, declared, at the meeting of the British Association of that year, that the Charrs of England and Ireland, the Ombre chevalier of the Lake of Geneva, and all the different Charr-like fishes of Sweden, Switzerland, and all the southern parts of Germany were one and the same species—or that *S. umbla*, L., *S. salvelinus*, L., *S. alpinus*, L., and *S. salmarinus*, L., were merely synonymous†.

Heckel already has shown, with regard to the Swiss representatives of Agassiz's *S. umbla*‡, that two very different species are comprised in it, different in the size of the scales, in the shape of the body, in the coloration, and, according to Rapp's researches, in the number of the vertebræ—or that the *S. umbla*, figured by Agassiz, 'Poiss. d'eau douce,' pls. 10 & 11, is the true *S. umbla* of Linné, from the Lake of Neuchatel, but that the *S. umbla*, Agassiz, pl. 9, is identical with *S. salvelinus*, L., from the Lake of Zurich.

Nor can I arrive at the same conclusion as M. Agassiz with regard to the British Charrs known to me. It is much to be regretted that in that paper neither the localities are mentioned whence the specimens examined were obtained, nor that the opinion started was supported by a comparative description; and we cannot assume that M. Agassiz's opinion referred to Scotch specimens only (which

* Ann. & Mag. Nat. Hist. 1841, vi. p. 448.

† Report of the Fourth Meeting of the British Association, at Edinburgh, p. 622.

‡ Reisebericht, p. 91.

I had no opportunity of examining), as he speaks of the Charr of England and Ireland. M. Agassiz opposes those naturalists who, for distinction of the species, have especially attached themselves to the form of the head and to the arrangement of the colours, and says that the characters ought to be found in the structure of the head, in the opercular bones, in the surface of the cranium, and in its proportions relative to the whole body, and that the shape of the body also is important for the distinction of the species. When we add the size of the teeth and of the scales, characters as constant and excellent as any of those named, every one who peruses the descriptions terminating this paper will satisfy himself that our three British species have been distinguished from one another and from those of the Continent by those very characters which have been recommended by M. Agassiz. Ichthyology has been so much advanced within the last thirty years that it would be hardly fair to take the same view of a paper written in 1834 as if it were of a recent date; and I make these lengthened remarks only because there may still be some who, having adopted M. Agassiz's former views, will be inclined to adhere to them.

When M. Agassiz denounces the form of the *head* and the arrangement of the colours as too variable to supply precise characters, I can only partly agree with him. With regard to the former, it is only the *snout* which varies in its form according to age, sex, and season; but, according to my experience, this variation is subject to certain laws: if a male of a certain age has a hooked prominent lower jaw at a certain time of the year, all the males of that species, of the same age and at the same season, are provided with a hooked mandible; and this character may be well used as a specific distinction from another species without such a hook. Differences in the shade of colours are of no value for distinction of species. Sharply defined markings, as cross-bands, large spots, may be dependent on age, and peculiar to the young state of all the species of a whole group (dark cross-bands in the genus *Salmo* equivalent to the white streaks in the genus *Sus*, to the white spots in the genus *Cervus*, to the dark spots in the young Lion, to the light dots in *Muscicapa*, *Rubecula*, &c.); yet two species may differ, and really differ, in the development of those colours, and then they become a precise and valuable character, which is nearly always joined with another. By the colours alone, fresh specimens of *S. salvelinus* and *S. umbla*, of *S. grayi* and *S. willoughbii*, may be always distinguished.

Agassiz's view was adopted by Sir W. JARDINE*, who, however, prefers to adopt another Linnean name, *S. alpinus*. He ascertained its occurrence in most of the lochs of the north-west of Sutherlandshire.

1835. JENYNS† adopts only a part of the view advocated by Agassiz, distinguishing a *S. umbla* and a *S. salvelinus*. With regard to the former it is not stated whence the specimens had been obtained which served as types for the description. "The elongated form, the gill-

* Report of the Fourth Meeting of the British Association, at Edinburgh, p. 614.

† Man. Hist. Vertebr. pp. 427, 428.

cover produced behind into a rounded lobe, the axillary scale nearly half as long as the ventrals, the fourteen dorsal rays," are characters which tend to show that a species was examined different from that of the Lake of Windermere, and closely approaching the Llanberris Torgoch, although I should not venture to identify it with the latter.

Mr. Jenyns describes his second species as the Torgoch, and calls it *S. salvelinus*. If unfortunately the specimens from which this second description was taken had been lost, everybody, like Parnell, would have been at a loss to reconcile it with any of the Charrs known. "The dorsal fin is exactly in the middle of the entire length; the body is not so much elongated in proportion to its depth; posterior portion of the dorsal very little less elevated than the anterior," &c. Such are the characters attributed to the Torgoch; but they are not in accordance with the typical specimens, which are still preserved and now in the British Museum. They, indeed, are identical with the Llanberris species, the proper characters of which may be found in the detailed description subjoined to this paper.

1838. If PARNELL'S description* has been taken from a Scotch specimen, it is the only one which has been drawn up of the so-called Northern Charr; but much is detracted from its value when we consider that the author preserved his specimens as flat skins; therefore his statement, that the height of the body of a specimen $15\frac{1}{2}$ inches long was equal to the length of the head, and *one-sixth of the total*, does not express a peculiarity of the Northern Charr: but this elongate form of the body was probably caused by the way of preservation. Parnell's other observations on the Charr are borrowed from other authors, who had made their observations chiefly on English and Welsh specimens.

1840. The view of Agassiz was essentially supported by the late W. THOMPSON of Belfast, who, having had opportunity of examining the Charrs of Windermere, Loch Grannoch, Lough Melvin, and of nine other lakes in Scotland and Ireland, came to the conclusion that they are but one species—one, however, that is subject to extraordinary variety †.

But Mr. Thompson has not brought forward any other proof for this assertion, than the other assertion that the differences presented by the Charr from various localities are very manifold. The following appeared to him the most striking differences:—

1. In specimens from Loch Grannoch the male fish has the colours of *S. salvelinus*, Donov.; the female those of *S. alpinus*, Donov. The male has a much larger head and larger fins than the female. Number of ova, 500.

2. In specimens from Lough Melvin both sexes are coloured alike; nor can they be distinguished from each other by the size of the fins. Number of ova, 959.

The differences observed in the Charrs from the other localities are not pointed out. Certainly, if Mr. Thompson had really seen those in the size of the scales and of the teeth, he would have men-

* Fishes of the Firth of Forth, p. 148 (*S. umbla*).

† Ann. & Mag. Nat. Hist. 1840, vi. p. 439.

tioned them, and probably arrived at a different conclusion; but having found that some authors before him distinguished the species by the coloration as the chief character, and having satisfied himself that there is a great difference in this respect between the two sexes in the Loch-Grannoch fish, he did not make any further distinction between the other differences he was aware of, between accidental differences of individuals, between those of the two sexes, and, finally, between those of the fishes from various localities, but, considering all of them as equivalent, he was lost in a maze, out of which there was no other escape than to cut the Gordian knot by declaring those fishes as varieties of one and the same species.

We will not enter into a fruitless investigation as to the possibility of the differences which we observe in those fishes being induced by those physical peculiarities of the localities indicated by Mr. Thompson. We will take and examine them as they are, and as they will be, as long as zoologists of the present species of man exist, provided that human interference does not put a premature termination to the whole tribe. We find, then, that there are other constant differences in the Charrs from various localities, *besides* those of individuals, age, or sex—*which, derived from different parts, form an assemblage of characters affording easy specific distinctions**. If the difference were confined to a single character, to a slight modification of one organ only, I should not consider it sufficient to establish a separate species on it; if the difference consisted merely in the presence or absence of white margins of some of the fins, or if the fishes of one locality had only one fin-ray more, or one of the fins rather more elongate, than their representatives in another locality, one might call this a local variety. But if such a character is found always combined with a second, or with more, so that from the one an inference may be drawn as to the presence of the other, we are certainly obliged to make a specific distinction.

Thus, although we cannot agree with Mr. Thompson that the Windermere, the Welsh, and the Lough-Melvin Charrs are identical, we nevertheless consider his paper as highly important to our knowledge of the geographical distribution of the Charrs in Great Britain.

1. A Charr is found in Loch Grannoch, Kirkcudbrightshire, which makes its appearance only during ten days, never before about the 13th of October†. The sexes are distinct from each other

* Haller, in 'Correspondence of Linnæus,' ed. by Sir J. E. Smith, ii. p. 267.

† Objections have been made to my occasionally calling the Charr "in season during some of the winter months." The different species of Charrs appear to be "in season" at very different parts of the year—the freshwater Herring in November, the Torgoch towards the end of the year, the Charr of Windermere in May and August. Considering that those fishes are nearly secure from the persecutions of man during the rest of the year, they ought to be allowed to be taken when, once a year, they approach the shores in large shoals to spawn, at least in those localities where such a control might be kept over their capture that all danger of their becoming scarce would be avoided. Carnivorous fishes inhabiting a certain confined locality, like the Charrs, increase in number only to a certain degree; when their food becomes scarcer, they feed on their own progeny.

in colour, and in the size of the head and of the fins (in the number of the vertebrae, the male having 60, the female 62-63?); number of ova, 482. Beside a detailed description of the colours, the account does not contain anything from which we could determine the species.

2. Of other localities in Scotland, Loch Inch and Loch Corr are mentioned. They appear to be inhabited by a species identical with, or similar to, *S. willoughbii*; at all events by one very different from the "Haddy" of Loch Killin in Invernesshire. The latter is very interesting, inasmuch it appears to be closely allied to the Freshwater Herring of Lough Melvin. They are only caught when spawning, about the 26th of September.

3. The freshwater Herring of Lough Melvin appears to be confined to that locality.

4. Lough Dan (county Wicklow, Ireland) is inhabited by a Charr "presenting some of the characters both of the northern and Welsh Charr." Specimens were caught in summer with the fly.

5. Other localities in Ireland are—L. Kindun, L. Gartan, L. Derg, Lake of Luggela, Loughnabrak, and L. Corrib. The Charrs from those localities have a deep-red belly, and appear to approach *S. willoughbii* or *S. cambricus*.

6. The following localities in Ireland are named on the authority of other writers:—L. Esk (co. Donegal); Cummeloughs, in the mountains of Cumberagh; Lake of Inchigeelagh (co. Cork), and one or two other small lakes in this neighbourhood; L. Neagh*; a lake near Dunfanaghy (co. Donegal); L. Eaghish (co. Monaghan).

1841. YARRELL, in the first edition of his work, distinguished, according to the view of Donovan, a *S. umbla* and a *S. salvelinus*, adopting afterwards the opinion of Agassiz and Thompson. His account is composed of the observations of the different writers mentioned. As new localities, are mentioned Keswick, Crummock Water, Coniston Water, Loch of Moy, Loch Inch, &c. The Gilt Charr is mentioned as a variety of the Red Charr.

I conclude this paper with the descriptions of three species, which certainly are not the only ones by which Great Britain and Ireland are inhabited. I look forward with great hopes for the assistance kindly promised by various friends of natural history, trusting that with their help I shall finally be enabled to make up a complete series of specimens from all the localities which are inhabited by this obscure and therefore so interesting group of *Salmonidæ*, and to give a more satisfactory account of them after having compared them with their congeners of the Continent.

SALMO WILLOUGHBII. (Pl. V.)

(The Charr of Windermere.)

Body compressed, slightly elevated, its greatest depth being one-fourth of the distance of the snout from the end of the middle caudal rays; the length of the head is a little more than one-half of the distance of the snout and of the vertical from the origin of the dorsal.

* See pp. 41, 42.

Head compressed; interorbital space convex, its width being less than twice the diameter of the eye. Jaws of the male of equal length anteriorly; teeth of moderate strength, four in each intermaxillary, twenty in the maxillary. Length of the pectoral less than that of the head, much more than one-half of the distance between its root and that of the ventral. Dorsal rays twelve. 165 transverse series of scales above the lateral line. Sides with red dots; belly red; pectoral, ventral, and anal with white margins.

Description of a male specimen, length 11 inches 2 lines.—Head and body compressed, slightly elevated; its greatest depth is below the origin of the dorsal fin, where it is contained four times in the total length (to the end of the middle caudal rays). The least depth of the tail equals the length of the base of the dorsal fin. The height of the head above the mandibular joint equals the distance between the posterior margin of the orbit and the end of the operculum. The upper profile of the head is somewhat elevated above the margin of the orbit, the diameter of which is nearly one-fifth of the length of the head, shorter than the snout, and more than one-half of the width of the interorbital space; the latter is very distinctly convex, with a rather prominent ridge along the middle, and with a pair of series of pores. Snout slightly compressed, subconical, with the jaws equal anteriorly. The *nostrils* are situated immediately before the eye; the posterior is the wider, and the cutaneous bridge between both is not developed in a flap. The *maxillary* extends scarcely beyond the vertical from the posterior margin of the eye, and is armed with 20–21 *teeth* of moderate size; four teeth in the intermaxillary, seventeen in each mandible, two pairs on the vomer, fifteen on each palatine bone, and four pairs on the tongue. The *suboperculum* forms the hindmost part of the gill-cover, and does not cover the exposed portion of the humerus above the root of the pectoral; its vertical width is rather less than one-half of that of the operculum, therefore it is comparatively narrow. Nearly all the *branchiostegals* are situated at the side of the head, and exposed in a lateral view of the fish. The lower branch of the outer *branchial arch* is provided with eleven lanceolate, slightly curved gill-rakers; the longest is less than two lines long in the specimen described.

D. 12. A. 12. P. 13–14. V. 9–10.

The origin of the dorsal fin is exactly in the middle between the snout and the root of the caudal; the length of its base is equal to the length of the last ray, and contained once and three-fourths in that of the fourth. The fourth and fifth rays form an acute point, and the upper margin of the fin is straight. The first ray is rudimentary, the second half as long as the third, the third three-fifths of the fourth, the fourth simple, the fifth branched, fourth and fifth longest, the last split to the base. The distance of the adipous fin from the dorsal is equal to twice and a third the base of the latter.

The origin of the anal fin is exactly in the middle between the root of the caudal and that of the outer ventral ray; the length of its base equals that of the dorsal, and is contained once and two-

thirds in the length of the fifth ray. The five anterior rays are enveloped in a common membrane, so that their length can be ascertained only by dissection; the fourth and fifth rays are the longest, and form an acute point; the lower margin of the fin is nearly straight. The first ray is rudimentary, the second half as long as the third, the third three-fourths of the fourth, the fourth simple, the fifth branched; the last split to the base, its length being two-fifths of that of the fourth.

Caudal fin forked, one of the middle rays being half as long as the outer ones, the length of which is contained five times and a half in the total. Lobes pointed.

The base of the pectoral is entirely free, and not overlapped by the gill-cover apparatus. It does not extend to the vertical from the origin of the dorsal, is rather shorter than the head, and at least two-thirds of the distance between its root and that of the ventral.

The ventral is inserted below the two last dorsal rays; its length being two-thirds of that of the pectoral, or of the distance between the root of its outer ray and the vent.

The scales are very thin and small; one taken from between the dorsal and the lateral line is ovate, two-thirds as high as long. In order to ascertain the number of transverse series of scales, it is necessary to count those above the lateral line, and not the perforated scales of the lateral line, which are larger than the others, and do not correspond to the transverse series. The scales on the back are minute, rudimentary, hidden in the skin.

The colour on the sides of the back is a dark sea-green, passing into blackish on the back, on the greater part of the dorsal and caudal. Sides with a slight silvery shade, passing into a beautiful deep red on the belly. Pectoral greenish, passing into reddish posteriorly, the upper margin being white; ventral red, with white outer margin, and with a blackish shade within the margin; anal reddish, with a blackish shade over the whole of the middle, and with white anterior margin; sides of the head silvery, lower parts minutely dotted with black.

The typical specimens were caught in the middle of November, during the time of spawning.

Through the kindness of F. T. Buckland, Esq., I have received four specimens of a closely allied species from Iceland. They are from 19 to 15 inches long, and were imported in large quantity by Mr. Hogarth: having been prepared like smoked Salmon, they are not in a state fit for an accurate examination, although in their external characters (even in the colours) they are pretty well preserved. The vertebral column, gills, and intestines had been removed from the fishes before they were smoked. Now those fishes agree *externally* very well with the Charr of Windermere; and I should not hesitate to consider them as one species, but for a statement made by Valenciennes, according to which the vertebral column of that northern species is composed of sixty-seven vertebrae*. Having laid bare the spine on one side of the Windermere specimen, which

* Cuv. et Val. xxi. p. 250.

I have described and figured, I have found only fifty-nine vertebrae—a number stated also by Yarrell. A difference of eight vertebrae will not be found within the limits of one species of *Salmo*; but it is a question whether the skeleton in the Paris Museum really is that of an Iceland Charr*, Valenciennes having comprised under the name of *Salmo alpinus* “plusieurs Truites rapportées de Norvège par Noël de la Morinière, ou de Suède et d’Islande par M. Gaimard,” without adding whether the skeleton referred to belongs to a Scandinavian or Iceland specimen.

Faber (‘Fische Islands,’ p. 168) also mentions the Iceland Charr under the name of *Salmo alpinus*, a name which cannot be applied to the specimens brought by Mr. Hogarth, for the same reasons as stated above. The description given by him is valueless with regard to specific distinction; and as he unites a true (freshwater) Charr with another fish regularly entering the sea, it is probable that he has confounded two species.

SALMO CAMBRICUS (Pl. VI.).

(The Torgoch of Llanberris.)

Body slightly compressed and elongate, its greatest depth being one-fifth, or two-ninths, of the distance of the snout from the root of the caudal fin; the length of the head is considerably more than one-half of the distance of the snout and of the vertical from the origin of the dorsal. Head rather depressed, *interorbital space flat*, its width being less than twice the diameter of the eye. Male with the lower jaw longest; teeth of moderate strength,—six in each intermaxillary, twenty in each maxillary. Length of the pectoral less than that of the head, much more than one-half of the distance between its root and that of the ventral. Dorsal rays thirteen (fourteen). 170 transverse series of scales above the lateral line. Sides with numerous red dots, belly red; pectoral, ventral, and anal with white margins.

The numerous specimens examined of this species agree in every respect with one another. We take for the following description a *male specimen 9 inches long*, the usual size of the Torgoch, which scarcely ever exceeds the length of 12 inches.

Body rather compressed and elongate; its greatest depth is below the origin of the dorsal fin, where it is contained five times or four times and a third in the total length (without caudal). The least depth of the tail is three-fifths or two-thirds of the length of the base of the dorsal fin. The height of the head above the mandibular joint equals the distance between the posterior margin of the orbit and the end of the operculum. The upper profile of the head is not elevated above the margin of the orbit, and is slightly concave. The diameter of the eye is one-fifth of the length of the head, two-thirds of the extent of the snout, and more than one-half of the width of the interorbital space; the latter is flat, with the median

* *Salmo umbla* (Lake of Constance) has sixty-five vertebrae (Rapp, Bodensee-Fische, p. 33).

ridge and the lateral series of pores scarcely visible. Snout rather depressed, conical, with the lower jaw slightly curved upwards and overreaching the upper. The *nostrils* are situated midway between eyeball and end of the snout; the anterior is round, open, surrounded by a membrane, which posteriorly is developed into a small flap, nearly entirely covering the smaller, oblong, posterior nostril. By this character alone the Torgoch may be distinguished from the Charr and Freshwater Herring. The maxillary extends to (or scarcely beyond) the vertical from the posterior margin of the eye, and is armed with 19–21 teeth of moderate size; six or seven teeth in each intermaxillary, seventeen in each mandible; seven teeth on the vomer form two sides of a triangle, the point of which is directed backwards; fifteen teeth on each palatine, five pairs on the tongue. The *suboperculum* is produced backwards, covering the triangular portion of the humerus above the root of the pectoral, and being in immediate contact with the latter; the vertical width of the suboperculum is one-half, or rather less than one-half, of that of the operculum. Only three *branchiostegals* are exposed in a lateral view of the fish, the others being situated at the lower side of the head. The lower branch of the outer *branchial arch* is provided with thirteen lanceolate straight gill-rakers; the longest is somewhat less than two lines long in the specimen described.

D. 13 (14). A. 12 (11). P. 12 (13). V. 9.

The origin of the dorsal fin is somewhat nearer to the snout than to the root of the caudal; the length of its base is not much less than its height. The fifth and sixth rays form the rounded top of the fin. The first ray is rudimentary, the second half as long as the third, the third half as long as the fourth, the fourth simple, five-sixths of the fifth, which is branched, the sixth the longest, the last split to the base. The length of the base of the dorsal is contained once and a third in its distance from the adipous fin.

The origin of the anal fin is exactly in the middle between the root of the caudal and that of the outer ventral ray; the length of its base is less than that of the dorsal, and not much less than its height. The four anterior rays are enveloped in a common membrane; the fourth and fifth rays form a rounded point; and the lower edge of the fin is slightly emarginate. The first ray is short, the second half as long as the third, the third three-fourths of the fourth, the fourth simple, a little shorter than the fifth, which is the longest and branched; the last split to the base, its length being nearly one-half of that of the fifth.

Caudal fin emarginate, the length of a middle ray being a little more than one-half of that of the outer ones, the length of which is contained six times and a half in the total. Lobes slightly rounded.

The base of the pectoral is overlapped by the gill-cover apparatus. It extends nearly to the vertical from the origin of the dorsal, is considerably shorter than the head, and three-fourths of the distance between its root and that of the ventral.

The ventral is inserted in the vertical from the eighth to eleventh

dorsal rays, its length being two-thirds of that of the pectoral, or of the distance between the root of its outer ray and the vent.

The scales are very thin and small, deeply imbedded in the skin; one taken from between the dorsal and the lateral line is ovate, two-thirds as high as long. The perforated scales of the lateral line do not correspond to the transverse series. Scales on the back minute.

The back is dark sea-green, which colour becomes lighter on the sides, assuming a yellowish shade and gradually passing into the bright red of the lower parts; sides with numerous reddish orange-coloured dots. Pectoral greenish, passing into reddish posteriorly, the upper margin being white; ventral and anal red, with white anterior margins; dorsal and caudal blackish, with broad lighter margins. Cheeks and suboperculum with numerous black dots.

Vertebrae: sixty-one.

Young specimens, from 5 to 6 inches long, scarcely differ from the adult specimens described. They are from Mr. Yarrell's collection, who obtained them from a lake near Barmouth in Merionethshire, called Coss-y-gedawl. In consequence of the young age the eye is much larger, longer than the snout, two-sevenths of the length of the head, the maxillary not extending to the posterior margin of the orbit. The pectorals are comparatively a little shorter, the ventrals a little longer, than in the adult. Dorsal fin with fourteen rays—that is, two rays more than in the Charr. The dark colour of the back emits eight cross-bars on the sides, and the red dots are larger and less in number—differences such as are usually observed between old and young *Salmonidae*. The specific characters (the flat head, elongate body, rounded fins, peculiar nostrils, increased number of dorsal rays, &c.) are very conspicuous. Yarrell has given a figure of one of the specimens, in which the head is incorrect in nearly every respect.

The typical specimens were caught on the 26th and 29th of November; the time of spawning appeared to have been then beginning.

SALMO GRAYI (Pl. VII.).

(The Freshwater Herring of Lough Melvin.)

Body compressed, slightly elevated, its greatest depth being one-fourth of the distance of the snout from the end of the middle caudal rays; the length of the head is scarcely more than one-half of the distance of the snout and of the vertical from the origin of the dorsal. Head compressed; interorbital space convex, its width being less than twice the diameter of the eye. Jaws of the male of equal length anteriorly; *teeth very small*, four in each intermaxillary, sixteen in the maxillary. Length of the pectoral equal to, or rather more than, that of the head, terminating at no great distance from the ventral. Dorsal rays thirteen or fourteen. 125 transverse series of scales above the lateral line. Sides with scattered light orange-coloured dots; belly uniform silvery whitish, or with a light-reddish shade; fins blackish.

Description of a male specimen, length $10\frac{1}{2}$ inches.—Head and body compressed, slightly elevated, its greatest depth being below the origin of the dorsal fin, where it is contained four times in the total length (to the end of the middle caudal rays). The least depth of the tail is considerably less than the length of the base of the dorsal fin. The height of the head above the mandibular joint is more than the distance between the posterior margin of the orbit and the end of the operculum. The upper profile of the head is elevated above the margin of the orbit, the diameter of which is one-fifth of the length of the head, shorter than the snout, and a little more than one-half of the width of the interorbital space. The latter is convex, with a prominent ridge along the middle, and with a pair of series of pores. Snout slightly compressed, subconical, with the jaws equal anteriorly. The nostrils are situated midway between the end of the snout and the anterior margin of the eyeball; the posterior is the wider and round, the anterior being a very narrow vertical slit; both are separated by a narrow cutaneous bridge. The *maxillary* extends to the vertical from the posterior margin of the eye, and is armed with sixteen very small *teeth*, the posterior ones being quite rudimentary. All the other teeth small—four in the intermaxillary, twelve in each mandible, two to four on the vomer, fifteen on each palatine, and four pairs on the tongue. The *suboperculum* forms the hindmost part of the gill-cover, and does not cover the exposed portion of the humerus above the root of the pectoral; it is narrow, its vertical width being one-third of that of the operculum. Only the two or three outer *branchiostegals* are exposed in a lateral view of the fish, the others being situated at the lower side of the head. The lower branch of the outer *branchial arch* is provided with nine lanceolate straight gill-rakers; the longest is two lines long in the specimen described.

D. 13 (14). A. 12. P. 13-14. V. 9.

The origin of the dorsal fin is nearer to the end of the snout than to the root of the caudal; the length of its base is considerably more than that of the last ray, and contained once and two-fifths in that of the fourth ray. The fourth and fifth rays form an acute point, and the upper margin of the fin is nearly straight. The first ray is nearly half as long as the second, the second half as long as the third, the third not much shorter than the fourth; the fourth and fifth are longest, the former simple and the latter branched; the last is split to the base, and nearly half as long as the fifth. The distance of the adipous fin from the dorsal is less than twice the length of the base of the latter.

The origin of the anal fin is in the middle between the root of the caudal and that of the outer ventral ray; the length of its base is less than that of the dorsal, and two-thirds of the length of the fifth ray. The fourth, fifth, and sixth rays are the longest, and form an acute point; the lower margin of the fin is slightly emarginate. The first ray is short, half as long as the second; the second half as long as the third; the third two-thirds as long as the fourth, which s

simple; the fifth branched; the last is split to the base, two-fifths as long as the fourth.

Caudal fin forked, one of the middle rays not being quite half as long as the outer ones, the length of which is one-fifth of the total. Lobes pointed.

The base of the pectoral is entirely free, and not overlapped by the gill-cover apparatus. It is as long as, or even longer than, the head, and extends to, or slightly beyond, the vertical from the origin of the dorsal, terminating at a short distance from the ventral.

The ventral is inserted below the ninth, tenth, and eleventh dorsal rays, its length being three-quarters of that of the pectoral; it terminates at no great distance from the vent. In smaller specimens than the one described the two outer rays are somewhat less lengthened.

The scales are very conspicuous, comparatively much larger than in the other British species. Those between the dorsal fin and lateral line are nearly square, with the hind margin rounded. Those of the lateral line are not larger than the others; and their number, therefore, nearly coincides with the number of the transverse series. The scales on the back are the smallest, yet very distinct.

Sides and belly silvery; the scales on the side of the back have a silvery centre and a blackish margin; the back itself bluish black; belly with a reddish shade; sides with scattered light orange-coloured dots; fins blackish; the dorsal lighter superiorly, and with a few light dots at the base; ventral with a narrow whitish margin. Head silvery, black above.

This account of the "Freshwater Herring" is very incomplete, and can be considered only as the first step towards a satisfactory knowledge of this species. We are not yet acquainted with the immature state, or with variations which may occur, and with the female fish only by a short notice of Mr. W. Thompson. I have before me two other male specimens of nearly the same size as the one described, but without any indication of the locality, and preserved in spirits for a long time; and six other specimens given to Prof. W. Thomson, of Belfast, as being perhaps from Lough Melvin, and kindly lent to me for examination. Those eight specimens agree with the Freshwater Herring in the small size of their teeth, by which character these Irish fishes may be at once distinguished from the other allied European species—in the shortness of their head, in the length of their pectoral, and in the shape of the fins; but they differ from the typical specimens in several not unimportant points, which I shall point out when a further supply of specimens shall enable me to form a definite opinion about the value of those differences. I may, however, mention that the females of one of those Irish fishes have fully developed eggs of the size of a pea, when only 5 inches long! Without full material, and with the uncertainty as to locality, it would be as dangerous to establish new species on differences which may, after all, turn out to be dependent on age, as unwise to refer them to the "Freshwater Herring" of Lough Melvin, thereby destroying a definition of its specific characters.

The typical specimens were taken in the beginning of November,

evidently with a net; the state of their sexual organs shows that the spawning commences at that time of the year. It must be very difficult to catch the fishes after the middle of November, partly because they retire into the deeper parts of the lake, and partly because the attempts to set nets are frustrated by the stormy weather of the season. Repeated endeavours to obtain more specimens, made by the Earl of Enniskillen, proved to be unsuccessful. In a letter from Mr. J. Walker, this gentleman mentions that he saw one taken with a fly in the month of August.

The Earl of Enniskillen mentions, in a letter directed to Mr. Thompson, that the "Freshwater Herring" is plentiful in the middle of November. "The people are now taking them in cartloads. The flesh of such as I send is white and soft, and different from what that of Charr is in any other lough." Mr. Thompson* saw the female; and, according to him, it is externally not different from the male. The ovaria contained 959 ova in a specimen 11 inches in length, each being two lines in diameter.

Number of vertebrae sixty, as ascertained by Thompson in a male and female fish, and by myself in two males.

7. REVIEW OF THE VERMETIDÆ. BY OTTO A. L. MÖRCH (OF COPENHAGEN). (Part III.)

[Concluded from Proc. Zool. Soc. 1861, p. 365.]

BIVONIA, Gray, 1850.

The *Bivonæ*, Gray, Cat. Brit. Mus. 1842, p. 62.

Bivonia, Gray, *ibid.* p. 90; Gray, 1850, in Mrs. Gray's Fig. iv. p. 82. no. 3; Adams, Genera, i. p. 358.

T. affixa, plerumque spiralis, apertura contracta circulari, sæpe liris spiralibus interrupto-nodulosis et lira mediana elevata; columella levissima, nitida.

Animal tentaculis cylindricis, filamentis pedalibus subulatis vel setaceis. Operculum parvum, rudimentare (Phil.).

Dr. Gray gives (in the Brit. Mus. Cat. 1842, p. 62) the following character:—"The *Bivonæ* have an orbicular spiral operculum, with an oblong lateral scar like the *Trochi*." I suppose this description was made from a broken specimen, giving the muscular impression the appearance of being lateral. In the Brit. Mus. Cat. for 1840, quoted in Proc. Zool. Soc. no. 258, by Dr. Gray, I cannot find anything about this genus. The edition 1844, quoted in the same place, is, according to the indication of the pages 62 & 90, no doubt a typographical error. In the Systematic Index of Mrs. Gray's Fig. of Mollusca, p. 82, the diagnosis is altered thus:—"Operculum rudimentary, small (spiral?)," which is evidently taken from Philippi's description of *Vermetus triqueter*, Biv.,—"Operculum parvum, rudimentare," which must thus be regarded as the type. Of the other

* Ann. and Mag. Nat. Hist. 1841, vi. p. 443.

species referred to this genus, *V. glomeratus*, Biv., having a large convex operculum, is a *Spiroglyphus*; and *V. subcancellatus*, Biv., is a true *Vermetus*. The *V. semisurrectus*, Biv., with an "operculum fere completum," seems not, according to the figure of Philippi, to differ in the size of the operculum from the typical species.

1. BIVONIA TRIQUETRA, Bivona, 1832.

T. solitaria aut gregaria, extus apicem versus saltem triquetra et depressiuscula, orbiculatim vel turbinatim contorta, rugis transversim flexuosis; antice sæpe elongata, cylindrica.

T. ejusdem structuræ atque V. gigantis, sed multo minor; diameter tubi enim nunquam 2½ mill. excedit. Apex et interdum tota testa, si solitaria, exquisite triquetra, basi adnata depressa; pars testæ libera autem semper cylindricam formam induit. Rarius præter carinam dorsalem, costæ 2-3 adsunt; plicæ transversæ validæ, rugosæ, irregulares, in parte cylindrica multo minus conspicuæ. Color albidus aut fuscescens.

Animal operculo parvo, rudimentari, tentaculis superioribus cylindricis, paululum retractilibus, inferioribus setaceis longissimis; nigrum, pallio flavescente; aut albidum, luteo, violaceo vel badio maculatum (Phil.).

Massa quædam formata ab aliis tubulis, &c., Bonanni, ii. 20 E.

Vermetus triqueter, Bivona, Nuov. Gen. 1832, p. 11 (Phil.); Philippi, Enum. i. p. 170. t. ix. f. 21, ii. p. 143; Siebold, Wirbellose Thiere, p. 344. 2.

Bivonia triquetra, Gray, Fig. iv. p. 82, t. 58. f. 4.

Vermetus (Aletes?) triqueter, Mörch, Journ. Conch. viii. 36.

Var. α. PINNICOLA (Mus. reg.).

T. irregulariter spiralis, lineis tribus longitudinalibus crenulatis (Gravenhorst).

Vermicularia granulata, Gravenh. Tergestina, 1831, p. 65. no. 5 (non Fabr.).

On the large *Pinna*, Seba, Thes. iii. tab. 91. no. 1.

Vermetus granulatus, Forbes, Ægean Report, p. 138, verisim.

? *Serpula rupestris*, Risso, Eur. MÉR. p. 204. no. 25?

Var. β. SPIRORBIS.

T. solitaria, alba, cretacea, spirorbiformis, apertura soluta; carina dorsali crenulata, varicibus arcuatis 1 vel 2 in anfr. penultimo; latere externo subperpendiculari, liris confertis obsoletissimis; striæ incrementis irregulares, sigmoideæ, sæpe membranacæ, peripheriam versus incrassatæ, in locis occultis pulcherrime undulato-squamulosæ; anfr. primi carnei.

Diam. testæ 19 m.; diam. aperturæ 3¾ m.

Hab. In littore Dalmatiæ (coll. *Dunkeri* in lapide).

Var. γ. ALETES.

T. lateraliter affixa, anfr. obliquis decumbentibus planis; carina dorsalis compressa, crenulata, umbilicum approximans; striæ in-

crementi membranaceæ, obsolete undulatæ in regione umbilicali (Philippi, t. 9. f. 21).

Hab. In littore Dalmatiæ cum præcedente (*coll. Dunkeri*).

T. juvenilis læviuscula, fusco-rosea vel carnea, spirorbiformis, leviter corrodens.

Diam. testæ $2\frac{1}{2}$ m. ; diam. aperturæ $\frac{3}{4}$ m.

On the old specimens in the group belonging to Prof. Dunker.

Var. δ . SERPULINA.

T. glomerata, lira dorsali funiculari prominula; liræ longitudinales remotæ, interruptæ; rugæ incrementi confertæ, sæpe submembranaceæ, undulatæ; varice erecto juxta aperturam; anfr. primi planorbiformes; testa infantilis bullata, nitidula, castanea.

A detached crust in the coll. of Prof. Dunker.

Var. ϵ . EXPANSA.

T. solitaria, corrodens, spirorbiformis; anfr. ultimus carina dorsali compressa, punctis ferrugineis remotis; latere externo basi dilatato crenulato; liris longitudinalibus obsoleteissimis; rugæ et striæ incrementi leviter sigmoideæ; apertura circularis, soluta, contracta.

Diam. aperturæ 4 m. ; diam. anfr. ult. 6 m. ; diam. testæ circ. 22 m.

Hab. Ad ins. Madeira (*Mus. Cuming*). On *Patella longula*, Meusch., whereon it has formed a bed nearly going through the shell.

Var. ζ . AMPLIATA.

T. repens, spiraliter torta; anfr. primi obliqui, decumbentes; varice dorsali juxta aperturam ampliata subquadrangularem.

Diam. aperturæ fere 7 m.

Hab. In mare Mediterraneo (*Mus. Cuming*). A few specimens of this variety are to be seen on the under edge of the large crust of *Spirogyphus glomeratus*, described above.

Var. η . FASCICULARIS.

Testis aggregatis, basi spiratis, antice porrectis, teretibus, subfastigiatis (Phil.).

Vermetus triquetet, var., Biv. Nuov. Gen. t. 2. f. 4 (Phil.).

Vermetus triquetet, var. β , Phil. Enum. i. p. 170, t. 11. f. 22.

Bivonia triquetra, Gray, Figs. i. pl. 58. f. 4 (copy).

Hab. In Sicilia, frequens (*Phil.*).

“Var. β , quam libenter speciem peculiarem esse crederes, ad instar *Madreporarum* cespitosa rupes vestit, et ipsa massas non spernendæ molis constituit; partem tantummodo attuli ultra 1' longam, 6–7^{'''} latam.”—*Philippi*.

Philippi never observed varices in this species. The specimens I have compared showed generally one or two varices in the last and penultimate whorls. The variety η is a good transition to the following species, from which perhaps it does not differ.

2. *BIVONIA SEMISURRECTA*, Bivona, 1832.

T. solitaria, cylindrica, apice contorto, rugosa, adnata, antice longe porrecta, varicosa, sæpe striis longitudinalibus subgranosis asperula.

T. minus vitrea, tenuior, facilius quam reliquæ cum Serpulæ testa confundi potest, præsertim cum sculptura plerumque obsoleta, aut propter crustam calcaream non conspicua sit.

Diam. tubi variata 2-4'''.

Plerumque apex tantum adnatus; et pars antica, sæpe usque ad 4'' longa, libera est, sæpe lævissima. Varices manicæformes hæc species frequentius ostendit quam reliquæ; colorem semper album vidi (Phil.).

Animal operculo fere completo, tentaculis omnibus retractilibus, superioribus cylindricis, inferioribus longioribus subulatis; caput et pedem fulva punctis cæruleo-fuscis marmorata, collare fulvum cæruleo-fusco articulatam ostendit, semel ego anteriorem animalis partem pulchre cinnabarinam punctis albis adpersam, et punctis nigris circa operculum ornatam, collare autem cinnabarinum nigro articulatam vidi. Tentacula inferiora subverrucosa, intus longitudinaliter subsulcata (Philippi).

Vermetus semisurrectus, Bivona, Nuov. Gen. p. 10, t. 2. f. 3; Philippi, Enum. p. 171, t. 9. f. 1911, p. 144; vix Lacaze Duth.

Bivonia semisurrecta, Gray, Figs. p. 28, t. 58. f. 1; Adams, Genera, p. 358.

Vermetus (Aletes?) semisurrectus, Mörch, Journ. Conch. viii. p. 39.

Hab. In mari Mediterraneo (Sicilia) frequens plerumque testaceis, rarius scopulis adnata (Philippi).

Dr. Hornbeck has received a specimen of this species attached to *Murex branderis*, L., from M. Bivona, jun., which agrees perfectly with the above description; but the median lira on the penultimate whorl is a little more prominent than in the others. In the Museum of Breslau is a specimen of nearly twice the diameter of Philippi's, represented pl. 9. f. 19, and which yet appears to be the same species. I believe this species is only the adult state of the preceding. The chief differences are afforded by the animal; in the present species all the tentacula are stated to be retractile, whilst in the preceding species only the superior are a little retractile; but these observations are probably not founded on very exact investigations. The brim of the mantle is simple, not reflected as in *B. triquetra*; but this character is very likely only momentary. The colours are very different, but seem not to be constant, and are subject to great variations. In the first volume of 'Enumeratio,' Philippi describes the lid thus—"Operculum fere completum;" but in the second volume—"Operculum completum, tenue, planum." Philippi's representations of the two species seem to me to show the opercula of the same size in proportion to the lumen of the tubes. The animal represented by Lacaze Duthiers as *V. semisurrectus* seems not to have any lid; I suppose, therefore, it is *V. gigas*, Biv.

3. BIVONIA SUBTRIQUETRA, Mörch.

T. valida, lateraliter affixa, irregulariter torta; anfr. primi lituiformes vel planorbiformes; carina mediana elevata, compressiscula; latere externo planiusculo, subperpendiculari, basi expanso, liris plerumque destituto; latere interno convexiusculo (in junioribus plano), liris 10–12 æquidistantibus; striæ incrementi leviter sigmoideæ; dissepimenta interna tenuia, convexa. Diam. aperturæ circ. 12 m.

Var. α. SQUAMIFERA.

T. carina dorsali parum prominente, squamis paucis remotis compressis acutis; latere interno liris 4–5 validis angustis sub-squamosis, interstitiis lirulis 1–2 inæqualibus; latere externo superne lirulis 2–3.

Diam. aperturæ circ. 7 m.

? Favanne, La Conchyl. pl. 66. f. B 2, fem. juvenile?

Fossilis in form. tertiaria ad Asti (coll. T. O. Semper).

This species has the same relation to *B. triquetra* as *Thylacodes melitensis*, Gm., to *T. intiotiosa*, Salis.

4. BIVONIA SUTILIS, Mörch.

T. affixa irregulariter lituiformis, fere libera; anfr. graciles, primi irregulariter planorboidei, carnei, liris expressis longitudinalibus alternatim minoribus, submoniliferis, interstitiis granulis validis, remotis, sæpe cum lateralibus confluentibus, inde scrobiculis elongato-quadratis reticulata; sculptura aperturam versus lævior vel fere evanescens; anfr. ultimus solutus, longus, albescens, varicibus duabus majoribus et duabus minoribus.

Diam. aperturæ et anfr. ult. circ. 3 m.

Hab. In littore occidentali Americæ centralis, in valva solitaria *Veneris subimbricata* Sow. affixa (*Mus. Cuming*).

This species is exceedingly like to *Bivonia semisurrecta*, Biv., but differs chiefly in the catenulated granulations of the furrows and moniliferous appearance of the liræ.

Var. α. ? MAJOR, liris 3–4 validioribus, ubique impresso-punctata.

Diam. aperturæ 7 m. (coll. *Dunker*, 222).

This specimen, on a fragment of a *Pinna*, probably from Central America, is very like a large variety of *B. semisurrecta* in the Museum of Breslau.

Var. β. TRIQUETRA.

T. corrodens, irregulariter planorbiformis, triquetra, lira dorsali distincta; rugæ et striæ incrementi utrinque sigmoideæ; liræ longitudinales obsoletissimæ vel evanescentes.

Diam. aperturæ 5 m.

Hab. Mazatlan, on a valve of a *Placunanomia* (*Semper's collection at Altona*).

I cannot see any notable difference between var. β and *Bivonia*

triquetra, var. *typica*; but I believe it has the same relation to *B. subtilis* as *B. triquetra* to *B. semisurrecta*.

5. *BIVONIA QUOYI*, H. & A. Adams.

T. solitaria, laxè contorta, tenuiuscula, livido albo fuscoque variegata, arena agglutinata præsertim in anfr. primis; anfr. ultimus longus, porrectus, flexus, liris longitudinalibus obsoletis, interstitiis lirulis parvis obsoletissimis; striæ incrementi submembranacæ, expressæ.

Apertura circularis diam. circ. 4 m.

Cladopoda quoyi, Adams, Genera, i. p. 359, t. 39. f. 3 a.

Hab. Ad ins. Philippin. (*Mus. Cuming*).

The description is from the specimen represented by Messrs. Adams. I do not know if the authors have placed this species in the genus *Cladopoda* from a knowledge of the animal; but the shell seems to me so like that of *Bivonia semisurrecta*, that I have referred it to the present genus until the animal proves the contrary.

Var. α . LILACINA.

T. vix agglutinans, crassiuscula, aperturam versus lilacina, liris longitudinalibus granulosis; in anfr. primis rugis obliquis corrugata.

Diam. aperturæ fere $4\frac{1}{2}$ m.

Hab. Ad ins. Philippin. (*Mus. Cuming*).

One specimen a little larger and thicker than the preceding; the first whorls are lost.

Var. β . PLANORBOÏDES.

T. lilacino et albo variegata, arenulis sparsis agglutinatis, primum irregulariter planorbiformis; anfr. ultimus longiusculus, porrectus, reflexus; anfr. graciles, teretes, subæquales, lirulis remotis longitudinalibus, granulis sæpe pulcherrimis, sat approximatis; interstitiis lirula parva mediana granifera; anfr. penultimus striga longitudinali ferruginea abrupta; varicibus tribus, ultimo erecto valido.

Diam. anfr. ult. circ. $3\frac{1}{8}$ m.

? *Tubulus vermicularis*, Buonanni, Rec. p. 92. f. 20 A (sed duplo major); Mus. Kirch. pl. 6. f. 20 A (copy).

? *Le cor de chasse*, Favon. i. p. 669, t. 6. f. 3 (copy, but reversed and enlarged).

Hab. Ad ins. Philippin. (*Mus. Cuming*).

I do not know any shell better resembling the figure of Buonanni.

Var. γ . LAQUEARIS.

T. repens, sordide carnea; anfr. primi lividi, laqueatim torti; liræ validiusculæ, sat approximatae, graniferae, hic illic squamulis minutis; rugæ incrementi arcuatae, irregulares; apertura affixa, latere affixo plano obscuro.

Diam. aperturæ 3 m.

Hab. Ad ins. Philippin., lapillo affixo (*Mus. Cuming*).

Very similar to the typical specimen in colour, but creeping and shorter.

Var. δ . RUGOSO-SQUAMOSA.

T. alba, crassiuscula, laquearis, irregulariter spiralis; liræ latiusculæ; laminæ incrementi confertæ, undulatæ, intersectionibus squamis latis brevibus; anfr. ultimus solutus, longus, læviusculus, squamulis incrementi tenuibus parvis.

Diam. aperturæ 3 m.

Hab. Ad ins. Philippin.? (*Mus. Cuming*).

One specimen, with a few agglutinated pebbles.

Var. ϵ . STRIGATA.

T. crassiuscula, soluta, irregulariter torta, alba, postice lineis longitudinalibus duabus ferrugineis; latere affixo plano, fascia longitudinali badia, utrinque ferrugineo terminata; liræ longitudinales validæ, regulares, hic illic squamulosæ; rugæ incrementi subæquales, æquidistantes, inde interstitiis scrobiculatis; lapillis sparsis agglutinatis.

Diam. aperturæ circ. $3\frac{1}{2}$ m.

Hab. Ad ins. Philippin. (*Mus. Cuming*).

Description taken from a small detached specimen.

Var. ζ . PAPPILLOSA.

T. lateraliter affixa, carnea; anfr. primi 3-4 fere regulariter planorbiformes; anfr. sequentes laqueati, obliqui, incumbentes; liræ longitudinales remotæ, papillis conicis compressis acutis sat remotis; interstitiis lirulis 1-2 minutis graniferis.

Apertura subsoluta, diam. $3\frac{1}{2}$ m.

Hab. Ad ins. Philippin.; in valva solitaria *Balani tintinnabuli?* affixa (*Mus. Cuming*).

This variety unites the preceding small and narrow forms with the following larger and broader.

Forma 1. ADSPERSA.

T. anfractibus ampliatis, lateribus dilatatis.

Var. η . CORALLIOPHILA.

T. tenuiuscula, irregulariter planorbiformis, in corallio fere semiimmersa, albescens, fasciis longitudinalibus duabus ferrugineis; latere affixo fascia badia; anfr. aperturam versus dilatati, planiusculi, latere externo margine depresso dilatato, rugis incrementi validis; latere interno et dorsali liris longitudinalibus confertis confuse granulosis; anfr. ultimus contractus, tubo aperturali porrecto, tenui, angusto, læviusculo malleato, rugis annulatis obsoletis, liris evanescentibus; intus alba, columella nitida, sulco infra mediano obsoleto; anfr. primi cinerei.

Diam. aperturæ 3 m.; diam. anfr. penult. $5\frac{1}{2}$ m.; longitudo tubi 10 m.

Serpula costalis, Chenu, Ill. t. 10. f. 7 (non absimilis).

Hab. Ad ins. Philippin. (coll. Cuming). (Specimen descriptum extat in collectione Hornbeckiana.)

In Mr. Cuming's collection is a specimen without apertural tube, attached or slightly burrowing in the very same kind of coral as Dr. Hornbeck's specimen. A detached tube, bent like a fishing-hook, about 60 m. long, and agreeing in sculpture and calibre with the apertural tube above described, is also found in Mr. Cuming's collection.

Var. θ . TRIQUETRA.

T. affixa, scaphitoïdea, albescens, tenuiuscula, latere affixo plano candido; anfr. ultimus triqueter, carinula plana mediana candida, utrinque linea castanea marginata; marginibus, præsertim externo, dilatatis; latere interno liris 2 vel 3 albis et lineis ferrugineis 2 vel 3 confluentibus; striæ et rugæ incrementi sæpe ferrugineæ, varie flexæ, in intersectionibus lirarum et carinæ præcipue incrassatæ; anfr. ultimus rectus, pone aperturam inflexus, contractus, cylindricus; apertura circularis, intus candida; anfr. primi intus castanei.

Diam. aperturæ $5\frac{1}{2}$ m.; diam. anfr. ult. fere 10 m.

Hab. Ad ins. Philippin. Specimen in fragmento *Tetraclitæ* affixum extat in Mus. Cuming.

Var. ι . GRANIFERA.

T. crassiuscula, alba vel flavescens; anfr. incumbentes, obliqui, depressiusculi, aperturam versus ampliati, marginibus dilatatis; anfr. primi angusti, inferne lividi; liræ longitudinales confertæ, alternatim minores, sæpe interruptæ vel confusæ; rugæ incrementi validæ, sigmoïdeæ, sæpe undulatæ, versus marginem incrassatæ et sæpe furcata, granulis validis ornate; faucibus macula badia oblonga, margine castaneo; columella candida, nitida; parietes interne flavescens (ut videtur in specimine fracto).

Diam. aperturæ 6 m.; anfr. ult. inferne 12 m. latus.

Hab. Ad ins. Philippin.? (Mus. Cuming).

This shell looks very different from the preceding variety; but the first whorls are exactly of the same shape and bluish colour (with agglutinated minute pebbles) as in the type, but chiefly in var. γ .

Var. κ . FULGURATA.

T. spirorbiformis, latissime umbilicata; anfr. ultimus ampliatus, convexus, peripheria dilatata; liræ spirales confertissimæ, regulares, subgranosæ; lira quarta vel quinta quæque expressior, læviuscula; rugæ incrementi sigmoïdeæ, sat approximata, utrinque incrassatæ; anfr. ultimus juxta aperturam contractus; apertura soluta, circularis; anfr. primi varicibus parvis 2 vel 3 fornicatis erectis; color pallide flavescens, præsertim peripheriam versus, fascia mediana obsoleta lactescente; lineis transversis fulguratis, aurantiacis vel fuscis, approximatis.

Diam. aperturæ $9\frac{1}{2}$ m.; anfr. vel 12 m. in latere affixo; diam. max. testæ 45 m.

Hab. Ad ins. Philippin.; specimen cum fragmento *Pinnæ incurvæ*? extat in Museo Cumingiano.

The whorls in the centre remind one of those of var. β . It looks at first glance entirely different; but it is evidently the same form as var. ι , only larger and more regularly grown.

Var. λ . PUNCTATA.

T. lituiformis, crassa, inferne planissima, affixa, superne convexa, latere externo præcipitanter declivi; liræ longitudinales remotæ, expressæ, nodulis obsoletis irregularibus, interstitiis sæpe lirula intercalante; rugæ incrementi expressæ, leviter arcuatæ; inde confuse reticulato-scrobiculata; color albescens vel fuscescens, punctis ferrugineis et lapillis agglutinatis adspersa; apertura circularis, contracta, soluta.

Diam. testæ 35–55 m.; diam. aperturæ $7\frac{1}{2}$ m.; anfr. ult. 11 m.

Serpula costalis, Chenu, Ill. pl. 10. f. 6, simillima.

Hab. Ad ins. Philippin. (*Mus. Cuming*).

The specimen shows on the underside the cast of the denudated layers of a pearl-oyster. It differs chiefly from the figure quoted in having all the whorls in one plane, and consequently having a very large umbilicus, which is open in the middle, the first few whorls being lost. This variety approaches in many respects to var. θ . *triquetra*.

Var. μ . VARIEGATA.

T. crassa, spiraliter torta; anfr. obliqui, incumbentes; latere externo dilatato; liræ longitudinales obsoletæ, rugis incrementi sæpe incrassatis et continuis decussatæ; inde fere ubique confuse reticulato-scrobiculata vel malleata; anfr. ultimus solutus, longus, tortus, erectus; color albescens, præsertim in lateribus, fascia mediana lata castanea e lineis longitudinalibus confluentibus composita, lacteo variegata, lineis ferrugineis aperturam versus remotis.

Diam. aperturæ 6 m.

Rumph. Amboina, t. 41. f. H, non absimilis.

Hab. Ad ins. Philippin. (*Mus. Cuming*); specimen in lapide affixum.

This variety approaches in colour the var. κ . *fulgurata*.

Var. ν . FLOS-LACTIS.

T. crassiuscula, irregulariter torta; anfr. contigui vel incumbentes; liræ longitudinales obsoletæ vel nodulis acutiusculis ornata; rugæ incrementi crassiusculæ, irregulares, sæpe confluentes; latere externo fascia lata fusca vel castanea variegata, latere superiore fascia lata lactea vel pallide cyanea; anfr. primi flavescens, læviusculi.

Diam. aperturæ 7 m., speciminis minoris 3 m.

Hab. Ad ins. Philippin. (*H. Cuming*), in *Cerithio noduloso* affixa.

This variety differs chiefly from the preceding in the colours being stronger, the exterior side being of a deep chestnut-brown colour, and the upper side of a bluish white, like the preceding forms, but much more developed. A smaller specimen, attached to the same shell, with agglutinated pebbles, differs chiefly from the type in being thicker in the shell.

? Var. ξ. (ALETES).

T. solida, spiraliter torta, lateraliter affixa; anfr. contigui, planiusculi, incumbentes, obliqui, suturis dilatatis; anfr. ultimus longus, solutus, fere semiteres, aperturam versus reflexus, liris longitudinalibus confertis, sæpe connatis et leviusculis, leviter undulatis; rugæ incrementi parvæ, approximate, suturam versus incrassatæ, leviter sigmoideæ et sæpe furcatæ; interstitia lirarum reticulato-scribiculata, fasciis longitudinalibus angustis approximatis 4-5 aurantiacis; sutura alba; anfr. ultimus sordide livescens; columella candida, nitida, intus aperturam versus fuscens.

Diam. aperturæ circ. 6 m.; anfr. ult. $7\frac{1}{2}$ m.; anfr. penult. circ. 10 m.

Hab. — ? (*Mus. Cuming*).

This variety is not unlike *Vermetus cercus*, Carp., chiefly so in shape; but the sculpture and colour remind one of var. η. *corallio-phila*. The affixed side is thinner, white, and shows marks of a pearl-oyster.

6. BIVONIA CONSTRICTOR, Mörch.

T. crassa, repens, laqueatim contorta, sordide lactea, primum roseola; anfr. convexiusculi; latere externo dilatato; liræ latæ, parum prominentes, subapproximate, versus marginem externum omnino evanescentes; rugæ incrementi prominentes, irregulares, leviter sigmoideæ, in intersectionibus interdum obsolete nodulosæ; anfr. ultimus pone aperturam contractus, breviter cylindricus, varicibus duabus æquidistantibus crassis brevissimis arcuatis; intus fere ubique castanea; apertura soluta, circularis, periphæria interna alba.

Diam. apert. 7 m.; diam. anfr. ult. circ. 10-12 m.

Serpula arenaria, Bowd. Elements, ii. f. 130, non absimilis.

Hab. Australia (*Mus. Cuming*).

One specimen, nearly half sunk in the surface of a calcareous conglomerate, with an imbedded spine of an *Echinus*: it seems to be somewhat corroding. The last whorl shows two varices, the first at the same distance from the second as that is from the aperture. The figure quoted is not unlike the principal specimen in the group, but the apertural tube is rather long.

7. BIVONIA GOREENSIS, Gm.

T. teres, cancellata, flava, intus cornea, 8-9 pollices longa, striis elevatis, longitudinalibus confertis (Gm).

La longueur de sa coquille est de 8 à 9 pouces, et sa largeur de 3 à 4 lignes. Elle est contournée plus irrégulièrement que le *Vermet* et fait un peu moins de spires, qui vont aussi de droite à gauche. Sa surface est relevée de 50 petits filets longitudinaux, fort serrés, et traversés par d'autres filets semblables, qui forment un treillis extrêmement fin. Son ouverture ne s'élève pas d'un demi pouce au-dessus des spires. Elle s'incline toujours un peu sur le côté. Elle est jaune au dehors, et de couleur de corne au dedans.

Animal.—Les cornes ont deux fois plus de longueur que de largeur. Son pied paraît comme plié en deux à son extrémité. C'est dans ce pli qu'est placé l'opercule qui est si petit qu'on a de la peine à le distinguer sans le secours du verre lenticulaire. Il n'a guère plus d'un huitième de ligne de diamètre. Le manteau est bordé tout autour de 12 petits tubercules jaunes. La tête, les cornes, le pied et le manteau sont bruns pointillés de jaune et de rouge : le reste du corps est blanc-de-corne dans sa moitié supérieure et blanc-de-lait taché de brun dans l'autre moitié.

Le Dofan, Adans. Sénégal, p. 164, t. 11, f. 3.

Les Boyaux de mer d'Afrique, Fav. i. p. 651, t. 6. f. E 2.

Serpula, no. 27, Schröter, Einl. ii. p. 566.

Serpula goreensis, Gm. 3745.

Vermetus goreensis, Daudin, Rec. 1800, p. 35.

Serpula goreensis, Dill. ii. p. 1077. no. 20 ; Wood, Index, t. 38. f. 19 (copy).

Vermetus goreensis, Blv. Dict. lvii. p. 325.

Vermetus (Dofania) goreensis, Mörch, Journ. Conch. viii. p. 26.

Hab. "Cette espèce s'attache par monceaux ronds d'environ un pied de diamètre, sur les coquillages et sur les morceaux de bois que le hazard a fixés au fond sablonneux et coquillier de la rade de l'île de Gorée."—*Adans.*

If the description of the lid is correct, and not erroneous like the observations of Bivona on *Thylacodes polyphragma*, it must be referred to this genus. In the Royal Museum is a large flat crust agreeing with the description of Adanson, but which looks more like a true *Vermetus*.

Gen. THYLACODES, Guettard, 1774.

T. plerumque solitaria, repens, quandoque spirata, sæpe liris 3-5 longitudinalibus nodulosis; apertura circularis, nunquam contracta. Testa nuper nata bulimöidea, apertura antice subeffusa. Animal tentaculis breviusculis, nodulo oculifero juxta basin externo; filamenta pedalia subulata, longa [Phil.], contractilia, sulco profundo longitudinali interno, mammilla basali intermedia perforata; propodium planum, parvum, antice recte truncatum, angulis utrinque productis; mesopodium spatulatum, medio concavum, antice mammilla valida subcompressa; metapodium magnum, cylindricum, postice truncatum, rugis transversis subtilissimis (secundum cl. Gray radiatim sulcatum), utrinque subulatum, membrana brevi elongata recurrente utrinque cum capite frenis conjunctum; operculo nullo (Mörch).

- Serpula*, pp., L. S. N. ed. x. pp.*
Tulaxodes, Guettard, Mém. 1774, vol. iii. pp. 143, 152.
Thylacodes, Agass. Nomencl. p. 370, et Herm. Index, ii.
Serpulus, Montf. 1810, Conch. Syst. pl. 22, sed non deser.
Serpulæ concameratæ, Schmidt, 1818, Beste Einricht. p. 215.
 ?*Lemintina*, Risso, 1826, Hist. iv. p. 114.
Serpulorbis, Sassi, Journ. Ligust. di Sc. Sept. 1827, v. p. 482 ;
 Sassi, Fér. Bull. 5. xix. 1829, p. 123.
Cellularia, Schmidt, Möll. Cat. Mus. Gotha, 1833, p. 70 (non Pallas).
 ?*Hatina*, Gray, Synops. Brit. Mus. 1842, pp. 62, 90 ; 1844,
 p. 62.
Serpuloïdes, Gray, Figures, 1850, iv. p. 83 ; Guide, 1857, p. 127.

Guettard established this genus chiefly on account of the internal septa, the presence of which in his genus *Campulotus* (*Vermetus*, Adans.) was unknown to him. The latter genus was distinguished by regular spiral whorls, and included not only *Vermiculus*, but even *Scala scalaris*, L. Guettard states (*l. c.*, p. 152) that he chiefly founded his genus on the genus *Certium* of Gualtieri, which contains principally the large Mediterranean species.

Lemintina (Risso) is generally regarded as a badly observed species of this genus, from which it differs in the want of the pedal filaments. The curious feather-like bodies represented by Risso are described thus:—"La bouche est fendu en long, placé sur un trompe ou mamelon conique au sommet de la tête, laquelle est surmontée d'un petit panache blanc, qui sont les branchies." I believe this supposed gill is the lingual membrane, which seems to me very probable upon comparing the description with the description of the tongue of *Vermetus* by Lacaze Duthiers, in 'Annales des Sciences,' 1859, xi. p. 208.

The genus *Hatina*, Gray (*olim*), founded on *Vermetus inopertus*, Rüppel, has no pedal filaments ; but it is possible that the male organ is in reality one of the filaments, the other either being overlooked or forgotten by the artist. But it must be observed that the filament represented is situated in the place which the male organ usually occupies in allied families. V. Siebold denies entirely the existence of an exterior male organ ; and no author has described it since.

The radiating lines on the tip of the metapodium, represented by Philippi, but not described, and regarded as a generic character by Dr. Gray, are not to be seen on specimens in spirits ; they are probably nothing more than coloured lines. The lid is wanting, but Bivona mentions that it has an "operculum minimum punctiforme." A similar minute operculum, concealed in a fold of the foot of the Dofan, is described by Adanson. The animal appears, like the other Vermetidæ, to be viviparous. The egg-cases and larvæ are described by Philippi (Wiegman's Archiv f. Naturg. 1839, p. 128), and illustrated by a figure from Scacchi, but more extensively by Schmarda

* "Sæpe isthmis integris passim intercepta." But the animal is described as an Annelid.

(Wiener Denkschriften, 2. Abth. 4. Band. 1852, p. 135, pl. 10). The latter author has mistaken the ear-capsules for the eyes (Troschel, Jahresbericht, 1852). The spermatozoa (or perhaps the spermathecæ) are described by Siebold (Wirbellose Thiere, p. 344); in the same work (pp. 341, 345) are given some observations on the renal and mucous organs. Troschel has represented the teeth of *T. polyphragma* (Sassi) and *T. decussatus* (Gm.), which chiefly differ from the teeth of *Siphonium nebulosum* (Dill.) in having a little tooth more on each side of the rachial plait. The structure of the maxilla is represented by the same author (Gebiss, p. 155, pl. 13. f. 3).

1. THYLACODES POLYPHRAGMA, Sassi.

T. solitaria, irregulariter spiralis; anfr. sæpe contigui teretiusculi, sutura dilatata, iris parvis longitudinalibus confertis sæpe alternatim minoribus, confuse ruguloso-granosis, sæpe iris validis 3-4, nodulis remotis et punctis ferrugineis interpositis; anfr. ultimus longus, leviter tortus, gracilis; color sordidus e fulvo et flavido albescens.

Diam. aperturæ 14 m.

Animal capite, pede et limbo pallii purpureis aut purpureo-atris, punctis albis maculisque sulphureis pictum; reliquum corpus pallidum albescens; tentacula superiora brevia, crassa, conica, non retractilia, inferiora cylindrica, filiformia, acuminata, pallide annulata (Phil.).

Serpula arcuaria, L. Knorr, Vergn. iv. p. 23, vol. i. t. 29. f. 5, 1769.

Serpula intestina, Salis-Marschlius, Reise, p. 358, 1793.

Serpula arenaria, Lam. v. p.

Serpulorbis polyphragma, Sassi, l. c., 1827; Fér. Bull. 1829; Poli, t. 1. f. 17 (Philippi); Delle Chiaje, t. 57. f. 1-9.

Vermetus gigas, Gray, Figs. t. 58. f. 6 (copy).

Serpuloides arenaria, Gray, Figs. iv. p. 83.

Vermetus gigas, Phil. Chenu, Ill. pl. 4. f. 5.

Dentalium intestiniforme, Lin. 1859; Hanl. MS. of Mus. Ulr. p. 49.

Serpulorbis gigas, Adams, Gen. t. 39. f. 2^a (optime).

Var. a. ALETES.

T. lateraliter affixa, fere regulariter spiralis; anfr. obliqui, contigui incumbentes; anfr. ultimus interdum solutus, longus.

Vermicularia lineolata, Gravenh. Tergest. p. 57. no. 3 (ex spm. orig.).

Vermetus gigas, Biv. Nuov. Gen. p. 9, t. 2. f. 1, 2 (Phil.); Phil. Enum. i. p. 170, t. ix. f. 18, and ii. p. 143.

Serpuloides arenaria, Gray, Figs. iv. p. 83, t. 57. f. 2 (copy).

Serpulorbis gigas, Biv. Ad. Gen. i. t. 39. f. 2 (copy)

Hab. In mare Mediterraneo; Tarento (*Salis*); Sicilia (*Phil.*); Genoa (*Sassi*).

Var. β . AMPLA.

T. laxa contorta, tenuiuscula; anfr. vix contigui, teretes, ampli, primum depressiusculi, angulo acuto aperturam versus evanescente; anfr. ultimus solutus, erectus, breviusculus; liræ longitudinales parvæ, approximatae, rugis incrementi subæqualibus decussatae, inde interstitiis subtiliter punctato-scribiculatis; anfr. ultimus superne liris duabus tribusve interruptus, nodulis compressis elongatis. Color albus, præsertim intus, superne flavescens in anfr. primis pallidissime lilacinus.

Diam. apert. 27 m.; long. tubi aperturalis 30 m.; diam. anfr. penult. circ. 15 m.

? *Vermetus siphon*, Lam., Chenu, Ill. t. 7. f. 3, minor.

? *Serpulorbis siphon*, Chenu, Man. p. 320. f. 2306 (copy).

Hab. In ins. Melitens. (*Coll. nostra*). Specimen in lapide molli flavo affixum.

2. THYLACODES MELITENSIS, Gm. 1791.

T. teretiuscula, contorta, umbilicata, decussatim striata, costis longitudinalibus nodulosis, intus lævi polythalamia (Gm.).

Die vielkammerige gewundene Seeschlange, Schröter, Einl. ii. p. 576, t. 6. f. 19, 1789; Schröter, Neue Litteratur, 1785, ii. p. 216.

Hab. Fossilis in Melita inventa, gyris 2 primis recta sibi impositis (Gm.). *Formatio tertiaria.*

Var. β . REPENS.

1716. *Exuvia serpentis in lapides conversa*, Besler, Rariora, t. 36. f. 102.

1817. *Serpula grandis*, Link, Verz. Rostock, p. 23 (Lang, Lapid. t. 50. f. 3).

This species is chiefly distinguished from the preceding by its great thickness; the granules of the liræ are of a vesiculous nature.

Var. γ . ITALICA.

Vipera petrificata, Worm, Mus. 1655, p. 90.

Wurmformige Meerröhre, Knorr, Petrif. 2. Th. 2. Bd. p. 288. t. 1. γ ; (*Tubus aperturalis*), Knorr, *ib.* p. 298, t. 1 a. f. 13.

Serpula polythalamia, Brocchi, Subapp. 268.

Serpula dentifera, var. *c.*, Lam. v. p. 367. no. 24.

Serpula arenaria, Bronn, Hal. Tertiärg. 1831, p. 65.

Serpula decussata, Defr. Dict. t. xlviii. p. 571 (Piémont, Bordeaux).

Vermetus arenarius, Hörnes, Geol. Reichsanst. p. 200, t. 20. f. 5, 6; Griffith, A. Kingd.

Hab. Fossilis in form. tert. Italiae borealis.

3. THYLACODES DENTIFERUS, Lam.

T. teres, contorta, costellis longitudinalibus duabus tribusve dentiferis.

“Cette espèce devient assez grand.”—*Lam.*

Var. ζ , *testis majoribus subsolitariis* (Mus. no.), Lam.

Serpula dentifera, Lam. v. p. 367. no. 24.

Magilus dentiferus, M.-Edw., Lam. v. p. 625.

Vermetus dentiferus, Rouss., Chenu, Ill. t. 4. f. 1 (med. et sup.).

Vermetus dentiferus, Blv. Dict. Sc. t. lvii. p. 325.

Hab. Les mers de l'Asie australe (Lam.).

"Tube assez grand, à coupe circulaire, contournée irrégulièrement, à stries d'accroissement grossières, rugueuses, et d'autres fois pourvu de deux à trois petites côtes ou carènes longitudinales, dentifères, ou mieux tuberculeuses. Couleur d'un rouge brun, mais quelquefois blanche. Cette espèce, qui offre une première variété, dont les tubes sont subsolitaires, et une autre où ils sont subanguleux et agglomérés, vient des mers de l'Asie australe. Elle n'est peut-être pas distincte de la *S. arenaria*, qui, comme elle, n'est qu'un Vermet. Un individu de la collection de M. Lamarck m'a même offert son opercule corné." — *Blainv. Dict. Sc. t. xlviii.* 1827, p. 558.

In Mr. Cuming's collection are several specimens from Australia which seem to me to agree pretty well with the above description, but which differ from the upper figure of Chenu in having less prominent nodules. The lid mentioned by Blainville is very likely found in the var. δ . of Lamarck, which I suppose is *Siphonium nebulosum*, Dillw.

Var. α . REPENS.

T. repens, affixa, tenuiuscula, flavescens; liræ longitudinales parvæ, expressæ, subremotæ, liris incrementi minoribus subundulatis approximatis decussatæ; inde subtiliter reticulata; liræ tres prominentiores, inæquales, nodulis linearibus remotis, maculis linearibus fuscis interpositis; rugæ transversæ validæ, irregulares; varices breves, irregulares, sæpe 3-4.

Diam. aperturæ circ. 9 m.

Hab. Australia; Swan River, creeping on a *Cardium*; Cape Upstart (Mus. Cuming).

The *Vermetus dentiferus* (Q. & G.) approaches this variety in shape, but looks very different in colour and in the form of the aperture. The following species is very likely only a narrow form of the type, depending on its being agglomerated.

4. THYLACODES SULCATUS, Lam.

T. teres, inferne contorta, subglomerata, antice porrecta; costellis longitudinalibus numerosis, subdentatis (Lam.).

Serpula sulcata, Lam. v. 1818, p. 367. no. 22, ed. 2. v. p. 625; Blainv. Dict. t. xlviii. p. 558.

Vermetus novæ hollandiæ, Rouss., Chenu, Ill. pl. 1. f. 4a, vix 5.

Hab. Les mers de la Nouvelle Hollande (Lam.); Kangaroo Island (Mus. Cuming).

The description and locality of Lamarck seem to me to agree perfectly with the shell represented by Chenu, which has also the same calibre as the *Dofan* (Adanson), quoted, with a query, by Lamarck. This shell differs only from the preceding species in its smaller calibre, very likely dependent on its being agglomerated

detached specimen shows a transition state. Fig. 5 of Chenu looks entirely different, and more allied to *V. annulatus*, Rouss.

5. **THYLACODES TURONIUS**, Rouss.

Vermetus turonius, Rouss., Chenu, Ill. pl. 4. f. 44.

Hab. —?

According to the specific name, it would be from Touraine; but, from the colours in the aperture, it would seem to be a living shell.

6. **THYLACODES ANNULUS**, Rouss.

T. repens, laquearis, longitudinaliter subtiliter striata; anfr. ampliati: postice carina brevi crenulata (ex icone).

Vermetus annulus, Rouss., Chenu, Ill. t. 1. f. 8.

Hab. —?

I do not know of any shell like the figure; but it seems to be a good species.

7. **THYLACODES RIISEI**, Mörch.

T. solitaria, repens, laqueatim torta, tenuiuscula, albescens, carneo vel pallidissime lilacino variegata; anfr. ampli, præsertim aperturam versus, liris longitudinalibus parvis planis approximatis alternatim minoribus, superne liris tribus remotis, tuberculis compressiusculis elongatis, sæpe acutis, interdum muticis, confluentibus, punctis ferrugineis interpositis; striæ incrementi minutæ in intersectionibus lirarum minutissime imbricatæ; latere affixo irregulari, sæpe fascia castanea lata longitudinali.

Diam. aperturæ circ. 15 m.

Desh. *Traité de Conch.* t. 79. f. 16, non absimilis.

Hab. Ins. S. Thomæ, Antillarum, Riise, Hornbeck (*Mus. reg. et Univ.*).

Var. α . **LIMACELLA**.

T. repens, solidula, candida, hic illic pallide carnea; anfr. subæquales, liris longitudinalibus latiusculis planis confertis, liris latis 7-8 remotis undulatis vel obsoletissime nodulosis; rugæ incrementi juxta margines validæ, inde lateribus fluctuatis; striæ incrementi obsoletissimæ; apertura subovalis, affixa.

Diam. aperturæ $6\frac{1}{2}$ lat., 8 m. alt.

Hab. Ins. Antill., in *Ostrea limacella*, Lam., affixa (*Mus. Cuning*).

This variety corresponds very well with the first whorls of the type. It differs chiefly by greater solidity and more regular liræ, but otherwise looks very different.

Var. β . **MÜHLENPFORDTII**.

T. albescens, solidula, agglomerata, primum repens vel irregulariter spiralis; anfr. ultimus porrectus, teres, longus, leviter tortus, læviusculus, rugis et striis incrementi inæqualibus; liræ longitudinales expressæ, approximata; superne seriebus tribus nodulorum compressorum; liræ incrementi undulata, approximata; interstitiis lirarum irregulariter scrobiculatis.

Diam. aperturæ circ. 6 m.

V. novæ hollandiæ, Chenu, Ill. t. 1. f. 4, quoad staturam.

Hab. Mexico (*Dr. Mühlentfordt*) (*Coll. Dunkeri*).

Described from a dead group composed of about six or seven specimens. The first whorls are so like those of the former variety, that I do not think it can be specifically different. In shape it looks not unlike *Bivonia semisurrecta*. In Mr. Cuming's collection is a specimen labelled "Philippines," which does not seem to differ from it materially.

8. THYLACODES ERUCIFORMIS, Mörch.

T. tenuiscula, repens, laqueatim contorta, pallide violacea, albo et flavescente variegata, maculis adspersis paucis castaneis, liris longitudinalibus parvis obsoletissimis, superne liris tribus expressis remotis inæqualibus nodulis asperis parvis; striæ incrementi obsoletæ; anfr. ultimus varice brevi; apertura reniformi-ovali, latere interno affixa.

Diam. apert. 7-8 m.

Hab. California, on *Crucibulum? umbrella*, Desh., var. (*Mus. Cuming*).

The small sharp nodules of the three dorsal rows are strongest in the exterior row, reminding one of those of *Cardium echinatum*. This species is the analogue to the preceding from the east coast.

Var. α. LUMBRICELLA.

T. repens, recta, primum laxè contorta, arenulis agglutinatis cinereo et violaceo variegata, fasciis abruptis longitudinalibus vel strigis latis transversis castaneis; liræ longitudinales sat remotæ, sæpe alternatim minores, interstitiis sæpe scrobiculato-reticulatis; liris medianis tribus interdum expressis vel crassis, granulis regularibus æquidistantibus; rugæ incrementi expressæ, superne arcuatæ, lateraliter incrassatæ, validæ, confertæ, retusæ.

Diam. apert. circ. 6½ m.

Voy. de Venus, pl. 11. f. 2. fig. min. (Chenu, F. W. f. 2, copy) quoad staturam.

Hab. California; 10-12 specimens crowded on a *Margaritifera* (*Mus. Cuming*).

Var. β. ERYTHOSCLERA.

T. ut præcedentis sed crassa, alba; lineæ incrementi ferrugineæ, confertæ; interstitiis fenestratis.

Hab. California; on a young *Margaritifera* (*Mus. Cuming*).

This shell is very like to *Bivonia quoyi*, var. *variegata*, in respect of colour and the agglutinated sand; all the specimens are creeping, with affixed apertures.

9. THYLACODES NATALENSIS, Mörch.

T. solitaria, crassa, irregulariter planorbiformis; anfr. plerumque contigui, teretiusculi, complanati, latiusculi, lateribus rotundatis, lapillis, præsertim inferne, sparsis agglutinatis; liræ longitudinales subremotæ, interstitiis obsoletissime decussatis, rugæ

incrementi sæpe validæ, irregulares; color albus, pallidissime violaceo et flavo variegatus; anfr. primi intus fusc.

Alt. aperturæ $6\frac{1}{2}$, lat. 8 m.

Hab. Natal; specimen detritum communicavit T. Collins. The section of the whorls is transversely oval.

10. THYLACODES MASIER, Desh.

“Sa coquille est fort épaisse, longue d’un pied, large de 8 à 9 lignes, marquée de 20 cannelures longitudinales extrêmement fines et terminée par elle-même en trois spires assez irrégulières, dont celles du sommet se trouvent au-dessous des autres. Son ouverture ne s’élève pas au-dessus des spires. Elle est grise, fauve, ou couleur de chair au dehors, et couleur de corne au dedans.”—*Adans.*

Le Masier, *Adans. Sén.* 1757, p. 105. no. 5, tab. 11.

Vermetus arenarius, *Daudin*, 1800, p. 35.

Tuyaux solitaire, *Favanne*, i. p. 600.

Serpula siph, *Lam. Pp.*, v. p. 25.

Vermetus siph, *Blainv. Dict. Sc.* 1828, t. xlvii. p. 325.

Vermetus masier, *Desh.* ix. p. 65, 1843.

Hab. Cap de Verd, extremely rare (*Adanson*).

I have never seen this species.

11. THYLACODES BRASILIENSIS, ROUSS.

T. magna, solitaria, primum spiralis, liris remotis nodulosis; anfr. ultimus solutus, longus, erectus, leviter arcuatus.

Diam. aperturæ 30 m. (ex icone).

Vermetus brasiliensis, *Rouss., Chenu*, Ill. pl. 5. f. 5.

Hab. Brazil, according to the specific name.

From the shape of the aperture, it will probably prove to be a *Siphonium*.

12. THYLACODES COLUBRINUS, Bolt.

T. plerumque solitaria, crassa, picea, spiraliter torta; anfr. ultimus solutus, teres; anfr. primi teretiusculi, latere affixo acutangulo, liris longitudinalibus parvis remotis, interstitiis lirulis minoribus inæqualibus; apertura intus nigra.

Diam. aperturæ circ. 20 m.

Tubuli vermium perpulchri, *Seba*, iii. t. 93. f. 4, 5, 6, 7 (reversed).

Dinotus, *Guettard*, *Mém.* iii. p. 135. no. 10.

Le Cor de Chasse, *Favanne*, i. p. 600 (*Seba*, f. 6, 7).

Le minime, *Fav.* i. p. 600 (*Seba*, f. 4, 5).

Dicke schwartze Wurmkücher, *Knorr*, 1771, v. p. 33, t. 22. f. 1 (typus).

Le grand solitaire, *Favanne*, i. p. 600.

Serpula colubrina, *Bolt. Verz.* 1798, p. 50. no. 884.

Hab. India orientalis?

In the Museum of the University of Copenhagen are several specimens of this shell, one of which may be that figured by *Seba*, fig. 5.

Var. *a.* VIOLACEO-FUSCA.

"*T. irregulariter contorta, lineis elevatis interruptis, obsoleteiusculis, colore violaceo-fusco.*"—Sow.

More than an inch wide in some parts (Sow.), 1 inch (Wood).
Serpula fuscata, Geo. Humphr. Coll. (Sow.); Sow. Tank. Cat. 1825, no. 22. p. 93; Brit. Mus. Wood, Supp. t. 8. f. 3. 1828.

Var. *β.* ATRA.

T. solitaria, crassa, extus et intus picea, spirorbiformis; anfr. primi periphæria acuta, latere affixo plano; anfr. ultimus solutus, teres, declivis; liræ longitudinales parvæ, remotæ, juxta umbilicum lira compressa leviter undulata validiuscula; interstitia lirulis 5-6 inæqualibus, lira mediana majore; rugæ incrementi irregulares, leviter flexæ, marginem versus incrassatæ.

Diam. aperturæ $15\frac{1}{2}$ m.

Solen, Rumph, Amb. t. 41. f. L.

Solen clibaniformis, Petiv. Gazophyl. i. t. 20. f. 13 (copy).

S. corallorum lævis clibaniformis, Klein, Tub. Mar. t. vii. i. *β.* p. 5.

Tubulus vermicularis clibaniformis, Mart. i. pp. 24, 44. f. 10.

Vermetus ater, Rouss., Chenu, Ill. pl. 5. f. 3.

Siphonium ater, Chenu, Man. p. 320. f. 2294 (copy).

? *Serpula ochrea*, Gm. S. N. 3744. no. 19.

Hab. Ins. Philippin.

In Mr. Cuming's collection is a specimen growing on a large *Vermetus cereus*, nearly of the size of that figured in Born's 'Museum,' p. 435. All the figures are taken from specimens without apertural tube.

Var. *γ.* ALBINA.

T. præcedenti simillima, sed differt anfr. ultimo prælongo torto, albo-cinereo et nigricante variegato; anfr. primi badii, strigis et fasciis transversis albis; apertura intus alba; faucibus castaneis.

Diam. aperturæ $17\frac{1}{2}$ m.

Hab. Ins. Philippin (*Mus. Cuming*).

Very like the preceding variety in sculpture and shape, but more slender; the brown and blackish colour become mixed with white towards the aperture, which outside and inside is surrounded by a broad, pure white band.

Testa semiadultæ?

? *Siphonium giganteum*, Adams, Gen. t. 38. f. 7 *a.*

? *Siphonium carinatum*, Q. & G., *ibid.* p. 371. lin. 17.

The figure quoted is perhaps from a young specimen of this species. The var. *a.* of *Siphonium margaritarum* looks, also, very like it, and will perhaps have to be removed to this genus.

Var. *δ.* AGGLOMERATA.

T. contorta, picea, agglomerata, aperturam versus tenuiuscula; apertura subsoluta.

Diam. specim. maximi 12 m.; diam. specim. minimi 8 m.

Hab. Ins. Philippin (*Mus. Cuming*). A rolled group, composed of about fifteen specimens, in some of which the aperture forms a very short tube.

Var. *c.* LÆVIUSCULA.

T. solitaria, crassa, spiraliter torta; anfr. duobus contiguis, latere externo angulato; anfr. ultimus angustus, longus, teres, leviter flexus; laminae incrementi appressæ, irregulares, localiter valde arcuatim reductæ; color badius vel castaneus, variegatus: liræ longitudinales desunt, si excipias vestigium obsoletum in anfr. primo.

Diam. aperturæ circ. 10 m.

Tubuli vermium perpulchri, Pp. Seba, t. 93. f. 9 (optime).

Le Tuyau trompette, Favanne, i. p. 596.

Hab. In India orientali (*Mus. Spengler*).

This specimen has narrower whorls than any of the preceding varieties. It has evidently grown in the cleft of some *Astræa*, showing just the same impressions as represented by Seba, and which Guettard (Mém. p. 153) has mentioned as "le réseau." The striæ of growth are very strongly bent backwards in the places where the shell has been pressed by the coral.

13. THYLACODES? IMBRICATUS, Dkr.

T. solidiuscula, antice subrecta et libera, vel toto ventris latere incumbens, pallide fusca, striis costisque longitudinalibus subimbricatis instincta (Dkr.).

Vermetus imbricatus, Dkr. Mal. Blätt. Jan. 1860, p. 240. no. 59; Dkr. Moll. Japon. 1861, p. 17. no. 80, t. 11. f. 18.

Hab. Japonia, Dr. Nuhn (*Mus. Heidelb.*).

Duo specimina extant ad basaniten paullo porosum affixa. Testa eorum solidiuscula, turbinata, altera antice suberecta et libera, altera toto ventris latere incumbens et lapidi adnata. Utrumque specimen maximam partem decoloratum est et erosum, sed alterum eorum aperturam versus omnino illæsum, colore fusco costisque longitudinalibus imbricatis instructum, qua nota a *V. gigante*, Biv., differre videtur, quem nunquam imbricatum invenimus, quamvis mirum in modum variare soleat ut omnes ejus generis species. Tubus plane teres, intus lævigatus et cæruleo-lacteus. Pars testæ in lapide insidens irregularis et subtrigona est ut *Vermetus gigas*.

This species is perhaps a *Siphonium*.

14. THYLACODES SCABER, Gravenh., 1831.

T. irregulariter spirali, tuberculis parvis in lineas longitudinales dispositis, scabra (Gravenh.).

Diam. aperturæ 4 lin. (Gravenh.).

T. irregulariter planorbiformis; anfr. primi repentes, laqueatim contorti; anfr. teretes, liris longitudinalibus expressis planiusculis nodulis elongatis postice contractis unde leviter undulatis; interstitiis angustis lirula intercalante; liræ incrementi parvi, rugæ transversæ sæpe validæ, irregulares; latere affixo inæquali

noduloso liris destituto; apertura circularis, subsoluta; color albus, punctis ferrugineis paucis obsoletissimis; faucibus juxta aperturam macula castanea; hic illic lapillis agglutinatis.
(Descriptio ex specimine originali Musei Wratislaviensis.)

Vermicularia scabra, Gravenh. Tergest. p. 55. no. 2.

Hab. Ignot.; Lusitania?

The locality is very doubtful, as most of the species described in the work quoted, according to the original specimens, for the loan of which I am indebted to Professor Grube, are from the West Indies. The brown spot in the aperture and the size of the shell remind one of *Siphonium nebulosum*; but the sculpture is quite different, and in this respect it approaches to the next species. In the collection of Charles VIII. is a specimen with a long apertural tube, probably from Portugal, which is very like it.

15. THYLACODES DECUSSATUS, Gm., 1791.

T. teres, decussatim striata, subrugosa, flexuosa, sanguinea, intus lævis alba.—Gm.

Vermiculus rufescens leviter striatus sive cancellatus, Lister, t. 547. f. 4.

Vermiculus barbadiensis tortilis fuscus, Mem. for the Curious, 1708, p. 126. no. 32; Petiver, Gazophyl. i. t. 153. f. 9 (copy).

Tubulus vermicularis testaceus, Mart. i. f. 17 (copy).

Le Bois de Charme, Favan. i. pp. 597, 652, t. 6. f. L (copy).

Serpula no. 8, Schröt. Einl. ii. p. 558.

Serpula decussata, Gm. S. N. p. 3745. no. 21; Dillw. p. 1082; Wood, Index, t. 38. f. 30.

? *Tubulus marinus*, Gualt. t. 10. f. 10.

Serpula, Humphr. Conch. t. 10. f. 15, 15 a.

Vermiculus, Da Costa, Elem. p. 284, t. 2. f. 7 (copy).

Vermicularia glomerata, var. 2a, d, Gravh. Tergest. pp. 60, 61, pp.

Vermetus (Dofania) decussatus, Mörch, J. de Conch. viii. p. 34.

Serpulorbis, sp., St. Jan., Troschel, Gebiss, p. 155, t. 13. f. 2, 3 (maxilla et lingua).

Hab. I. Barbadoes (Lister); St. Thomas (Krebs, Riise, Hornbeck).

T. crassiuscula varie torta, solitaria; anfr. teretes, soluti vel interdum contigui et tum inferne plani; liræ longitudinales regulares, expressæ, latiusculæ, alternatim minores, interstitiis sæpe lirula parva; striæ incrementi sæpe submembranaceæ, in intersectionibus arcuatæ vel squamulosæ, remotæ, inde interstitiis fenestratis; rugæ transversæ validiusculæ, irregulares, inde lateribus fluctuatis; color valde variabilis, latere affixo plerumque castaneo, latere superiore albo, maculis punctivæ sæpe transversim confluentibus castaneis vel flavis, sæpe unicolor castaneus, intus infumatus.

Diam. aperturæ circ. 6 m.

Animal filamentis pedalibus contractilibus breviusculis basi dilatatis; mesopodium sulco profundo longitudinali divisum; metapodium truncatum, subcirculare, transversim subtiliter rugosum, centro impresso, utrinque freno cum capite conjunctum. Color

saturate rufus, præsertim superne, margine pallii linea flava notato (ex icone Oörstedii).

Var. β . TENUIS.

T. tenuiuscula, albescens, liris longitudinalibus validioribus remotis, interstitiis liris tribus inæqualibus; striæ incrementi flavæ, leviter undulata.

Diam. aperturæ circ. 6 m.

Vermicularia glomerata, Gravenh. Tergest. p. 60.

Jun.? *Vermicularia scabra*, Gravenh. Tergest. p. 56 (two fragments).

Hab. I. S. Thomæ (*Coll. nostra*).

Var. γ . INTERMEDIA.

T. tenuis, alba, liris longitudinalibus obsoletissimis, striis incrementi pallide flavis; fasciis pallidissimis longitudinalibus juxta aperturam.

Diam. aperturæ 5 m.

Hab. Ins. Jamaica (*Mus. Cuming*).

This shell is a good transition between the type and

Var. δ . LÆVIGATA.

T. solitaria, crassa, solida, lævigata, liris destituta, candida, interdum aperturam versus castanea vel badia; striæ et rugæ incrementi obsoletissimæ; anfr. ultimus plerumque porrectus, intus flavescens vel castaneus.

Le Villebrequin, Favan. i. p. 598, t. 5. f. G.

Serpula proboscidea (ochracea et alba), Gravh. Tergest. p. 78.

?*Vermetus porites*, Rouss., Chenu, Ill. pl. 2. f. 3, d, e.

Hab. I. S. Thomæ, in coralliis (*Heteroporis*) sæpe una cum *Siphonio nebuloso (Mus. Cuming et nostro)*.

This shell looks so different from the type, that I should not venture to put them together if I had not compared numerous specimens, in some of which the difference of sculpture and colour were present in one and the same individual. The tubes show frequently a deep channel at the affixed side, being the cast of a branch of a coral.

Var. ϵ . PHILIPPINENSIS.

T. crassiuscula, laqueatim contorta; anfr. inferne plani, lateribus dilatatis, badii vel castanei, superne albescentes punctis flavis transversaliter confluentibus; liræ longitudinales nodulis minutissimis, aperturam versus evanescentes; interstitia lirulis 1 vel 2 inæqualibus; striæ incrementi regulares, leviter undulata, pulcherrimæ.

Diam. aperturæ $7\frac{1}{4}$ m.

Hab. Ins. Philippin. (*Mus. Cuming*).

This shell seems only to differ from the type in its larger calibre and in the beauty of the striæ of growth.

Var. ζ. BADIA.

Differt a præcedente T. angustiore crassiore et colore badio.

Diam. aperturæ 4 m.

Hab. I. Philippin. (*Mus. Cuming*, specimen detritum).

16. THYLACODES SQUAMIGERUS, Carp.

T. majore, flavido-albida, solute spirali, plerumque glomerata; superficie costis spiralibus, squamis instructis, costulis pluribus intercalantibus; squamulis minoribus; squamis et squamulis imbricatis; interdum aperturam versus sculptura obsoleta (Carp.).

Aletes squamigerus, Carp. Proc. Zool. Soc. 1856, p. 226; Carp. Report, p. 324.

Hab. St. Barbara (sp. magn. glomer. in *Mus. Nuttall*); St. Diego (*Mus. Gould*).

A fine group of this shell is in Mr. Nuttall's collection. It agrees in the main with the Mazatlan species, but differs in colour and sculpture. Mr. Nuttall believes that he found another species without scales. (*Carpenter*.)

I refer this shell to the present genus, because I believe it is specifically identical with the following variety.

Var. α. PENNATA.

T. solitaria, tenuis, laqueatim torta, aperturam versus ampliata; anfr. inferne inæquales, planiusculi; liræ longitudinales compressiusculæ, noduloso-serratæ, alternatim minores, interstitiis interdum lirula parva intercalante; liræ incrementi sæpe castanei vel badii, conferte anguloso-undatæ, pulcherrimæ, præsertim si versus lucem teneas, in intersectionibus lirarum incrassatæ, unguiculatæ, squamiferæ; apertura orbicularis. Color inferne albus, fascia violaceo-fusca, superne flavescens; lineæ hic illic badiæ vel nigræ strigisque transversis flexis; anfr. primi castanei; faucibus albis, macula badia inferne juxta aperturam.

Diam. aperturæ 10 m.

Vermetus margaritarum, Voy. de la Vénus, pl. 11. f. 2 (fig. minor); Chenu, Ill. pl. 4. f. 2 (copy).

Hab. California (*Mus. Cuming*).

This shell differs chiefly from *T. decussatus*, Gm., which is its West Indian analogue, in the larger calibre of the whorls. The striæ of growth are bent in a beautiful manner, giving the liræ a pennate appearance, which is best seen when the shell is held against the light. Although Carpenter does not mention the transverse black lines, yet I suppose that this shell is the young of *Aletes squamigerus*, because Carpenter (Cat. p. 303) states that the *Aletes centiquadrus*, var. *imbricatus*, has some characters in common with the young of the great Californian Vermetid *Aletes squamigerus*. The figures quoted are exceedingly like the variety, but the whorls are somewhat too narrow.

17. THYLACODES MICHAUDII, Rousseau.

Vermetus michaudii, Rouss., Chenu, Ill. pl. 2. f. 5.

Hab. —? (*Mus. Cuming*).

Diam. circ. 6 m.

In Mr. Cuming's collection is a specimen labelled "Philippines," which seems to correspond pretty well with the figure quoted; it has the same annular ribs and longitudinal striæ, but is nearly covered over with a chestnut-brown colour, showing some darker longitudinal bands. The specimen is singular from possessing a long *varix maniciformis*, with about 12–13 false septa (analogous to those of the water-clam), proving that the animal has changed the direction of its tube at least as often as indicated by the septa.

18. THYLACODES PORITES, Rousseau.

T. tenuis, repens, teres, longitudinaliter subtilissime striata; stricæ incrementi obsoletissimæ, confertissimæ; sulci incrementi regulariter remoti, interstitiis convexiusculis; faucibus sæpe flavescens.

Diam. $3\frac{1}{2}$ –4 m.

Vermetus porites, Rouss., Chenu, Ill. pl. 2. f. 3.

Hab. —? On a *Porites*, according to the specific name; but I believe the coral represented is a *Palmipora*, Blainv., as in my specimen.

This species is exceedingly like *T. decussatus*, var. *intermedia*, if it really be different. It is chiefly distinguished by the annular, equidistant, rather remote annular sulci, the interstices of which are very slightly convex and decussate. This shell is the only one I know which seems to approach to Gualtieri's tab. 10. f. L, L.

19. THYLACODES PROTENSUS, Gm.

T. nitida, læviuscula, annulatim plicata, finem versus parum attenuata, lactea, exalbida aut cærulescens, calami anserini crassitie aut tenuiore, tota porrecta, aut partim flexuosa (Gm.).

Tubulus cylindricus, subflexuosus, anguinus, Mart. i. pp. 24, 46, f. 12A.

Serpula protensa, Gm. S. N. p. 3744. no. 20.

Hab. In mari Indico et Americam alluente (Gm.).

Gmelin has taken his description from Martius, but the locality from Rumphius and Davila. This shell is perhaps identical with the preceding and following species. It is chiefly from the expressions "*T. nitida*" et "*cærulescens*," that I refer this species to the *Vermetidæ*.

20. THYLACODES RUMPHII, Blainv., 1828.

"Coq. tubulaire, irrégulièrement contournée, si ce n'est à sa base qui s'avance presque à droite ligne, élégamment treillisée dans tout son étendu sans carène; de couleur roussâtre. Je distingue cette espèce d'après un individu de ma collection, dont j'ignore la patrie, et qui certainement ne peut être réuni au *S. protensa*, Lam."—*Blainv.*

Een entgestrekte Hornschlange, Rumph, t. xli. p. 126. no. 3.

Tubulus vermium, Petiv. Gazophyl. Amb. t. 21. f. 18 (copy).

Le tuyaux cordé, Favanne, i. p. 676, t. 5. f. F (copy).

Serpula protensa, Dill. ii. p. 1085. no. 38 (non Gm., nec Wood, f. 37).

Hab. —?

As the shell of Rumphius is marked with a number, it need not be from Amboina. The description of Favanne has much in common with Blainville's, chiefly in respect of the colours and septa; it is perhaps even from the same specimen. It is possible that this species is identical with the two preceding.

The annular rings in Rumphius' figure, and the reddish colour mentioned by Favanne and Blainville, remind one of *T. michaudii*, var. from the Philippines.

21. THYLACODES? ORYZATA, Mörch.

T. libera, agglutinans, repens, alba vel pallide isabellina, hic illic lineis interruptis et punctis obsoletis rufis; anfr. primi parvi, angusti, candidi, oblique spiraliter torti, contigui, liris longitudinalibus et transversis æquidistantibus et subæqualibus decussatis, inde interstitiis foveis quadratis; anfr. cæteri continui, sigmoidei, aperturam versus rapide crescentes, liris obsoletis longitudinalibus leviter spiraliter tortis, tuberculis acutiusculis subremotis ornatis; interstitia lirulis planis confertis inæqualibus 5-6; striæ et rugæ incrementi parvæ, flexæ, in intersectionibus minutissime granuloso-squamosis; apertura circularis, faucibus regulariter scrobiculatis (ex tuberculis externis).

Diam. aperturæ 12 m.; long. testæ 300 m.

Hab. Litt. occid. Am. centralis verisimiliter; China (*Mus. Cuming*).

The first spiral whorls are attached to a valve of a *Balanus*; towards the aperture is agglutinated a worn portion of a *Venus*, which looks to be *V. subimbricatus* (Sow.), and a little bit of a *Cardium*, which perhaps is *C. senticosum* (Sow.), both species from Panama, which probably is the true locality, as it is of the variety. The sculpture of this remarkable shell is very like that of *Argonauta oryzata*, Meusch.; like the latter shell, the tubercles outside form excavations inside. This sculpture is, too, very like that of the young of *Stephopoma*. The longitudinal liræ become feebler towards the aperture, in proportion to the size of the shell. The nodules are often united in pairs by small transverse ridges, but never form rings, as in the

Var. a. ANNULATUS.

Tubus crassus, ponderosus, teres, æqualis, liris longitudinalibus parum expressis tuberculiferis, interstitiis liris circiter tribus, mediana lira validior; striæ incrementi minutissimæ undulatæ; tubercula annulatim digesta; annuli subvaricosi, utrinque arcuati, sæpe interrupti vel furcati.

Long. tubi circ. 170 m.; diam. aperturæ 13 m.; diam. testæ 17 m.; diam. aperturæ fractæ 10 m.; testæ postice 13 m.

Hab. Ad Panamam (*Mus. Cuming*).

This shell seems to be a very old specimen; it has just the same sculpture, only differing in a few points; the longitudinal liræ are straight and not slightly spiral; the nodules are arranged in rings, separated from each other by constrictions. Both ends are fractured, so that it might have been possibly still larger. The walls have a thickness of 2 or 3 m., whilst the type is very thin, nearly pellucid. If this tube really is the same as the type, it must grow to a length of about 60 dm. I refer this species to the present genus, merely on account of the sculpture of the first whorls.

It is, in respect of thickness, most allied to *T. melitensis*, Gm.

Subg. TETRANEMIA, Mörch, 1859, Journ. f. Conch. viii. p. 353.

Filamenta pedalia longissima, subulata, non contractilia, mammilla valida intermedia; mesopodium parvum, elongatum, postice filamentis brevissimis obtusis duobus basi remotis (ex icone).

22. THYLACODES (TETRANEMIA) LONGIFILIS, Mörch.

T. repens, laqueatim contorta, fusco et flavo variegata, longitudinaliter lirulata, liris 3-4 validis remotis; apertura transversim subovalis, intus cyanea (ex icone).

Vermetus dentiferus, "Lam." Q. & G. l'Astr. p. 291, t. 67. 27, 28.

Vermetus dentiferus, Desh. ix. p. 65, non Lam.

Serpuloïdes dentifera, Gray, Fig. t. 56. f. 8, iv. p. 83; Gray, Guide, p. 127.

Serpulorbis dentifera, Adams, Genera, i. p. 359.

Serpulorbis dentiferus, Chenu, Man. p. 320, f. 2307; Pictorial Museum, f. 2821; Ill. Ntg. f. 3745.

Hab. Bai des Chiens Marins à la terre d'Endracht, sur une *Avicula* (Q. & G.).

Subg. HATINA, Gray, Proc. Zool. Soc. 1847, p. 156.

Animal rostro conico, tentaculis crassis flexis postice in figuram cordiformem desinentibus; metapodium magnum, cylindricum, truncatum; filamenta pedalia desunt; penis subulatus (ex icone).

Hatina, Gray, Brit. Mus. Cat. 1842, p. 62, no operculum.

23. THYLACODES (HATINA) INOPERTUS, Mus. Francof. 1828.

T. satis crassa, postice spiris nonnullis majoribus finiente, colore æruginoso.

Mensura: usque ad 2''; animal 1½'' (Leuck.).

Vermetus inopertus, Rüppel & Leuckart, Neue wirbellose Thiere, p. 38, t. 11. f. 3 (Gray, Fig. i. t. 57. f. 1, copy).

Serpulorbis operculatus, Gray, Proc. Zool. Soc. 1847, p. 156.

Serpuloïdes inoperculata, Gray, Fig. iv. p. 83; Gray, Guide, p. 127.

Serpulorbis inoperculata, Adams, Genera, i. p. 359.

Hab. In mari Rubro, socialiter vivens prope vicum *Tor* lapidibus affixus, reperitur (*Rüppel*).

If this species can be generically distinguished, it would chiefly be on account of the heart-shaped shield over the head, like that of *Siphonium maximum*, represented by Quoy and Gaimard. It wants the pedal filaments, in common with *Cladopoda* and *Limintina*; from the former it is distinguished by the circular tip of the metapodium, and from the latter by wanting the radiation of the foot.

Subg. LEMINTINA, Risso, 1826.

Lemintina, Risso, Hist. iv. p. 433; Gray, Proc. Zool. Soc. 1847, p. 156, et Fig. iv. p. 83, 1850.

Dr. Gray (Guide, p. 127) regards this genus as "probably only a badly described and figured *Serpuloïdes arenarius*;" but the shape of the metapodium seems so remarkable to me that I cannot believe that it is invented. The *Vermetidæ* have been so neglected that it is not impossible that a similar form may exist.

24. THYLACODES (LEMINTINA) CUVIERI, Risso.

T. cylindrica, subspiralis, unilocularis, ad extremitatem posteriorem clausa; apertura rotunda (Risso).

Animal limaciforme, postice vermiforme; tentaculis subulatis; oculi subsessiles, nigri; branchiæ albæ super capite locatæ; pes cylindricus, truncatus, superficie lævi rubra, flavescente radiata, pallio fimbriato ruberrimo (Risso).

Lemintina cuvieri, Risso, Hist. iv. p. 114, t. 2. f. 16-18; Gray, Fig. t. 57. f. 3, p. 83.

Hab. Sur les rochers peu profonds (*Risso*).

The figure of the shell does not show any longitudinal striæ; the description seems more natural than the figure, which is chiefly remarkable from the radiated metapodium dentated at the edge.

Subg. CLADOPODA, Gray, 1850.

Operculum none; foot elongate, front end simple, hinder extremity oblong, clavate or subtruncate (*Gray*).

Cladopoda, Gray, Fig. 1850, p. 83; Guide, p. 127.

This genus is chiefly founded on the elongated shape of the hinder part of "the foot," which, in the 'Voyage de l'Astrolabe,' is represented as fiddle-shaped (*pes panduriformis*), like the foot of *Lacuna*; but, from analogy with the other *Vermetidæ*, it must be the tip of the metapodium unusually enlarged. In specimens in spirits of *T. polyphragma* the metapodium is sometimes of an expanded shape; I suppose therefore that this character is not of generic value. The

pedal filaments seem to be rudimentary, as I suppose they are described by Quoy and Gaimard thus :—"En avant de la bouche, sont deux petits tubercules assez courts." The eyes in the *typical* species are represented, differently from those of all other *Vermetidæ*, at the middle of the tentacula. The annular figure is also peculiar.

25. THYLACODES (CLADOPODA) GRANDIS, Gray, 1842.

"Notre individu, de seize lignes de diamètre, bien discoïde, ce qui n'existe pas toujours, est aplati en dessous, arrondi en dessus, rugueux, strié dans la longueur, avec deux ou trois côtes tuberculeuses. Sa couleur est jaunâtre sale. Son ouverture, parfaitement ronde, est lisse et violacée en dedans."—Q. & G.

"L'animal a un écusson céphalique, long et ovalaire, les tentacules courts, portant les yeux à une certaine distance de leur base. En avant de la bouche, sont deux petits tubercules assez courts. Le pied, qui manque d'opercule, présentait la particularité suivante : il se relevait au devant de la tête en forme de croc. Le pied a des taches blanches en avant. Le manteau, qui est blanc, a son bord brun. Plusieurs individus avaient la tête blanchâtre, quelques uns avaient le manteau jaune. Un seul avait la tête entièrement noire, et un autre rougeâtre."—Q. & G.

V. (à grand tube) *arenarius*, Lam., Q. & G. l'*Astrolabe*, 1833, ii. p. 289, t. 67. f. 18-20.

Vermetus grandis, Gray, Fig. i. p. 29.

Cladopoda grandis, Gray, Fig. iv. p. 83, t. 56. f. 9.

Cladopoda arenaria, Q. & G., Adams, Genera, p. 359, t. 39. f. 3.

Cladopoda grandis, Q. & G., Adams, Genera, p. 359.

T. juv.? *Cladopoda arenaria*, Chenu, Man. p. 320, f. 2302 (shell).

Hab. Le port du Roi-Georges, par d'assez grandes profondeurs, sur d'autres coquilles (Q. & G.).

The shell figured by Dr. Chenu is very different, chiefly in size, from that represented in '*l'Astrolabe*;' but is very like to a shell creeping on *Cookia inaequalis*, Martyn, from New Zealand, in the Royal Museum, probably obtained by Humphrey.

In Mr. Cuming's collection is a rather larger specimen of a shell, without locality, marked 1/6, probably from some old collection, which I provisionally refer to this species on account of the colour and its resemblance to *V. arenarius*, Q. & G. It reminds one too of *T. longifilis*, but it is twice as large as any of the specimens represented.

Var. a. OXYGONA.

T. primum laqueatim deinde annulatim torta, dura; anfr. ampliati, rapide crescentes, superne flavo et cinereo variegati, liris remotis circiter 6-8 umbilicum versus (2-3) fortioribus, nodulis obsoletis subasperis remotis; interstitia lirulis planis confertissimis 5-8; striæ incrementi confertæ, minutæ, in intersectionibus arcuatæ, interstitiis scrobiculato-punctatis; latere affixo tenui, lævigato, cinereo striato, externo destituto planiusculo;

periphæria acutissima, leviter expansa; apertura affixa, in anfr. penultimo reniformi-ovalis, intus albescens, margine interno in-crassato; anfr. primi intus castanei, desepimentis tenuibus convexis.

Latitudo aperturæ 16–18 m.; altitudo aperturæ circ. 14 m.; lat. anfr. lateris affixi circ. 20 m.

The specimen shows traces of a soft yellowish stone, on which it has been affixed. On some places are traces of small reddish spots. It is very like *T. colubrinus* in size and sculpture.

26. THYLACODES (CLADOPODA) ELEGANS, Q. & G. 1833.

Animal corpore cinereo; tentaculis, capite et pede rubro maculatis.

Testa ignota (Q. & G.).

L'animal a la tête courte, jaune, ponctuée de rouge vif; deux lignes de cette couleur, en chevron brisé, occupent l'intervalle des yeux. La partie antérieure de la tête et le pied sont d'un joli gris clair; ce dernière est bordé et ponctué de rouge; les tentacules ont une ligne en long de cette couleur. Le bord du manteau et de la bouche sont également rouges.

Vermetus elegans, Q. & G. l'Ast. ii. p. 293, t. 67. f. 11, 12.

Cladopoda elegans, Gray, Fig. iv. p. 83, t. 56. f. 4; Adams, Genera, i. p. 359.

Hab. —? The locality is not indicated.

This species differs chiefly from the preceding in the regular position of the eyes.

27. THYLACODES (CLADOPODA) ZELANDICUS, Q. & G.

Animal capite nigricante, rubro punctulato; limbo pallii aurantiaco; pede rubro punctato.

“La tête est jaunâtre en arrière, brune et ponctuée de rouge en avant. Le pied est seulement jaunâtre, avec des taches rouges; le manteau est largement bordé d'un orange vif.

“Le tube, contourné sur lui-même, ne nous a point offert de caractères appréciables sur le moment.”—Q. & G.

Vermetus zelandicus, Q. & G. l'Astr. p. 293, t. 67. f. 16, 17.

Vermetus novæ zelandiæ, Gray, Fig. i. p. 28, t. 56. f. 6.

Cladopoda novæ zelandiæ, Gray, Fig. iv.; Guide, p. 127.

Cladopoda novæ zelandiæ, Q. & G., Adams, Gen. i. p. 360.

Hab. La baie des Iles, à la Nouvelle Zélande (Q. & G.).

It is only with doubt that the authors of this species have distinguished it from the preceding.

Additions and Corrections.

BURTINELLA TURBINATA (SERPULA), Phil. (P. Z. S. 1861, p. 148.)

According to specimens in Mr. Semper's collection, this species is entirely different from *B. nystii*, Galeotti, and nearly allied to *Hy-*

droïdes norvegica, Günth.,—the variety described by Montagu as *Serpula reversa*, Mont.=*S. contorta*, Brown, Ill. t. 2. f. 4.=*Heterodisca reversa*, Flem. It is a true Serpulidous shell.

3 a. STEPHOPOMA, n. sp. (See P. Z. S. 1861, p. 148.)

In the collection of Charles VIII. is preserved a lid distinctly spiral, of a brown colour, convex inside, and provided outside with long bristles, very like those of *Stephopoma senticosum*, Mörch (Proc. Zool. Soc. 1861, pl. 25. f. 2), but having all the lateral spines simple, without any accessorial spines. It is mounted on mica, and labelled by the late Rev. Mr. Lyngby as the lid of a *Serpula* found on the egg-case of *Raia batis* (in Danish "Tærbe"). That it really was found in the Kattegat, near Gilleleie, which was his parish, is probable from the circumstance that he has added the *Danish specific* name to a fish of which several congeneric species are described in his MS. "Rariora Codana" with Danish specific names. Unfortunately I cannot find his diary, in which it is more particularly described according to the ticket. The study of the Worm-tubes is so neglected that I do not regard it impossible that a Vermetid may be found in the Northern Seas. Perhaps it may prove to be the *Spirorbis striatulus*, Brown (Ill. pl. 1. f. 59), which is from Dunbar, in Gen. Bingham's collection.

3 b. STEPHOPOMA ARCHIMEDIS, König. 1842-44.

T. subcompressa, spirata; anfractibus quinque, ultimo remoto; superficie plicato-rugosa; orificio ovali.

Serpula archimedis, König, Carb. p. 57, t. 9. f. 6.

Serp. spinosa, Kön. Carb. p. 58, t. 9. f. 8 (T. juvenilis).

T. depressa, planorbiformi, anfractibus quatuor, contiguis, sensim incrassatis, spinis in quincunces dispositis, obductis (De König).

Hab. Fossil in the Mountain Limestone, at Vise (König).

The supposed young shell is from the clay of Tournay. The form of the aperture and the flexure of the striæ of growth are quite that of *Stephopoma*. The sculpture of the supposed young shell can only be compared with the embryonic shell of *Stephopoma senticosum*, Mörch (Proc. 1861, pl. 25. f. 14), which circumstance has guided me in giving it the present place.

It is probable, from the appearance of a group of *Vermeti* on a *Chama* (in the Museum Regium), that *Siphonium textum*, M., *S. scaphitella*, M., and *S. pictum*, M., are different ages of *S. subcrenatum*, Lam., corresponding to the different forms of *Siph. nebulosum*, Dillw.

Erratum, P. Z. S. 1861, p. 180, line 6 from bottom, for *squamas confertas fornicatas amplexentibus*, read *squamis confertis fornicatis amplexentibus*.

February 25, 1862.

Dr. J. E. Gray, V.P., in the Chair.

Mr. Leadbeater exhibited a Hybrid Duck between the Pintail and the Teal (*Anas acuta* and *Querquedula crecca*), and a hybrid between the Common and Silver Pheasants.

Dr. Hamilton exhibited a female example of the Grey Hen (*Tetrao tetrix*), which had partially assumed male plumage.

Dr. Cobbold exhibited and made some remarks upon a specimen of a curiously malformed Trout.

The Secretary read the following extracts from a letter addressed to him by Dr. George Bennett, F.Z.S., dated Sydney, December 20th, 1861:—

“Two ‘Kagus’ (*Rhinochetus jubatus*) arrived from New Caledonia, December 11th, in H. I. M. schooner ‘Gazelle.’ One of them is for myself (from my friend D. N. Joubert, Esq.), the other has been presented by the commander of the schooner, Capt. Hardy, to the aviary in the Botanic Gardens. I intend sending my specimen home by an early vessel, of which I will inform you by the next mail. I intend requesting Mr. Moore, the director of the gardens, to send you also the other specimen; but if he accedes to my request you will have to send some bird in exchange, as, being Government property, that is the only way in which he can dispose of it. Mine, of course, I present to the Society. The birds differ a little in size, which may probably be a sexual distinction. They appear to be young, and run about in a very lively and active manner, elevating their wings alternately, and at the same time raising their crests to their utmost expansion. This more particularly occurs when making an attack upon any of the birds in the same compartment of the aviary. A young Nankin Heron in speckled plumage, and the “Weka,” or New Zealand Rail, are the more immediate objects of attack. At the latter bird the Kagu rushes and pecks, driving it to the further corner of the aviary. The *Dacelo*, or Laughing Jackass, and the *Corcorax leucoptera* also come under its enmity, but not so frequently as the two former birds, as these can readily fly on to the perches out of its reach, for I have not as yet seen the Kagu use its wings for flight.

“The Kagu sleeps with its head under the wing, and also occasionally reposes with the head sunk between the shoulders. It feeds on meat cut small, intestines of fowls, snails, worms, &c. Mr. Joubert fed his bird at New Caledonia on worms collected by the natives for the purpose, and says that it ate nearly a quart in one day. It seems to be an active bird, and although it is said to be very shy in a wild state, becomes very tame soon after it is captured, and appears easily reconciled to captivity.

“ We get plenty of Koalas, or Native Monkeys (*Phascolarctos cinereus*). These animals are very tame, and have been fed some time on gum-leaves (their natural food), some on bread and milk, &c., but still they do not survive longer than six weeks at the furthest. They die plump and in excellent condition; so it cannot be starvation that kills them. Not a week passes but I could purchase them of all ages for from 10s. to 15s. each, as they are brought by the coasting vessels from the Patterson and other parts of this colony. I propose, as soon as we have a piece of ground allotted for our Acclimatization Society, to enclose some trees with zinc wire and give them liberty within its range, and see if by such a method we shall be enabled to domesticate them, and find some method of feeding them, so as to send them to Europe.

“ We have not yet procured any male Brush-Turkeys, but have sent orders to various parts of the colony, more especially the Clarence River district. We intend to domesticate them, so as to keep up a supply for exchanges. These birds are everywhere becoming scarcer, from the wholesale destruction of them and their eggs by the aborigines, and we find the only sure means of procuring either eggs or birds is by the aid of the blacks.

“ Two fine young and healthy specimens of a Hornbill (probably *Buceros ruficollis*) were brought from the Island of Guadalcanar, one of the Solomon group, in the schooner ‘Coquette,’ as also an elegant Pigeon from the same island, and a species of Gallinule from Tanna (New Hebrides group), called ‘Tarbach’ by the natives of Sandwich Island (another of the same group), and ‘Bush-fowl’ by the missionaries at Tanna. They are all alive, and were brought by two Belgian gentlemen (Captain Mechel and M. R. Alain), who have placed them in my charge to be transmitted to you for the Duc de Brabant. I have accepted the offer, as, if they arrive alive, you and Mr. Gould will be able to inspect and, if new, describe them. I intend sending them with the Kagus.

“ These birds have been fed principally on yams, potatoes, bread, and bananas, and occasionally a very minute portion of meat. The plumage of the head, neck, and breast is of a light auburn-brown colour, and the rest of the plumage of a beautiful black, except the tail, which is white. The naked portion round the eye is of a light blue colour. The naked portion of the throat and cheeks is white, with a delicate shade of light blue. The eyelids are of a reddish tinge, and eyelashes long. Irides of a light grey colour. The mandibles are horny, of a dirty white colour, but near the base a tinge of dark red colour prevails. The feet and legs are black.

“ I intend sending Mr. Gould, by the ‘La Hogue,’ an egg of a species of *Megapodius*. It measures 3 inches in length and $1\frac{3}{4}$ inch in breadth, and is of a light brownish or ‘café-au-lait’ colour. The eggs are found over all the islands of the New Hebrides group, and are eaten by the natives, as the eggs of the *Leipoa* and *Megapodius* by the aborigines of Australia. The egg in my possession was given to me by Captain McLeod, of the ‘Eliza K. Bateson,’ who procured it at the Island of Nua Fou, where it is named ‘Mallow’.

by the natives. The eggs are deposited by the birds in the sand about the borders of a large lake of brackish water situated in the middle of the island (evidently an extinct crater, as the soil in which the eggs are deposited consists of sulphureous sand), and are hatched by the heat generated in the mound, as in all the *Megapodidæ*. In Nua Fou Island the birds and eggs are, I am informed, under the protection of the king, and can only be procured by his permission. I have seen the same kind of eggs from the New Hebrides group. Captain McLeod has promised, on his return to the island in a few weeks, to procure me some of the birds alive or dead, when I shall be able to send you more accurate accounts."

The following papers were read:—

1. ON A NEW SPECIES OF MALACOPTILA FROM WESTERN ECUADOR. BY P. L. SCLATER, M.A., PHIL.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate VIII.)

A re-examination of my specimens of birds of the family *Bucconidæ* induces me to believe that I have confounded under the name *Malacoptila panamensis* (Laf.), which I assigned to a series of examples of this genus collected at Esmeraldas by Mr. Fraser, two species. One of them may probably be the true *M. panamensis* of Lafresnaye, though this must remain rather uncertain until the original of Lafresnaye's description shall have been accurately compared with it; the other I propose to call

MALACOPTILA POLIOPIS, sp. nov. (Pl. VIII.)

Cinerascenti-fusca, dorso toto et alarum tectricibus maculis triangularibus albidis distincte notatis; pileo et facie cinereis; fronte loris et plumis mystacalibus pure albis, his cinereo partim mixtis; laterum cervicis plumarum scapis elongate albido lineolatis: subtus alba, pectore toto pallide fulvo; ventre summo et lateribus cinerascenti-brunneo variegatis: reatricibus et remigibus clare nigricanti-brunneis; caudæ, ipsa immaculata, apice pallidiore, fulvescente: rostro plumbeo, mand. inf. in uno specimine ad basin flavida: pedibus fusco-nigris: tectr. subalaribus pallide fulvis.

Long. tota 7·0; alæ 3·5; caudæ 2·8; rostri a rictu 1·4 poll. Angl. et dec.

Hab. in reg. litt. reipublicæ Æquatorialis, Esmeraldas (*Fraser*).

Mr. Fraser procured two examples of this species when at Esmeraldas; and, as they are both marked females, I was induced to believe they might be referable to that sex of *M. panamensis* of which (or of a species which I have referred to this name) he procured several examples. I am now convinced that these two examples cannot be referred to *M. panamensis*, that species being wholly of a rich reddish brown above, and having a deep ferruginous chest and a much larger amount of white on the frontal plumes. This bird is,

in fact, more like *Mal. inornata* of the Vera Paz, from which, however, it appears likewise distinguishable on comparison, the latter having a rufescent tail, the breast of a less decided fulvous, and the fulvous colour more equably distributed over the lower surface.

2. DESCRIPTIONS OF BUTTERFLIES FROM THE COLLECTIONS OF
A. R. WALLACE AND W. C. HEWITSON. BY W. C. HEWITSON.

(Plates IX., X.)

NYMPHALIDÆ.

MYNES LEUCIS, Boisduval. (Pl. IX.)

This species was first described by Dr. Boisduval, in the 'Voyage of the Astrolabe,' under the name it bears above. It was also described by Guérin Méneville, in the 'Voyage of the Coquille,' under the same name, but is figured in the plates which accompany the work as *Nymphalis australis*. The figure there given is a very good one; but as it only represents the upper side, I have thought that a figure of its remarkable under side, together with some of the strange varieties into which it runs, from the rich collection of Mr. Wallace, may be of interest to those who make the Lepidoptera their study.

Greatly as the varieties of this insect differ above, they bear a much closer resemblance to each other on the under side, and do not wander very far from the accompanying figure.

The examples figured in the plate are all females. A male in my own collection, from Mysol, is entirely black, with the exception of the central spot of the posterior wing. I have described below all the varieties which I have with me, for the whole of which we are indebted to Mr. Wallace. They were all collected in the New Guinea group of islands. I have indicated each variety by a separate letter, following the good example of Dr. Boisduval in his 'Spécies Général,' not being myself able to see that any good whatever can arise from the modern custom of giving names to varieties and thus elevating them to the same importance as the typical species, from which they are sometimes scarcely to be known. On the contrary, I believe that it will produce great and endless confusion.

Var. A. ♂. Anterior wing black, spotless. Posterior wing black, with a large central bifid white spot, and two smaller spots between it and the inner margin bordered with grey.

Hab. Mysol.

Var. B. ♀ (Pl. IX. fig. 1). Anterior wing black, with a spot near the middle of the costal margin, two spots beyond the middle of the wing, and a submarginal band of eight spots all white. Posterior wing with the central spot quinquefid.

Hab. Dorey.

Var. C (Voyage Coquille, pl. 14 *bis*). Anterior wing black, with a small spot near the middle of the costal margin, followed by *two*

bands of rather large spots, all pale yellow; the first band irregular, of six spots; the second band submarginal, of eight spots.

Hab. Offack.

Var. D. ♀. Anterior wing black, with the white spot near the middle of the costal margin, a large bifid spot at the centre of the wing, a small spot below it and the submarginal band of white spots, two of which (the sixth and seventh) are obliterated. Posterior wing with the central white spot distinctly quinquepartite.

Hab. Batchian.

Var. E. ♀ (Pl. IX. figs. 2, 3). Anterior wing black, irrorated with grey, with the costal spot larger, the large central white spot tripartite; a band of four white spots between it and the costal margin, and the submarginal band of eight spots. Posterior wing with the central spot as in the last; the base and inner margin of the wing grey.

Hab. Batchian.

There is a further variety of this with all the spots the same, but yellow.

Var. F. ♀. Anterior wing dark brown; the base grey, with *two* white spots on the costal margin, the large central spot quinquepartite, *extending nearly to the outer margin, and absorbing two* of the white spots of the submarginal band.

Hab. Aru.

Var. G. ♀ (Pl. IX. fig. 4). Anterior wing black, with a broad, transverse, irregular, emarginate band of white extending from the costal margin nearly to the inner margin, connected on its outer side before the middle with one of two small white spots, and again near its anal angle with one of two white spots, the only spots of the submarginal band which are distinct, the other six being scarcely visible.

Hab. Dorey.

TERINOS TETHYS, n. s. (Pl. X. figs. 1, 2.)

Upper side: male, brown. Anterior wing dark brown, rufous at the base; the apex white, with its outer margin brown. Posterior wing rufous brown, paler towards the inner margin; the outer margin, from its middle to the anal angle, rufous white, traversed by two bands of lunular brown spots.

Under side rufous brown; both wings crossed by numerous undulating pale lines. Anterior wing with a line of brown within the cell, and one on each side of the discocellular nervules; the apex rufous white. Posterior wing with, below the middle, a transverse irregular band of oblong dark-brown spots, followed (between the middle of the wing and the inner margin) by three lunular orange-yellow spots; the outer margin beyond these rufous white, traversed by a pale-rufous band.

Exp. $3\frac{4}{10}$ inches.

Hab. Mysol.

In the collections of A. R. Wallace and W. C. Hewitson.

TERINOS TAXILES, n. s. (Pl. X. figs. 3, 4.)

Upper side : male, dark rufous brown. Anterior wing with a rufous spot near the apex. Posterior wing with the outer margin, from its middle to the anal angle, broadly rufous, marked by three dark-brown conical spots and an undulating dark-brown band.

Under side rufous brown ; both wings crossed by several pale undulating lines. Anterior wing with three lines across the cell—one on each side of the disco-cellular nervules, followed by a band of spots, all rufous brown. Posterior wing with some indistinct spots near the base, followed by two broken bands of rufous brown ; crossed beyond the middle by a band of five dark-brown spots, followed by a deeply indented band of rufous orange.

Female, dark rufous brown ; the outer margin of the anterior wing more emarginate than in the male. Anterior wing crossed beyond the middle by two undulating rufous bands, and a submarginal band of spots of the same colour ; the first of these bands commences near the costal margin with two sagittate spots. Posterior wing with the outer margin broadly rufous, clouded near the apex, traversed by six lunular spots and an undulating band of dark brown. On the under side it does not differ from the male, except in having a small white spot on the costal margin near the apex, and the outer margin of both wings much paler.

Exp. $3\frac{1}{2}$ inches.

Hab. Celebes.

In the collections of A. R. Wallace and W. C. Hewitson.

TERINOS TEUTHRAS, n. s.

Alis fuscis : harum anticis versus marginem costalem purpureo micantibus ; posticis purpureis, macula magna rosea quadripartita prope medium marginis costalis lunulis nigris notata.

Upper side : male, brown ; the portion composed of the plush-like scales dark brown ; the remainder of the anterior wing tinted with purple. Posterior wing tailed, purple, with a spot of rufous white near the middle of the outer margin divided into four by the median nervules, and marked by two or three brown lunules.

Under side light rufous brown, paler towards the margins. Both wings crossed beyond the middle by a continuous undulating band of white. Anterior wing with three rufous zigzag transverse lines across the cell, and a fourth oblique line marking the disco-cellular nervules and forming a triangle with one of the three bands just mentioned ; beyond the cell there is another rufous band, and below it two indistinct rufous spots ; a white spot, black in the middle, near the apex, and below it a submarginal band of white having its outer border rufous. Posterior wing crossed by two zigzag rufous bands before the middle, and, beyond the middle and the continuous band, by five rufous spots (the middle spot scarcely seen), followed by a zigzag band of orange, bordered on both sides with white.

Exp. $3\frac{3}{10}$ inches.

Hab. East India.

In the collection of W. C. Hewitson.

This species differs from *T. clarissa*, in the anterior wing, by having a larger portion of it covered with the plush-like scales. In *T. clarissa* they extend upwards very little beyond the lower discoidal nervure. In *T. teuthras* they go beyond the upper discoidal nervure. The two species are, however, so closely allied that I should have hesitated to describe this as a distinct species if I had not discovered that the third disco-cellular nervure meets the median nervure differently. In *T. clarissa* the lower disco-cellular meets the median at some distance before the base of its second branch; in *T. teuthras* exactly at the base of the said branch.

TERINOS TERPANDER, n. s.

Alis fuscis: harum anticis versus marginem costalem purpureo micantibus; posticis magna parte dimidii posterioris fulva, fascia anali nigra.

Upper side: male, brown. Anterior wing slightly tinted with purple near the costal margin. Posterior wing, without a tail, with most of its outer half pale orange, traversed *near the margin* and the anal angle by a curved brown band.

Under side rufous brown. Both wings crossed at the middle by a broad rufous band bordered on both sides with lilac-white. Anterior wing with some indistinct rufous bands near the base, bordered with lilac white, followed towards the anal angle by two other indistinct bands; a white spot near the apex. Posterior wing with two spots, a broad band, and a narrow zigzag band, all rufous and bordered on both sides with lilac white; crossed beyond the middle by a band of five brown spots, followed by a narrow zigzag rufous band bordered on both sides with brown, by a zigzag broad band of white, and by a narrow submarginal line of lilac-white.

Exp. $2\frac{3}{10}$ inches.

Hab. Borneo.

In the collection of W. C. Hewitson.

This species, which is much smaller than the others, is closely allied to *T. clarissa*. The plush-like scales extend above the higher discoidal nervure, as in *T. teuthras*; the lower disco-cellular nervure meets the median, nearly as in *T. clarissa*.

In this genus the nervures, which are generally closely examined as affording materials for generic distinction, give most valuable aid in determining closely allied species. I have in this paper described four new species of a genus which before contained but one, and find that they all differ in the position of the disco-cellular nervures. It would almost seem as if the variations of these nervures were only specific, as I have before found them a valuable aid in separating two very closely allied species of *Callithea*.

In *Terinos clarissa*, the lower disco-cellular nervure meets the median nervure *considerably before* the base of its second branch.

In *Terinos terpander*, the lower disco-cellular nervure meets the median nearly at the same point as in *T. clarissa*, but somewhat nearer the base of its second branch.

In *Terinos taxiles*, the lower disco-cellular nervure meets the median nervure *a little before* the base of its second branch.

In *Terinos teuthras*, the lower disco-cellular nervure meets the median nervure *at the base* of its second branch.

In *Terinos tethys*, the lower disco-cellular nervure meets the median nervure *a little beyond* the base of its second branch.

3. ON THE RED CORPUSCLES OF THE BLOOD OF VERTEBRATA, AND ON THE ZOOLOGICAL IMPORT OF THE NUCLEUS, WITH PLANS OF THEIR STRUCTURE, FORM, AND SIZE (ON A UNIFORM SCALE), IN MANY OF THE DIFFERENT ORDERS. BY GEORGE GULLIVER, F.R.S., PROFESSOR OF COMPARATIVE ANATOMY AND PHYSIOLOGY TO THE ROYAL COLLEGE OF SURGEONS.

The object of this communication is to give a summary of the value and import of the red corpuscles of the blood as regards systematic zoology, deduced from my observations published, piecemeal, during the last twenty-three years, in the 'Proceedings' of this Society and elsewhere. Such notices will be given of the labours of others in this interesting field, up to the year 1845, as the present confused state of physiological history may seem most to require.

The drawings now exhibited to the Society are selected from a much larger number in my possession, and are all on the same scale, exhibiting plainly to the eye the relative form and size of the corpuscles in 171 species of the different classes and orders of the Vertebrate subkingdom, and the difference of structure in the corpuscles of the two great divisions of this subkingdom—*i. e.*, 1, *Vertebrata apyrenæmata*, or Mammalia; 2, *Vertebrata pyrenæmata*, or Oviparous Vertebrata.

Structure of the Corpuscles of Apyrenæmatous Vertebrates.

In Man and other Mammalia there are two sets of red corpuscles. The first or temporary set disappears at an early period of intra-uterine life, and is replaced by the second or permanent set.

The corpuscle of the temporary set is composed of a vesicle including a nucleus, is larger than the corpuscle of the second set, and is, in short, a cell containing a nucleus. This cell is, both in structure and size, the true analogue of the red corpuscle of oviparous Vertebrata. (See Phil. Mag. for Aug., 1842, p. 107; and my Note to Wagner's Physiology, Lond., 1844, p. 242, fig. 148.)

The corpuscles of the second set are those which replace the first set, and, subject to waste and supply, are the red corpuscles of the blood from birth, and during the greater part of the period of utero-gestation, until death; and to these corpuscles the following observations will always be applied, unless otherwise expressed.

This corpuscle is not homogeneous, but is composed of a colourless membranous part, with a semifluid or viscid matter in which

the colour resides; and this matter, which forms the chief bulk of the corpuscle, is very soluble in water, while the membranous part is insoluble in water. The corpuscle is slippery, soft, elastic, and viscid; it will assume a variety of forms, and quickly return to its regular shape; and the corpuscles will stick together, not only in the well-known piles, but also by their edges. Dr. Hodgkin and Mr. Lister noticed the viscosity of the part of the corpuscles which had been ruptured by pressure; but Dr. Davy first clearly described the general viscosity of the entire corpuscles, which has been confirmed by the recent observations of Dr. Charles Robin, who appears to have been unacquainted with the observations just mentioned, so long before made in this country. I have observed that this viscosity of the corpuscles is much increased in buffy blood.

The regular corpuscle has no nucleus—nothing at all like that so plain in the corpuscle of oviparous Vertebrata. Even the oval corpuscle of Camelidæ has the true Mammalian type, both in size and structure, being of the small size usual to Ruminantia, and alike destitute of a nucleus; so that it is in shape only that these corpuscles resemble those of the inferior classes, as proved by me long since in the papers cited below. And as the history of what, in 1845, Mr. Wharton Jones appropriately called “this vexed question of a nucleus” is interesting and important in physiological literature, and seems never to have been clearly known, we may dwell a little on the subject.

The mistake of describing a nucleus in the red corpuscle of Mammalia arose from its central spot, and from the observers having seen the nucleus so plainly in the larger corpuscles of fishes and reptiles. Thus Hewson, using the corpuscles of the Skate to ascertain their structure, never entertained a doubt that the nucleus he saw so plainly—“like a pea in a bladder”—in the red corpuscle of that fish was a true representative of a nucleus in the human blood-corpuscle, and, indeed, that what was true of the structure of the one was equally so of the other.

And this error, in one shape or other, prevailed up to our time, and was quite general about the year 1839, when I was always endeavouring to correct it (see *Med. Ch. Trans.* vol. xxiii.; *Lancet*, 1840–41, p. 101; and my *App. to Gerber's Anatomy*, p. 13); while Müller, Krause, Gerber, and others, following Prevost and Dumas and Prof. Milne-Edwards on the Continent, had satisfied themselves of the existence of a nucleus in the human blood-corpuscle; and the late Dr. Martin Barry was publishing engravings in the ‘*Philosophical Transactions*,’ in London, of what he regarded as positive proofs of this so-called nucleus. But it must be recollected that in 1827 Dr. Hodgkin and Mr. Lister made the following statement:—“Our observations are at variance with the opinion long since formed by Hewson, that these particles consisted of a central globule inclosed in a vesicle composed of the coloured part; and which, though refuted by Dr. Young, has since in a modified form been revived by Sir Everard Home and Bauer in this country, and by Prevost and Dumas on the Continent.” This conclusion of Dr. Hodgkin and Mr. Lister refers to their examination of the human blood-corpuscles; and most in-

teresting it is, among the first anatomical fruits of Mr. Lister's very important labours in the improvement of the microscope, and withal so accurate that it ought at once and for ever to have dispelled any further belief in this imaginary nucleus of the blood-disc of Man. Yet, after all, it does not appear that their observations were pushed far enough to verify the remarkable exactness of Hewson's description regarding the oviparous Vertebrata, but only to show its inaccuracy when applied to Mammalia. And so here we were left to the distraction of half-truths, that fruitful source of error, very precise and conscientious in themselves, but still so confounding two things fundamentally different as to obscure the whole truth. This, indeed, as in so many other cases, lay between both parties; for the descriptions of Hewson and of Hodgkin and Lister are quite accurate and real, when confined, as they ought always to be, to the class of animal on the blood of which those excellent observers were severally engaged.

Lastly, in 1842 and 1845 Mr. Wharton Jones in England, and M. Donn  on the Continent, fully coincided with me as to the difference in question between the Mammalia and the lower Vertebrata; and this essential fact as to the "vexed question of a nucleus" was then established evermore, though in 1841 Dr. Rees and Mr. Lane were still maintaining that there really is a nucleus in the blood-disc of Man. But their supposed nucleus seems to be identical with what I have always depicted and described as the membranous base or frame of the corpuscle, and similar to the part figured by Home and Bauer, but a very different thing from a nucleus.

Now, if we wash the red corpuscles of Mammalia in water, using a tall narrow jar or even a test-tube, allowing them to subside, decanting the supernatant liquid, and adding fresh portions of it until all the colouring-matter and viscid part be removed, there will be a whitish precipitate, consisting mostly of pale, thin, nearly transparent, flattened circular discs. These are the membranous bases or frames of the corpuscles—corresponding to the globuline of some authors—quite insoluble in water, and so faint as not to be easily seen until their opacity has been increased by some such reagent as corrosive sublimate, which makes them very distinct. In short, this washed corpuscle is its colourless tegumentary frame, which, thus treated, is finer and smaller than (that is to say, about two-thirds the diameter of) the fresh unwashed corpuscle, thinner and of larger comparative diameter than the nucleus of the blood-disc of oviparous Vertebrata, and approaching in size to, but wanting the globular form of, the objects represented in the beautiful drawings by Bauer:—

Fig. 1. Outlines of the human corpuscle, the first and second as seen flat and on edge; and the third showing the thin, delicate, faint and colourless membranous frame or base of the same, and entirely devoid of a nucleus, after three days washing in water. At fig. 12 is seen, first, a sketch of a regular corpuscle of a bird, and next, the same corpuscle made round, and clearly showing its nucleus after similar washing in water. This washed corpuscle is represented rather larger than it should be.

Shape of the Red Corpuscles of Apyrenæmatous Vertebrates.

The red corpuscle is a circular, flattened, biconcave disc, rounded at the margin. The flatness of the corpuscle was first clearly proved by Hewson,—though the old error of its spherical or spheroidal figure prevailed for years afterwards, and was particularly supported by Mr. Hunter. The biconcave form was inferred by Dr. Young, and proved by Dr. Hodgkin and Mr. Lister. This concavity causes the central spot so long mistaken for a nucleus.

There are certain exceptions, regular and irregular, to the circular and biconcave shape. The *Camelidæ*, as will be more particularly explained in the proper place, have oval corpuscles. And when we consider how pliant and elastic the Mammalian corpuscle is, and what a delicate endosmometer it may be, how it will be taking in and giving out fluid according to the relative density of the liquor sanguinis and contents of the corpuscle, we might expect rapid variations in its shape within certain limits; and such is the fact.

Accordingly, the corpuscles may be either swollen, puckered, or shrunk into a variety of figures, flat, tumid, like a shallow circular or oval cup, stellate, notched, granulated, mulberry-shaped, crescentic, angular, lanceolate, fusiform, comma-shaped, and other figures, defying definition. In certain *Cervidæ*, to be noticed presently, the angular, crescentic, and lanceolate corpuscles are in unusual abundance. Dr. Richardson has well depicted a number of forms presented by the corpuscles in connexion with disease.

Relative Sizes of the Red Corpuscles of Apyrenæmatous Vertebrates.

The knowledge of this subject was very vague before my observations. It was the prevailing statement, after Hewson, that the size of the corpuscle is not at all connected with that of the animal, since he found them alike in the ox, cat, ass, mouse, and bat. But, while confirming the accuracy of his statement as to animals of such different orders, I soon found that, in a really natural family, *other things equal*, the largest corpuscles will be generally found among the large species, and the smallest corpuscles among the small species, of that family. See, for examples, the drawings of the corpuscles of Rodentia and Edentata, orders characterized by large corpuscles; and those of Ruminantia, an order, on the other hand, characterized by small corpuscles. There are many exceptions to an exact relation between the sizes of the species and corpuscles; but these will probably fall into order as our knowledge extends. In the Ass, for instance, the corpuscles are slightly larger than in the Horse, as might be expected from the comparative muscular and respiratory activity of these two animals; in the Mouse and the gigantic Rat the corpuscles scarcely differ in size; in the Noctule they are just appreciably smaller than in some of the more diminutive Bats. To enumerate the exceptions, which are commonly but slight, would be tedious and unnecessary, as some of them may be seen in the woodcuts, and numerous others, as well as those just mentioned, in my 'Tables of Measurements,' published in the 'Proceedings' of this

Society, October 14, 1845, and in subsequent numbers; in the Appendix to the English version of Gerber's 'Anatomy,' and in my 'Notes to the Edition of Hewson's Works,' printed for the Sydenham Society. The exceptions among the Feræ were long since especially noticed by me; and exceptions among aberrant species of any family may be generally expected. But no example has hitherto been discovered (*cæteris paribus*) of any one natural family, subject to the exceptions implied, in which the largest corpuscles do not prevail among the large species, and the smallest corpuscles among the small species of that family. And this is the way in which I have put or intended the rule as to the relation between the size of the corpuscles and that of the species in the higher Vertebrata. But I never extended it to the two lowest classes, as may be seen from my measurements of their corpuscles, and in the papers just cited. On the contrary, some of the great Ophidia, as *Python*, are there shown to have smaller corpuscles than such little species as *Coluber* and *Anguis*. And this seems to be sufficient notice of the so-called exceptions of certain reptiles and fishes erroneously adduced, in a former Part of the 'Proceedings' of this Society, against my observations.

As to the comparative smallness and abundance of the corpuscles of the Tunny, if, as there is reason to suppose, this be a warm-blooded fish, the fact would be interesting as a probable indication of a special adaptation. Dr. Davy, the highest authority on this question, has long since proved experimentally that its ally (the Bonito) has warm blood, and that the blood of the Tunny is so very rich in red corpuscles as to afford a remarkable contrast in this respect to some of the cold fishes with which he made the comparisons. I long since perceived that there must be some sort of connexion between the size of the red corpuscles and the respiratory function; and Dr. Davy in 1844 held, as the result of precise observations, that these corpuscles are important in relation to animal heat. They have long been considered as carriers of oxygen. More recently, Professor Milne-Edwards, in his excellent '*Leçons sur la Physiologie*,' has made this subject his own as far as concerns the tendency of the red corpuscles to be of smaller size in proportion to the general activity and respiratory demands of the animal, and *vice versâ*. His observations are numerous and interesting on this point; and the many exceptions as to regular gradation of size, such as may be seen in the present woodcut, and, further, in the 'Tables of Measurements' already referred to, are fairly recognized by him. But our knowledge is not at present sufficiently advanced to admit of a calculation of the disturbing circumstances, of which hybernation and peculiarities of structure and habits, and differences in the relative proportion of the red corpuscles to the other proximate constituents of the blood, may be among the number.

In Mammalia and Birds I have long since observed some tendency to a relation of size between the red corpuscles and pulmonary air-cells and capillary vessels. And when the beautiful observations of the late Professor Quekett showed the value and import of the bone-cells, it was immediately seen that there is a like disposition to a re-

lation between these and the red corpuscles. In short, *cæteris paribus*, the higher the organization of the animal, the greater is the quantity and surface of the red corpuscles, and *vice versâ*. The sum of this surface of a given quantity will be increased in proportion to their minuteness, and diminished in proportion to their largeness, just as the surface of a pound of lead would be much greater in small than in large shot.

Man.—But few Mammalia have larger corpuscles than Man; among these may be noted the elephant, the whale, the great ant-eater.

Quadrumana.—The corpuscles differ but little from those of Man, being only just appreciably, or sometimes not at all, smaller, both in the monkeys of the old and new continents. In the lemurs the corpuscles are slightly smaller generally.

Cheiroptera and Insectivorous Fera.—The corpuscles are slightly smaller than in the monkeys.

Fera.—There is considerable diversity in the size of the corpuscles, but such a marked disposition to uniformity in those of certain subdivisions of the order, that some of them might be distinguished from others by a comparison simply of the corpuscles. Some of the small *Felidæ* have rather larger corpuscles than the lion or tiger. If set down in the order of the size of the corpuscles, from large to small, the families would stand thus:—seals, dogs, bears, weasels, cats, viverras. A *Viverra* may be instantly known, by the smallness of the red corpuscles, from a dog. In the seals, otters, and dogs the corpuscles are about as large as in Man, and those of the viverras as small as in some little species of Ruminantia. *Bassaris* has been alternately associated with the bears and viverras; as far as regards its corpuscles it agrees best with the bears. The Kinkajou in the same respect approaches more to the viverras than to the bears and weasels with which it has at different times been arranged.

Pachydermata.—As discovered by Mandl, the elephant has corpuscles larger than those of Man; in the rhinoceros they are rather smaller than in Man, and still smaller in the tapirs, pigs, and horse. In *Hyrax* the corpuscles are enlarged again; so that in this respect this animal is more like a rodent than a pachyderm. Indeed, it may be expected that, whenever a marked difference exists in the corpuscles of any species as compared with the corpuscles of its nearest allies, that species will prove to be an aberrant one—*Cercoleptes*, *Bassaris*, *Hyrax*, for example.

Cetacea.—In *Balæna* the corpuscles are slightly larger than in Man, and rather smaller in the porpoise, with an intermediate size in the ca'ing whale.

Ruminantia.—An order characterized by the smallness of the corpuscles. In the Napu musk deer, meminna, and Stanley musk deer I discovered* that the red corpuscles are the smallest known in the animal kingdom, and that those of the brocket deer and the *Ibex* are next in minuteness. Then follows a further enlargement

* See Med. Chir. Trans. vol. xxiii.; Dublin Medical Press, Nov. 27, 1839; and the Lancet, vol. ii. p. 101, 1840-41.

in the corpuscles of the common goat, which had always been previously described as the smallest known. In the sheep they are somewhat larger still; while in the large species of the order, as the Buffalo and Aurochs, the Sambur, Wapiti and Moose-deer, the corpuscles are as large as in many Carnivora, and larger than in most of the *Viverridæ*.

In certain *Cervidæ*, as the Mexican, Reeve's, and the Hog Deer, the crescentic, lanceolate, and fusiform shapes may occur in great abundance, as shown in the woodcut.

The *Camelidæ* have oval blood-corpuscles. But, as I proved in 1839 (see foot-note, page 97) and often since, it is in shape only that these red corpuscles resemble those of oviparous Vertebrata. The corpuscles generally of the *Camelidæ* have no nucleus, and so agree in structure, as they do also in size, with those of their mammalian allies. The oval shape of the corpuscles was discovered by Mandl in the Dromedary and Paco, quickly afterwards confirmed and found by me to exist also in the Bactrian Camel, the Llama, and the Vicugna.

Rodentia.—These have large corpuscles, like those of the *Quadrupana*. Even in that tiny creature the Harvest-mouse they are quite as large as in the Horse and Peccary, while in the Capybara they are as large as or larger than in Man. In some of the small active *Sciuridæ*, besides the large corpuscles, there was an unusual proportion of smaller ones, which might be curiously considered in connexion with the habits of this family.

Edentata.—The corpuscles are large; in the Armadillo hardly smaller than in Man, while they are larger in the Two-toed Sloth and in the Great Ant-eater. The corpuscles of these two last-named animals are the largest known among Mammalia, excepting the Elephant; and it may be supposed, according to the rule already explained, that the red corpuscles of the gigantic *Glyptodon* and *Megatherium* were larger than any yet seen in the class.

Marsupialia.—The corpuscles agree in structure with those of the corresponding placental series of animals, and generally approach in size to those of the Rodentia.

Monotremata.—The corpuscles of the *Ornithorynchus* are very like those of Man in all respects, according to the observations of Drs. Davy, Hobson, and Bedford; and my examination of the blood of the *Echidna* was to the same effect.

Red Corpuscles of Pyrenæmatous Vertebrates.

Hewson's description, when confined exclusively to these, is so remarkably accurate as to require little addition as regards structure. The regular red corpuscle of oviparous Vertebrata is a cell or vesicle containing a nucleus, while the regular red corpuscle of Mammalia has no nucleus. This is the leading or central difference, as resulting entirely from my own observations, between these two great subdivisions of the Vertebrata; and thus we long since disposed of "this vexed question of a nucleus." Compare figs. 1 and 12, and the description of them at page 102.

Birds.—The vesicle, when treated with water, so far from retaining its shape or becoming narrower, as erroneously represented by Professor Kölliker, becomes generally more or less round in this and the lower classes; and so do the oval corpuscles of the camels.

No bird has yet been found with the majority of the corpuscles otherwise than oval. In any drop of blood a few of them may be more or less circular; but their most common figure is with the short diameter as 1 to the long diameter between $1\frac{1}{2}$ and 2. Still they vary in different species, so as to present the form of a broader or narrower ellipse. The broad short shape is frequent in some little granivorous and insectivorous birds, as the Rice-bird; and the narrow long shape in several birds of different orders, as the Snowy Owl, Passenger Pigeon, and Butcher-bird. The thickness of the corpuscle is between a third and a fourth of its short diameter.

As might be expected from their comparative uniformity of organization, in birds the size of the corpuscle is much less variable than in Mammalia, and has throughout the class so far more relation to the size of the species, whether of one or different orders, that Hewson would scarcely have said of this class that the corpuscles are not disposed to be larger in the large than in the small species. In short, no instance is yet known, *cæteris paribus*, of a prevalence of the largest corpuscles in the small and the smallest corpuscles in the large birds, taking a great number of the different-sized species to compensate for aberrations; so that the whole class resembles in this respect a single order of Mammalia, and is alike without an exact or regular gradation in the size of the corpuscles, the rule applying only with many exceptions, as before noticed or implied. The Horn-bill, for example, has larger corpuscles than some much larger birds, as the Pelican.

A very remarkable relation exists between the short diameter of the oval corpuscles of birds and the diameter of the circular corpuscles of Mammalia. Indeed, so constant is this coincidence that it may be accepted as a rule. I have not met with an example in which the breadth of a bird's corpuscle does not closely correspond to the diameter of the corpuscle of some of the Mammalia.

Reptiles.—In structure and shape the corpuscles of reptiles are the same as in birds; but in size the reptilian corpuscles vary so greatly as to afford a remarkable contrast in this respect with birds. The largest occur in the naked amphibia, especially in the perenni-branchiate subdivision, as discovered by Professor Wagner; and the smallest in the lizards, tortoises, and serpents. Such is their magnitude in the *Proteus*, that they may be seen with a common hand-lens; and the observation of Dr. Crisp, which accords with my subsequent examinations of them in the fresh blood, shows that they are nearly as large in the great Japanese Salamander. In that paradoxical creature *Lepidosiren*, I found that the corpuscles have the true reptilian character, being larger than those yet known of any fish, and having also a stronger and more durable vesicle than that of the blood-corpuscle generally of fishes; and Dr. Gray (a very

high authority on a question of zoological affinity) has recently arranged this animal among the reptiles.

Fishes.—The structure of the corpuscle is the same as in the two preceding classes. The vesicle in fishes is usually more tender and evanescent. There are great variations in the size and shape of the corpuscles, as discovered by Professor Wagner, especially in the cartilaginous group. They are largest and oval in the Sharks and Skates, and circular in certain Cyclostomes, as *Ammocetes* and *Petromyzon*, in which the corpuscles are among the smallest—the discovery also of Wagner. Their large size in the Common Skate was discovered by Hewson. In the Pike I found them generally more or less pointed at the ends, though in many other osseous fishes the corpuscles are more or less regularly oval, and similar in size to those of birds, yet with the disc commonly broader in comparison with its length. It may be nearly or quite circular; and often at least half of the corpuscles are thus round, especially a few hours after death, so that the short ellipse is almost displaced by the circular form, as may be seen in the blood of the Tench.

The most aberrant corpuscles in the class, as might be expected, occur in Mr. Yarrell's Lancelot (*Amphioxus lanceolatus*), in which, according to the observations of Retzius, Quatrefages, and Müller, they are colourless, like lymph-globules and the blood-corpuscles of numerous Invertebrata. But it must be recollected that this creature is ranked as the lowest fish by Yarrell, and was in fact described by Pallas as a *Limax*. Professor Kölliker assures us that there are no blood-corpuscles whatever in this fish! It has been found on our shores; and whoever may take up a systematic investigation of the blood-corpuscles of the Invertebrata must either begin or end with *Amphioxus*, as their connecting link with the Vertebrata. In the Glutinous Hag, Müller found the corpuscles oval, and even fusiform.

Zoological Import of the Nucleus.

In Mammalia we have shown that, during an early period of intra-uterine life, the temporary red blood-cell with its nucleus is the analogue of the permanent or common red corpuscle of oviparous Vertebrata, while the permanent or common red corpuscle of Mammalia is devoid of any such nucleus.

To the cursory observer it might seem of little consequence whether the red corpuscles of the blood of Man and Mammalia have, or have not, a nucleus; and accordingly, up to this moment, the question seems to have been commonly regarded as a mere microscopical curiosity. But when, in 1839 and again two or three years afterwards, I fully saw the essential difference in question between these corpuscles and those of oviparous Vertebrata (having proved the fact by careful examinations of the blood of numberless animals, and that in opposition to the then prevailing erroneous statements and doctrines), it at once appeared to me as a very essential truth; and subsequent experience has only confirmed this view. In short, the fact of this structure of the corpuscles of the two great divisions

of Vertebrata, comprehending such a wide extent of subordinate facts as to rise to all the dignity of a central one, small as it may appear, is really a great addition to zoological science. Thus is plainly unfolded the most universal and essential difference ever before discovered between the Mammalia and oviparous Vertebrata; for this one minute point is in truth so large and extensive as to clearly characterize the divisions in question in any sex or at any age, which not one of the old diagnoses can effect. Yet not even a glimpse of this important truth, so readily reconciling the discrepancies of former observers, was ever caught, during the contentions as to the presence or absence of the nucleus, in this zoological point of view.

And the present conclusion is alike extended and supported by the discoveries of development for which we are indebted to Mr. Wharton Jones, who has clearly shown that there is a similar difference in this respect. But although his important researches ought to have been well known in this country since 1845, they have been strangely neglected, while the far less accurate and comprehensive observations of Professor Kölliker have been imported and translated, and much too generally adopted in England. In connexion with Mr. Wharton Jones's conclusion, I may mention that one, two, three, or four mammalian red corpuscles may certainly form a nucleus of a cell, as depicted by me in the 'Philosophical Magazine,' Sept. 1842, p. 170. This observation has often since been imported from abroad, but never with the least perception of its significance.

And so "this vexed question of a nucleus" is at length not only settled, but also placed at the service of systematic zoology. Accordingly, the two great divisions of the Vertebrate subkingdom are here characterized as *Vertebrata pyrenæmata* and *Vertebrata apyrenæmata*—the former corresponding to the oviparous, and the latter to the Mammalian section.

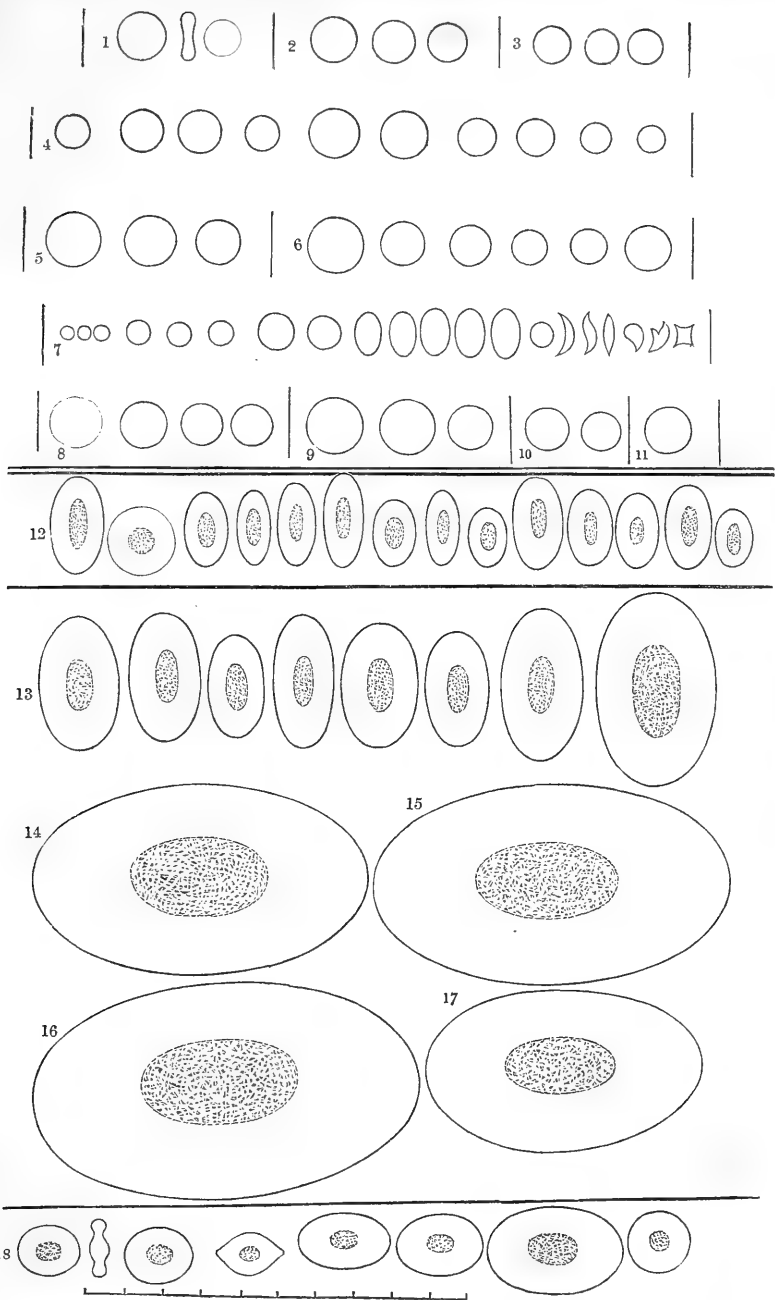
DESCRIPTION OF THE WOOD ENGRAVING (p. 101).

All the corpuscles are drawn to a scale of $\frac{1}{40000}$ th of an English inch, and are magnified about 920 times linear admeasurement. The scale is marked at the bottom of the engraving.

Corpuscles only of average size are given; and but one corpuscle from each species of animal, with the few exceptions presently to be noticed.

The corpuscles of Apyrenæmatous Vertebrates occupy the upper part of the engraving, above the double line; and the different orders of these are separated by the short upright lines. The corpuscles of Pyrenæmatous Vertebrates occupy all the larger part of the engraving below the double line. At 12 is a row of birds' corpuscles; 13-17, corpuscles of reptiles; and 18, a row of the corpuscles of fishes. The figures at 1 and 12, referring to structure, are fully explained at page 93. Of the Pyrenæmatous Vertebrates, the nuclei are shown much more plainly than they appear in the pure corpuscles; but the action of acetic acid exposes the nuclei as distinctly as they are here represented.

The names of the animals are set down in the following table, according to the order in which the sketches of the corpuscles stand in the engraving. The following measurements of the corpuscles are all in vulgar fractions of an English inch; but as the numerator is invariably 1, it is omitted throughout, and the denominators only are printed. T. denotes the thickness, L. D. the long diameter, and S. D. the short diameter of the corpuscles.



VERTEBRATA APYRENÆMATA.

Figs. 1. *Homo*.

Corpuscle flat	3,200
The same on edge, T.....	12,400
The same, long macerated in water	4,800

Figs. 2. *Quadrumanæ*.

<i>Simia troglodytes</i>	3,412
<i>Ateles ater</i>	3,602
<i>Lemur anjuanensis</i>	4,003

Figs. 3. *Cheiroptera*.

<i>Vespertilio murinus</i>	4,175
— <i>noctula</i>	4,404
— <i>pipistrellus</i>	4,324

Figs. 4. *Feræ*.

<i>Sorex tetragonurus</i>	4,571
<i>Ursus labiatus</i>	3,728
<i>Bassaris astuta</i>	4,033
<i>Cercoleptes caudivolvulus</i>	4,573
<i>Phoca vitulina</i>	3,281
<i>Canis dingo</i>	3,395
<i>Mustela zorilla</i>	4,270
<i>Felis tigris</i>	4,206
<i>Paradoxurus pallasii</i>	5,485
— <i>bondar</i>	5,693

Figs. 5. *Cetacea*.

<i>Balæna boops</i>	3,099
<i>Delphinus globiceps</i>	3,200
— <i>phocæna</i>	3,829

Figs. 6. *Pachydermata*.

<i>Elephas indicus</i>	2,745
<i>Rhinoceros indicus</i>	3,765
<i>Tapirus indicus</i>	4,000
<i>Equus caballus</i>	4,600
T.	13,422
<i>Dicotyles torquatus</i>	4,490
<i>Hyrax capensis</i>	3,308

Figs. 7. *Ruminantia*.

<i>Moschus javanicus</i>	12,325
— <i>meminna</i>	12,325
— <i>stanleyanus</i>	10,825
<i>Cervus nemorivagus</i>	7,060
<i>Capra caucasica</i>	7,045
— <i>hircus</i>	6,366
<i>Bos urus</i>	4,074
<i>Camelopardalis giraffa</i>	4,571
<i>Auchenia vicugna</i>	L. D. 3,555
	S. D. 6,444
— <i>paco</i>	L. D. 3,361
	S. D. 6,294
— <i>glama</i>	L. D. 3,361
	S. D. 6,294
	L. D. 3,254
<i>Camelus dromedarius</i> ...	S. D. 5,921
	T. 15,337
	L. D. 3,123
— <i>bactrianus</i>	S. D. 5,876
	T. 15,210
<i>Cervus mexicanus</i> : the seven last corpuscles—round, crescentic, sigmoid, lanceolate, comma-shaped, notched, and quadrangular forms.	

Figs. 8. *Rodentia*.

<i>Hydrochoerus capybara</i>	3,190
<i>Castor fiber</i>	3,325
<i>Sciurus cinereus</i>	4,000
<i>Mus messorius</i>	4,268

Figs. 9. *Edentata*.

<i>Myrmecophaga jubata</i>	2,769
<i>Bradypus didactylus</i>	2,865
<i>Dasybus villosus</i>	3,315

Figs. 10. *Marsupiatæ*.

<i>Phascolomys wombat</i>	3,456
<i>Hypsiprymnus setosus</i>	4,000

Fig. 11. *Monotremata*.

<i>Echidna hystrix</i>	3,300
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VERTEBRATA PYRENÆMATA.

Figs. 12. *Aves*.

	L. D.	S. D.
<i>Struthio camelus</i>	1,649	3,000
T.	9,166	
Nucleus	3,200	9,166
(With a corpuscle after maceration in water.)		
<i>Vanga destructor</i>	2,019	3,892
<i>Lanius excubitor</i>	1,989	5,325
<i>Bubo virginianus</i>	1,837	4,000
<i>Surnia nyctea</i>	1,555	4,042
Nucleus	3,200	10,666

	L. D.	S. D.
<i>Columba rufina</i>	2,314	3,429
— <i>migratoria</i>	1,909	4,626
<i>Dolichonyx oryzivorus</i>	2,400	4,167
<i>Buceros rhinoceros</i> ...	1,690	3,230
<i>Psittacus augustus</i>	2,085	3,600
<i>Phasianus superbus</i> ...	2,128	3,587
Nucleus	4,500	8,000
<i>Pelecanus onocrotalus</i> ..	1,777	3,369
Nucleus	3,200	9,600
<i>Trochilus</i> —	2,666	4,000
(Species unknown.)		

Figs. 13-17. <i>Reptilia.</i>		L. D.	S. D.	L. D.		S. D.
Gymnopus ægyptia-				Fig. 16. Proteus anguinus	400	727
cus	1,143	2,000	Fig. 17. Lepidosiren an-			
Crocodylus acutus	1,231	2,286	nectens	570	941	
T.	8,000		Nucleus	1,455	2,900	
Lacerta viridis	1,555	2,743	Figs. 18. <i>Pisces.</i>			
Anguis fragilis	1,178	2,666	Perca cernua	2,461	3,000	
Coluber berus	1,274	1,800	The same on edge, T. 8830			
Nucleus	3,227	4,986	Nucleus	6,000	8,000	
Python tigris	1,440	2,400	Cyprinus tinca	2,286	2,722	
Nucleus	3,555	7,468	T.	8,830		
Bufo vulgaris.....	1,043	2,000	Nucleus	8,500	9,600	
T.	5,625		Esox lucius	2,000	3,555	
Nucleus	2,802	5,261	Nucleus	5,333	8,000	
Lissotriton punctatus ..	814	1,246	Thymallus vulgaris ...	1,684	2,900	
Nucleus	1,778	2,667	Gymnotus electricus ...	1,745	2,599	
Fig. 14. Sieboldia maxima	450	800	Squalus acanthias	1,143	1,684	
Fig. 15. Siren lacertina.	420	760	Ammocetes branchialis	2,460		
Nucleus	1,142	2,007				

March 11, 1862.

Dr. Gray, V.P., in the Chair.

Mr. W. H. Flower, F.R.C.S., F.L.S., Conservator of the Museum of the Royal College of Surgeons, read a memoir on the Brain of the Javan Loris (*Stenops javanicus*).

The subject of this communication was an adult female, which died in the Zoological Society's Gardens in January, 1862. In the examination of the brain every care had been taken to preserve the natural configuration of the different portions of the organ; the drawing of the upper surface had been made before its removal from the cranial cavity, and the other drawings, descriptions, and measurements were checked by comparison with a cast of the interior of the skull. The value of the descriptions and figures of the brain of *Stenops* already published had been much diminished by inattention to such precautions; and they had also had the disadvantage of being made before the researches of Gratiolet had thrown light upon the arrangement of the convolutions on the cerebral hemispheres of the higher Quadrumana. A new description, which may serve as a standard of comparison in studying the cerebral anatomy of allied forms, seemed therefore to be called for.

The following is an abstract of Mr. Flower's remarks:—

“When seen *in situ*, the two hemispheres present together an oval figure, 1·3 inch in length, and 1·05 inch across the broadest part, which is situated at the junction of the middle and posterior third of the long axis. From this point the oval gradually narrows to rather a sharp apex in front. There is no appearance of that want of symmetry, both of size and form in the two hemispheres, described and figured by Vrolik. Projecting anteriorly to the extent of $\frac{1}{2}$ inch beyond the cerebral hemispheres are the olfactory lobes, of consider-

able vertical depth, but compressed laterally, and pointed in front. Projecting posteriorly is a very narrow edge of the cerebellum, most visible in the middle line, both on account of its own greater prominence at this part, and because the widening out of the termination of the great longitudinal fissure of the cerebrum allows more of its upper surface to be seen. When seen from one side, the upper contour of the brain forms a low, flattened arch, the greatest point of elevation being a little way behind the centre. The anterior or frontal lobe is much depressed, and excavated below to make room for the orbital plates of the frontal bone. The temporal lobes, distinctly marked off from the last by the Sylvian fissure, are full and make a considerable projection downwards and forwards. The occipital lobes are short and of little vertical depth, being hollowed below for the cerebellum, the greater part of which body they cover. The sulci of the cerebral hemispheres, though few, are well marked and tolerably symmetrical. A particular description of their arrangement is given in the paper. The principal sulci correspond with those which in the higher *Quadrumana* have been named Sylvian, antero-temporal, calloso-marginal, calcarine, and dentate.

“On the inferior surface of the brain, the olfactory lobes in their anterior half are seen to be compressed, and of equal width almost to their termination; posteriorly they become flat, and widen out to their attachment to the under surface of the anterior lobe. The fissure of Sylvius divides them from the temporal lobe. The orbital surface of the hemisphere, as seen on each side of the olfactory lobes, is hollowed out, and presents a simple longitudinal sulcus. The optic nerves are small for the size of the brain; behind them is a prominent, round, whitish mass filling up the greater part of the interpeduncular space, in which the corpora albicantia are not clearly distinguished from the tuber cinereum. The crura cerebri are of moderate size. The pons Varolii is not much elevated; it is distinctly marked off in front, but very indefinitely separated from the medulla behind. The last-named body is broad and flat anteriorly, the median groove distinct, its other divisions but faintly indicated. The nerves appear all to rise in the situations usual in this group of animals.

“The corpus callosum is 0.65 inch long, and covers half of the anterior pair of the corpora quadrigemina. Of these bodies the anterior are the largest, they are flat and rounded in outline; the posterior are small, but very prominent. The posterior part of the fornix is very broad, covering the optic thalami, and forming a wide lamina (*corpus fimbriatum*) descending into the middle corner of the ventricle. The hippocampus major is of moderate size. With all the care taken, it was not possible to ascertain satisfactorily the extent to which the ventricular cavity passed into the posterior lobe; but this is a circumstance of very little importance, and varies greatly even in the same species of *Quadrumana*. On the other hand, it is of considerable anatomical and physiological consequence that the portion of grey matter homologous to that forming the so-termed ‘hippocampus minor’ of the human subject, only of proportions

corresponding to the greater relative depth of the calcarine sulcus, exists in this brain, as in that of *Lemur* and *Galago* and all the true Apes.

“The brain of *Stenops* conforms closely with that of *Lemur*, both in its general form and the disposition of its surface-markings. The principal differences that were observed between them are described in the paper; and then follows a comparison of the brains of these two animals with those of the higher *Quadrumanæ*. As has been so well shown by M. Gratiolet, in his beautifully illustrated memoir upon this subject, a certain type both of general configuration and of surface-markings pervades the brain of all the *Primates*, from Man to the Marmoset. From this type M. Gratiolet excludes the *Strepsirrhine Quadrumanæ*, placing them, with the *Insectivora*, in a group of *Mammalia* whose cerebral organization he considers to be quite distinct from that of the two first families of *Quadrumanæ*. The author of the present paper finds reason to dissent from this proposition, and upon cerebral characters alone would retain the *Lemurs* in the position assigned to them by the majority of systematic zoologists—admitting, however, that, while possessing certain very important points of structure peculiar to the *Primates*, they are in many respects, especially in the shortness of the posterior lobes, an aberrant group, forming a transition towards the *Cheiroptera*, *Carnivora*, and other inferior *Mammalia*.”

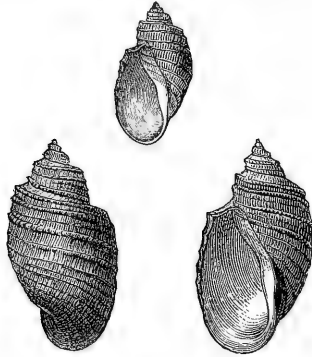
This paper will be published at full length in the Society's ‘*Transactions*,’ and appropriately illustrated.

The following paper was read:—

ON A NEW FORM OF PHYSA, OF THE SECTION AMERIA, RECEIVED FROM GEORGE FRENCH ANGAS, ESQ., OF ANGASTON, SOUTH AUSTRALIA, CORRESPONDING MEMBER OF THE SOCIETY. BY LOVELL REEVE, F.L.S.

The genus *Physa* occurs abundantly in the ponds and ditches of Europe and North America, and throughout the intertropical mainland and islands of the Eastern hemisphere. But in all the numerous species belonging to this wide range of geographical distribution the shell is regularly convex and smooth. In Australia and New Zealand a new type appears, in which the shoulder of the whorl is broadly angled. Eight species, in the collection of Mr. Cuming, characterized by this angular growth, some of them with the spire flatly immersed—two from New Zealand, the rest from North Australia, Port Essington, and the Boyne, Calliope, and Fitzroy Rivers—have been lately described by Mr. Henry Adams under the new generic title of *Ameria*, all being uniformly smooth. They differ from the rest of the *Physæ* in being formed on the angular type; they resemble them in being still destitute of sculpture. The form of *Physa* now introduced from South Australia is of the angular type, but it differs from all others in being sculptured transversely with thread-like ridges. The shells of the allied genus *Limnæa* are

convex and typically smooth; but there are two (*L. ovata* and *emarginata*, Say) which incline to develop obscure, irregularly formed ridges. The ridges of these *Limnææ* are not, however, analogous to the ridges of our new form of *Physa*. They are not of the same symmetrical, persistent growth, and have more the appearance of arising from a casual malleation of the surface of the shell.



PHYSA (AMERIA) ALICIE. *Ph. testa anguste obtecte umbilicata, suboblongo-ovata, tenui, inflata, flavescenti-cornea, spira parviuscula plus minus acute exserta; anfractibus tribus ad quatuor, superne subabrupte declivi-angulatis, deinde convexis, transversim undique filoso-liratis, liris inæqualibus inæquidistantibus, interstitiis striis fibrosis incrementi, super liras et ad suturas plicato-scabrosis, creberrime longitudinaliter decussatis; apertura suboblongo-ovata, labro tenuissime membranaceo reflexo.*

Long. $\frac{3}{4}$, lat. $\frac{3}{8}$ poll.

Hab. Lower Murray River, below Moorandi, and River Gawler, South Australia: in small ponds under stones, and attached to aquatic plants brought up by the dredge (*Angas*).

"This interesting form of *Physa*," writes Mr. Angas, "I should like to be dedicated to my eldest daughter Alicia, who found the first specimen, and called my attention to it;" and I have great pleasure in complying with a request so highly deserving of a lasting and honourable acknowledgment. The shell is of a slightly inflated oblong structure, with a rather small spire, sharply exserted, but more so in the specimens from the Gawler than in those from the Lower Murray River. Round the upper shoulder, so to speak, the whorls are rather narrowly sharply angled, forming a subconcave slope from the suture, below which the shell is encircled with thread-like ridges. The ridges are parallel throughout, but unequal in substance and in distance from each other, being especially finer and more crowded towards the base. The outer surface of the shell is composed of a yellowish, horny, membranaceous cuticle, of which the striæ of growth cross the interstices between the ridges in very close and strongly marked succession, and in the sutures and on

crossing the ridges they rise in minute scabrous plications. The aperture is enamelled with a tinge of ruddy colour.

The upper figure represents the shell of the natural size. In the lower figures it is enlarged to show the scabrous plications.

March 25, 1862.

Dr. J. E. Gray, V.P., in the Chair.

The Secretary announced that Dr. G. Bennett, F.Z.S., had shipped a living Kagu (*Rhinocetus jubatus*) for the Society from Sydney on the 16th of January previous, and read the following extracts from a letter just received from that gentleman relating to the habits of this remarkable bird:—

“Of the two Kagus brought from New Caledonia alive, one died on the 4th of January, 1862, and on dissection proved to be a female. It was larger than the one now sent to England alive; and when that one dies (as the plumage and crest are similar, and both appeared to be fully grown, the only distinction being size) it would be interesting to ascertain the sex. The Kagu is a very interesting bird, readily domesticated. It is amusing to see them politely bowing their heads one to the other, elevating their crests at the same time, and then finish by coquetting about. They climb up the wires in front of their place of confinement just as the Red-billed Porphyrios. They often leap, aided by the wings, upon the stumps or low branches of trees; but they invariably roost on the ground, in an erect position, with the head buried between the shoulders or under the wing, and in confinement never seek any elevated position for roosting. In New Caledonia they are usually seen about the sea-coast, by the side of rivers; and although in some parts of the island they are very numerous, yet about the settlement of Port du France they are seldom seen more than from two to four together at the same time. When disturbed they only fly to the height of a few feet, and escape into the thick brushwood. They are eaten by the natives. A lady just returned from New Caledonia informs me that a pair have been kept tame at Port du France for nearly three years, and are well-known roamers of the streets of that settlement. When a dog approaches them, they elevate their crests and flap their wings to drive it away. They are usually to be seen about those places where the men are digging, approaching them fearlessly for the sake of procuring worms or grubs that are turned up from the ground by the hoe or spade. The same lady describes a noise they make in their wild state, when concealed among the reeds or bushes, as resembling that of a young puppy crying for its mother.”

The following extract was read from a letter addressed by Colonel Abbott to George O. Wray, Esq., and communicated by the latter gentleman to the Secretary:—

“In March, 1838, as near as I can recollect, near the village of Pur-Buddah, distant $1\frac{1}{2}$ mile from the town of Akyab in Arracan, two Sepoys of the Arracan Local Battalion captured under a rock a large female Boa, some 12 feet in length, and abstracted with her a nest of eggs forty-eight in number. Both Snake and eggs were presented to me by a friend, who knew that I was interested in such things. My object now was to secure this prize, and see what would result from the detention. Unfortunately I was taken seriously ill, and neglected to keep notes on the subject, and all I now state is from recollection. The Python was in my possession for upwards of two months and a half, and was constantly coiled around her eggs, refusing food in various forms, living and dead, viz., fowls, rats, and frogs. I then quitted Arracan on sick-leave and came to Calcutta, bringing the Snake and eggs with me, and made them over to Dr. Pearson (since dead) and Dr. Evans. The Snake was in my possession, as I said before, about ten weeks in the province and ten days (more or less) in Calcutta, and nearly a week on the voyage up to Calcutta, as we went to Chittagong: this will bring the eggs and Snake to be known to me three months; and the eggs were still not hatched.

“On visiting the Museum and finding the eggs in the condition I sent them in, curiosity led us to detach an egg from the mass; and looking at it carefully it was supposed to be bad, as it exhibited marks of green mildew and soil, and there was no motion in it. We then determined to open it with a knife, and to our surprise we extracted a fully formed live young one, active and strong, which would, I have no doubt, have lived had it been allowed. I left Calcutta shortly after this, and do not know what became of the Boa and remaining eggs; but, should further information be required, I would suggest that application be made to Mr. Blyth, if still in Calcutta, or to the Curator of the Asiatic Museum of Calcutta.”

The following extracts were read from a letter addressed to Dr. Gray by Mr. Henry Blandford, respecting some Mollusks observed in Ceylon:—

“I have nothing particular to communicate respecting the *Aulopoma*, beyond what you have yourself noticed—viz., that the operculum is frequently drawn well into the whorl, the aperture of which is perfectly closed by the flexible edges of the former.

“There is but one species of *Aulopoma* in Ceylon, varying considerably in the size and in the height of the spire, and also, to some extent, in colouring. But these are mere variations, and there are not even any sharply defined varieties. I enclose you a sketch of the animal.

“The *Aulopomata* are found under damp leaves at the roots of trees, especially some of the Figs, such as *Ficus elastica*. In this selection of damp shady places they resemble most of the *Cyclophoroid* genera.

“The *Paludomus chilinoïdes*, of which you have two specimens, is very common in the plains of Ceylon and up to about 2000 feet.

It affects sluggish streams, tanks, and paddy-fields; in this respect it differs from the *Tanuli* and *Philopotami*, which greatly prefer swiftly running water. *P. spiralis* (from the north province of Ceylon) and *P. acutus* (from Madras, Trichinopoly, &c.) have similar habits to *P. chilinoïdes*, and are probably merely well-marked varieties of the latter.

“*Helix (Nanina) ceylanica* is a local variety of *H. bistrialis*. The former inhabits the hills up to about 3000 feet; the latter the plains of the north provinces of Ceylon, and a great part of Southern India. I send you a sketch of the animal of *H. (Nanina) bistrialis*.”

The following papers were read:—

1. CHARACTERS OF NINE NEW SPECIES OF BIRDS RECEIVED IN COLLECTIONS FROM BOGOTA. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XI.)

I have lately had an opportunity of examining several large collections of bird-skins from Bogota, containing altogether some three or four thousand individuals. The greater number of the species to which these belong are now well known in Europe, from their repeated importation in Bogotan collections; but I have found a few, principally among the more little-known groups, which appear to have been altogether overlooked or hitherto not collected. I beg leave to submit to the Society the following descriptions of these species.

FAM. TURDIDÆ.

1. TURDUS EPHIPPIALIS.

Supra cinereus, alis extus, nisi in primariorum parte terminali, et interscapulio rufescente indutis: subtus pallide cinereus: gutture albo, maculis triangularibus fuscis striato: ventre imo et crisso albis: tectricibus subalaribus et remigum parte interna pallide castaneis: rostro plumbeo: tomis pallescentibus: pedibus fuscis.

Long. tota 8·5, alæ 4·7, caudæ 4·2 poll. Angl. et dec.

Hab. In Nov. Granada int.

Mus. P. L. S.

Obs. Affinis *Turdo albiventri* ex Cayenna, et ptilosi fere simili, sed interscapulio et alis extus rufescentibus, et subalaribus castaneis facile dignoscendus.

I may remark that I have now received from the Berlin Museum a Thrush marked *Turdus amaurochalinus*,—a species with which I was not acquainted when I prepared my Synopsis of the American Thrushes, already printed in the Society's ‘Proceedings.’* This bird is certainly undistinguishable from what I consider to be *Turdus albiventris* of Spix, of which I have examples from Cayenne, Brazil, Bolivia, and Ecuador. My *Turdus ignobilis* of the highlands of New

* See P. Z. S. 1859, p. 321.

Granada is barely separable from the same species. On the other hand, there can be no question about the distinctness of the present Bogotan species, looking to its rufous interscapulum and wing-edgings, and dark, almost chestnut-brown under wing-coverts.

Fam. VIREONIDÆ.

2. HYLOPHILUS FERRUGINEIFRONS.

Olivaceus: alis nigricanti-fuscis, extus olivaceis: cauda olivacescenti-fusca: pileo brunnescente tincto, fronte ferruginolento: subtus dilutior, gutture et ventre medio albicantioribus: rostro plumbeo, tomis pallescentibus, pedibus fuscis.

Long. tota 4.0, alæ 2.1, caudæ 1.5.

Hab. In Nov. Granada int.

Mus. P. L. S.

Obs. Affinis *Hylophilo ochraceipiti*, mihi, ex Mexico, sed colore supero olivaceo rostroque robustiore differt. Remex primus, prout semper in hoc genere, spurius, dimidio brevior quam secundus: quartus, quintus et sextus fere æquales et longissimi.

I have tried in vain to reconcile this bird with Lafresnaye's *H. flavipes* (Rev. Zool. 1844, p. 342). It is certainly not his *Hylophilus semibrunneus* (l. c. p. 341), as I have seen specimens of the latter in the British Museum.

Fam. TANAGRIDÆ.

3. CHLOROSPINGUS OLEAGINEUS.

Olivaceus fere unicolor, fronte et regione oculari et corpore subtus flavicanti-olivaceis: alis nigricanti-fuscis, extus brunnescenti-olivaceo limbatis: cauda brunnea unicolore: rostro nigricanti-brunneo: pedibus fuscis.

Long. tota 5.5, alæ 3.25, caudæ 3.5.

Hab. In Nov. Granada int.

Mus. P. L. S.

Obs. Affinis *C. superciliari* et *C. rubrirostri* et eadem forma sed colore fere unicolore notabilis.

Fam. DENDROCOLAPTIDÆ.

4. PHILYDOR PANERYTHRUS.

Murino-rufescens: alis extus et cauda tota rufis, illarum pogoniis interne nigricantibus: subtus late fulvo-rufus: rostro albicante, hujus basi cum pedibus plumbeo.

Long. tota 7.5, alæ 3.9, caudæ 3.6.

Hab. In Nov. Granada int.

Mus. P. L. S.

This bird is allied in form to *Philydor rufus* (Vieill.) of Brazil (*P. ruficollis*, Spix, Av. Bras. i. p. 74, pl. 75), though the rectrices are not quite so sharply pointed. It may be distinguished by its more uniformly rufous coloration, and the complete absence of the cinereous head. I have a single Bogotan specimen, the only individual I have met with of this species.

Fam. TYRANNIDÆ.

5. LEPTOPOGON ERYTHROPS.

Olivaceus, pileo cinereo, loris, oculorum ambitu et corpore subtus ad medium pectus fulvide rufis: ventre flavicante: alis nigricanti-fuscis, tectricum apicibus fulvo terminatis; remigibus omnibus extus olivacescenti-fulvo marginatis: campterio alari, subalaribus et remigum marginibus inferis clare ochracescenti-rufis: cauda ochracescenti-cinerea, marginibus angustis externe olivacescentibus: rostro obscure fusco; pedibus corylinis.

Long. tota 5·0, alæ 2·7, caudæ 2·4.

Hab. In Nov. Granada int.

Mus. P. L. S.

This is a well-marked species, easily recognizable by its bright-rufous face and breast. In structure it agrees well with *Leptopogon superciliaris*, the type of the section, the bill being rather shorter, but precisely of the same form. The fourth quill is longest, slightly exceeding the third and fifth, which are equal. The first is rather shorter than the eighth, ninth, and tenth.

6. LEPTOPOGON PÆCILOTIS.

Supra olivaceus, pileo plumbescente, loris albescentibus; plumis auricularibus ad basin flavicantibus, inde distincte nigris: subtus flavo-virens; alis nigricanti-fuscis, tectricibus omnibus macula terminali ochracea præditis, remigibus olivaceo marginatis: cauda fusciscente, extus olivaceo anguste marginata: rostro superiore nigro, inferiore omnino flavo: pedibus pallide corylinis.

Long. tota 4·5, alæ 2·3, caudæ 2·0.

Hab. In Nov. Granada int.

Mus. P. L. S.

This species is closely allied to *Leptopogon superciliaris* (or at least to the Ecuadorian species which I identify with Tschudi's wretched figure), but is smaller in size, of a brighter and uniform greenish-yellow below, and has the lower mandible wholly yellow, and feet pale. In *L. superciliaris* the lower mandible is black like the upper. I have two similar specimens of Bogotan origin, and a third (imperfect) from Venezuela, which may also belong to the same species, though it wants the conspicuous ochraceous tipplings of the wing-coverts.

7. MYIOBIUS BELLUS.

Obscure olivaceus, pilei subcristati plumis interne rubro-igneis, alis nigris late ochraceo bifasciatis, harum remigibus eodem colore limbatis: cauda fusciscenti-cinerea: subtus flavus; pectore fulvo tincto: rostro superiore nigro, inferiore flavo: pedibus plumbeis.

Long. tota 4·2, alæ 2·3, caudæ 2·0.

Hab. In Nov. Granada int.

Mus. P. L. S.

This species of *Myiobius* is closely allied to the *M. pulcher* of Ecuador (P. Z. S. 1860, p. 464), and must be placed next to that species in the order in which I have arranged the genus (*l. c.*). It is, however, easily distinguishable by its larger size and larger wings, though nearly alike in coloration.

8. EMPIDochANES PÆCILURUS.

Fuscescenti-griseus, pileo obscuriore; loris fuscescentibus; alis et cauda nigricanti-fuscis, illarum tectricum apicibus et secundariorum marginibus externis albescentibus: subtus pallide ochraceus, lateraliter cinerascens; subalaribus, remigum et rectricum (nisi duarum mediarum) marginibus internis latis et crisso rufis, fere rubiginosis: rostro et pedibus nigris.

Long. tota 5·5, alæ 2·8, caudæ 2·3.

Hab. In Nov. Granada int.

Mus. P. L. S.

This Tyrant-bird, of which I have a single specimen, is readily distinguishable by its parti-coloured tail. The inner webs of all, except the medial pair, are broadly margined with clear rufous. This colour increases towards the base, and gradually occupies the whole of the vane. The outer tail-feather is also narrowly margined with the same colour. The under wing-coverts and inner margins of the quills are likewise similarly coloured. The fourth primary is rather longer than the third, which slightly exceeds the fifth, and longest; the second is slightly shorter than the third, the first being of about the same length as the eighth and ninth.

This bird has much the general appearance of an *Empidonax*, though abnormal in colouring. I place it for the present as a second species of the allied southern genus *Empidochanes*, of which the type is *Muscicapa oliva*, Bodd. (Pl. Enl. 574. fig. 2). This generic term I propose to use in the place of *Myiophobus* of Cabanis and Heine, as the latter name was previously given by Reichenbach to *Myiobius nævius**, for which and its allies I venture to employ it.

Fam. PSITTACIDÆ.

9. UROCHROMA STICTOPTERA. (Pl. XI.)

Psittaceo-viridis: alis extus nigris, macula in mediis tectricibus roseo-rubra; remigum marginibus externis et secundariis dorso proximis viridibus: caudæ rectricibus intus paululum aure-scentibus: rostro pallido: pedibus fuscis.

Long. tota 6·0, alæ 5·0, caudæ 2·5.

Hab. In Nov. Granada int.

Obs. This parrot appears to belong to the group called *Urochroma* by Prince Bonaparte, but is quite different from any known member of that section. The tail is nearly square at its termination, the two medial rectrices being slightly acuminate, the others rounded, but presenting the appearance of being rather worn.]

* See P. Z. S. 1860, p. 466.

2. ON TWO NEW SPECIES OF TYRANT-BIRDS FROM ECUADOR.
 BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO
 THE SOCIETY.

I am indebted to Mr. Gould's kindness for two specimens of Tyrant-birds from a collection recently received by him from the highlands of Ecuador. They are of nearly allied species, but stand best in the two neighbouring sections of *Ochthoëca* and *Mecocerculus*. By the latter name I propose to replace *Myiarchus* (Bp., nec Cab.), using it as a generic title for *Fluvicola leucophrys*, Lafr. et D'Orb., and its allies.

1. OCHTHOËCA CITRINIFRONS.

Obscure cinerea, dorso postico rufescente: fronte distincte citrino-flava: superciliis elongatis, albescentibus; alis caudaque nigricantibus, illarum marginibus externis rufescentibus: subtus omnino pallide cinereus: rostro et pedibus nigris.

Long. tota 4·75, alæ 2·5, caudæ 2·25 poll. Angl. et dec.

Hab. In rep. Æquator.

Mus. P. L. S.

Obs. Affinis *Ochthoëca albidemati*, Lafr., sed fronte citrina facile dignoscenda.

2. MECOCERCULUS GRATIOSUS.

Rufescenti-olivaceus, pileo fusco: fronte distincta et superciliis elongatis aureis; alis fusco-nigris, tectricum utrinque et secundariorum marginibus externis rufescentibus: cauda fusco-nigra: subtus olivaceus, ventre medio flavo: rostro et pedibus nigris.

Long. tota 4·5, alæ 2·5, caudæ 2·2.

Hab. In rep. Æquator.

Mus. P. L. S.

Obs. Affinis *Mecocerculo diademati*, sed rostro brevioribus, et harum tectricibus rufescente bifasciatis distinctus.

3. DESCRIPTION OF SOME NEW SPECIES OF ENTOZOA.

BY W. BAIRD, M.D., F.L.S., ETC.

1. ASCARIS UNDULOSO-STRIATA, Baird.

Head naked, with well-marked, roundish labial lobes. Body of a white colour, with a well-defined line running longitudinally through its whole length; smooth, but finely wavyly striated longitudinally, instead of transversely. The greatest diameter is at the anterior extremity, the body tapering gradually towards the tail, and terminating in a finely subulate point. In the female this point is long, and gradually becomes very fine; in the male the body, posteriorly to the opening from which issue the male organs or spicula, suddenly contracts and tapers quickly to a very sharp subulate point. The

body shows no transverse striæ, the only visible ones being longitudinal and finely waved.

Length of female $5\frac{1}{2}$ lines, male $4\frac{1}{2}$ lines.

Hab. Intestines of the King-Vulture (*Sarcoramphus papa*). (*Mus. Brit.*)

2. SCLEROSTOMA MUCRONATUM, Baird.

Body semicylindrical, of a brownish colour; thickest in the middle, attenuating towards each extremity, but more so at the anterior extremity. Integument strongly striated, or almost plicated. Head continuous with body. Male —? Female with the vulva situated about one-third from the posterior extremity, and marked with a strong tubercle. The tail is armed at its extremity with a strong, sharp spine, which is slightly incurved.

Length of female 4 lines; greatest breadth about $\frac{1}{2}$ line.

Males of this species have not been observed.

Hab. Intestines of the Palluma (*Phrymaturus palluma*) from Chili. (*Mus. Brit.*)

3. PENTASTOMA TERETIUSCULUM, Baird.

Head rounded and truncated. Body cylindrical, of a red colour, considerably more attenuated posteriorly. Tail shortly bilobed. Greatest width of body about 4 or 5 lines below the head; it then gradually attenuates till it reaches the posterior extremity. Integument annulosely ringed; rings about one-third of a line in width.

Length 2 inches 5 lines; breadth 3 lines.

The only specimen taken is a female.

Hab. Taken from the mouth of an Australian Snake (*Hoplocephalus superbis*) which died lately in the Zoological Society's Gardens, Regent's Park. (*Mus. Brit.*)

For the three above-described species I am indebted to Mr. Edward Gerrard, of the British Museum.

4. TETRARHYNCHUS MINUTO-STRIATUS, Baird.

Head of a white colour, solid and smooth. Neck much narrower than head, nearly of the same dimensions throughout its whole length, and minutely and finely striated. Bothria ear-shaped, rather broader at upper than lower part; open above, adnate below, with callous, raised edges. Proboscides short and club-shaped. Body a minute papilla.

Length of head 2 lines; breadth $1\frac{1}{2}$ line. Length of neck from 1 inch to 13 lines; breadth 1 line.

Hab. Taken from a species of *Brama*, off Madeira. (*Mus. Brit.*)

5. TETRARHYNCHUS BREVIS, Baird.

The animal is of a white colour, and is very short and thick. The head is large and broad, and the bothria are ear-shaped, rounded, and very much thickened on the edges. The neck is very short. The proboscides cylindrical and of considerable length.

Length of whole animal 3 lines; head nearly 2 lines; neck 1 line.

Hab. Taken from a species of marine Eel at Madeira. (*Mus. Brit.*)

6. TETRARHYNCHUS QUADRIPAPILLOSUS, Baird.

Head of considerable size; bothria large, rotundate-oval. Neck long, slender, terminating in an enlarged body enclosed in a sheath, which gives off at its lower part four papillæ disposed in such a manner as to interlock with each other and form a terminating conical point.

Length of whole animal about $3\frac{1}{2}$ lines.

Hab. Taken from the liver of *Alepocephalus*, sp., at Madeira. (*Mus. Brit.*)

For these three species of *Tetrarhynchus* I am indebted to J. Yate Johnson, Esq., C. M. Z. S.

7. BOTHRIOCEPHALUS (TETRABOTHRIUM) JUNCEUS, Baird.

Bothria four, attached to the head by their face, large and somewhat auriculiform. Head elliptical. Neck slender; first segments very fine, gradually becoming broader, but in no part exceeding half a line in breadth. Apertures of genital organs unilateral.

Length upwards of $4\frac{1}{2}$ inches; breadth of neck $\frac{1}{10}$ th of a line; broadest segments about $\frac{1}{2}$ a line.

Hab. Intestines of the King-Vulture (*Sarcorhamphus papa*). (*Mus. Brit.*)

For this species I am indebted to Mr. E. Gerrard.

4. DESCRIPTIONS OF EIGHT NEW SPECIES OF CYCLOSTOMACEA, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

(Plate XII.)

1. RHIOSTOMA HAINESI, Pfr. (Pl. XII. fig. 8). *T. late umbilicata, depressa, solida, distincte et conferte striata, sub epidermide obscura fuscula, flammulis angustis castaneis variegata; spira parum elevata, vertice minuto, corneo; anfr. 5, depresso-rotundati, ultimus infra peripheriam castaneo unifasciatus, antice longe solutus et deflexus, a sutura ad tubulum longe recurvatum carinatus, ante tubulum introrsum apertus, extus leviter incisus; apertura obliqua, circularis; perist. subduplicatum, album, margine sinistro incrassato, dextro expanso, plano, patente. Operc. cyathiforme, extus planum, anguste spiratum, marginibus anfractuum elevatis, membranosis.*

Diam. maj. 35, min. 25, alt. 12-14 mill. Ap. diam. 11-12 mill.

Hab. Camboja (*M. Mouhot*).

2. RHIOSTOMA SIMPLICILABRE, Pfr. (Pl. XII. fig. 7). *T. late umbilicata, depressa, solidula, leviter et confertissime striatula, sub epidermide nitida lutescens, elegantissime et subtiliter castaneo flammulata; spira breviter conoidea, vertice minuto, obtusiusculo; anfr. 5, depresso-rotundati, ultimus infra peripheriam castaneo unifasciatus, antice longe solutus et deflexus, a sutura usque ad tubulum recurvatum carinatus; apertura diagonalis, subcircularis, intus cærulescenti-margaritacea;*

perist. simplex, tenue, ante tubulum leviter incisum, undique vix expansiusculum. Operc. precedentis, angustius spiratum.
 Diam. maj. $27\frac{1}{2}$, min. $19\frac{1}{2}$, alt. 10 mill. Ap. diam. $8\frac{2}{3}$ mill.
Hab. Camboja (*M. Mouhot*).

3. *CYCLOTUS TRAILLI*, Pfr. (Pl. XII. fig. 4). *T. sublate umbilicata, depresso-turbinata, solidula, liris confertis, subtus minoribus sculpta, carneo-albida, fuscule variegata et fascia 1 rufa infraperipherica notata; spira breviter turbinata, acutiuscula; anfr. $4\frac{1}{2}$, convexi, celeriter accrescentes, juxta suturam lævigati, ultimus teres, antice vix descendens; apertura obliqua, subangulato-circularis; perist. tenue, vix expansiusculum, ad anfr. contiguum subinterruptum. Operc. Cycloti subdiscoidi.*

Diam. maj. 14, min. 12, alt. $10\frac{1}{2}$ mill.

Hab. Russel-Canda, Madras (*Dr. Traill*).

4. *CYCLOPHORUS SATURNUS*, Pfr. (Pl. XII. fig. 6). *T. late umbilicata, depresso-turbinata, solida, oblique striata et sub lente minutissime granulata, albida, fasciis et tæniis variis rufo-fuscis ornata; spira breviter turbinata, vertice minuto, acutiusculo; anfr. $5\frac{1}{2}$, rapide accrescentes, convexi, ultimus rotundatus, juxta umbilicum albus; apertura obliqua, subcircularis, intus flavescenti-albida; perist. albidum, latissimum, breviter adnatum, latere dextro fortiter revoluto, sinistro leviter retrorsum fornicato, patente. Operc. sub-6-spiratum, saturate rufum.*

Diam. maj. 63, min. 51, alt. 32 mill. Apert. alt. 26, cum. perist. 38 mill.

Hab. Camboja (*M. Mouhot*).

5. *LEPTOPOMA PORTEI*, Pfr. (Pl. XII. fig. 5). *T. perforata, globoso-conica, tenuis, spiraliter conferte striata et liris sub 6 distantibus subacutis cincta, albida, haud nitens, strigis fulguratis fuscis picta; spira turbinata, acuta; anfr. 6, convexi, ultimus inflatus, infra medium fascia alba et altera fuscula signatus, circa umbilicum albus; apertura parum obliqua, subcircularis, intus albida fusco marmorata; perist. duplex, ad anfractum contiguum haud interruptum, internum expansiusculum vix prominens, externum latere dextro late expansum et patens, sinistro angustissimum.*

Diam. maj. $18\frac{1}{2}$, min. 15, alt. 14 mill.

Hab. Polillo Islands (*Mr. Porte*).

6. *CATAULUS RECURVATUS*, Pfr. (Pl. XII. fig. 2). *T. breviter et profunde rimata, ovato-turrita, solida, distincte subarcuato-striata, virenti-fulva; spira regulariter attenuata; sutura profunda, simplex; anfr. 7, summi rubescentes, 3 ultimi convexi, ultimus antice subascendens, basi carina compressa antice dilatata munitus; periomphalum angustum, costulato-striatum; apertura subcircularis, ad basin interrupta et canali perlato*

aucta; perist. duplex, internum porrectum, basi fissum, externum patens et reflexum, parte canalem formante recurvata.

Long. 23, diam. 10 mill.

Hab. In sylvâ "Annamallay," ad radicem montium Nilgiricorum.

7. *CALLIA WALLACEI*, Pfr. (Pl. XII. fig. 1). *T. irregulariter pupæformis, solidula, lævigatissima, callo nitido obducta, fulvocarnea vel albida; spira irregularis, apice brevissime conoidea; sutura indistincta; anfr. sub 4½, summi vix conspicui, 2 ultimi antrorsum deviantes; apertura subcircularis, integra; perist. rectum, leviter incrassatum, ad parietem aperturalem adnatum, parte columellari subinflata.*

Long. 5, lat. 3 mill. Ap. diam. ½ mill.

Hab. In insula Ceram (Mr. Wallace).

8. *HYDROCENA (OMPHALOTROPIS) CERAMENSIS*, Pfr. *T. subperforata, ovato-conica, tenuiuscula, lævigata, nitida, unicolor fulvida vel cingulo albido ornata; spira conica, acuta; sutura marginata; anfr. 7, vix convexiusculi, ultimus periphæria leviter floccarinatus, crista basali forti munitus; apertura parum obliqua, angulato-ovalis; perist. simplex, expansiusculum, marginibus distantibus, interdum callo tenuissimo junctis, sinistro flexuoso, medio subdilato.*

Long. 8, diam. 4 mill.

Hab. In insula Ceram (Mr. Wallace).

5. DESCRIPTION OF A NEW SPECIES OF HELIX (NANINA).

BY DR. L. PFEIFFER.

(Plate XII.)

HELIX TITANICA, Pfr. (Pl. XII. fig. 3). *T. angustissime umbilicata, conoideo-depressa, solidula, lineis impressis spiralibus et irregularibus obliquis sculpta, sub epidermide pallide viridilutescente albida; spira conoideo-convexa, vertice minuto, obtuso; anfr. 5½, vix convexiusculi, priores subcarnei, ultimus non descendens, ad suturam crenulatus, medio obtuse carinatus et fascia latiuscula spadicea deorsum diluta notatus, subtus inflatus; apertura obliqua, ovali-lunaris; perist. rectum, marginibus distantibus, columellari vix incrassato, ad insertionem in laminam brevem triangularem revoluto.*

Diam. maj. 68, min. 57, alt. 38 mill.

Hab. Anamallay Forest, at the foot of the Neilgherries (Mus. Cuming).

EXPLANATION OF PLATE XII.

Fig. 1. *Callia wallacei*, p. 117.

2. *Cataulus recurvatus*, p. 116.

3. *Helix titanica*, p. 117.

4. *Cyclotus trilli*, p. 116.

5. *Leptopoma portei*, p. 116.

6. *Cyclophorus saturnus*, p. 116.

Fig. 7. *Rhiostoma simplicilabre*, p. 115.

8. *Rhiostoma hainesi*, p. 115.

9. *Rhiostoma housei*, Haines, Ann.

Lyc. N. Y. vi. p. 157 (for comparison with *R. hainesi*).

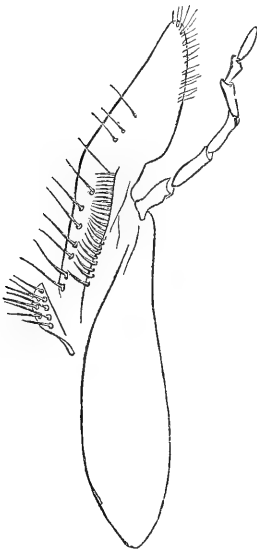
6. NOTES ON THE FORM OF THE COMB (PECTEN) IN DIFFERENT ANDRENIDÆ AND APIDÆ, AND ON THE ALAR HOOKS OF THE SPECIES OF SPHECODES AND HALICTUS. BY MISS E. F. STAVELEY*.

I have made a few notes in the hope of saving your time and eyes; but I fear they are of very little value; and, as you are aware, I know so little of what has been already written on the subject, that my notes, even if correct, may not be new. Besides this, my examination of the parts of the mouth has as yet been confined to about twenty-six Bees of various species and the three sexes.

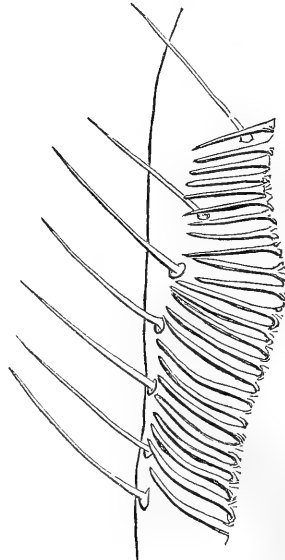
There are some peculiarities in the maxillæ of the Bees which I think might serve as generic or specific characters, and which I believe have not yet been used for that purpose.

One is the presence of a row of strong, flat hairs or teeth, forming a sort of comb, varying much in form and situation.

In all the *Andrenidæ* where I have found it, it forms a wavy line, commencing near the base of the upper joint of the maxilla about midway between the two margins, as in *Andrena cingulata*, ♀ (figs. 1, 2).



1



2

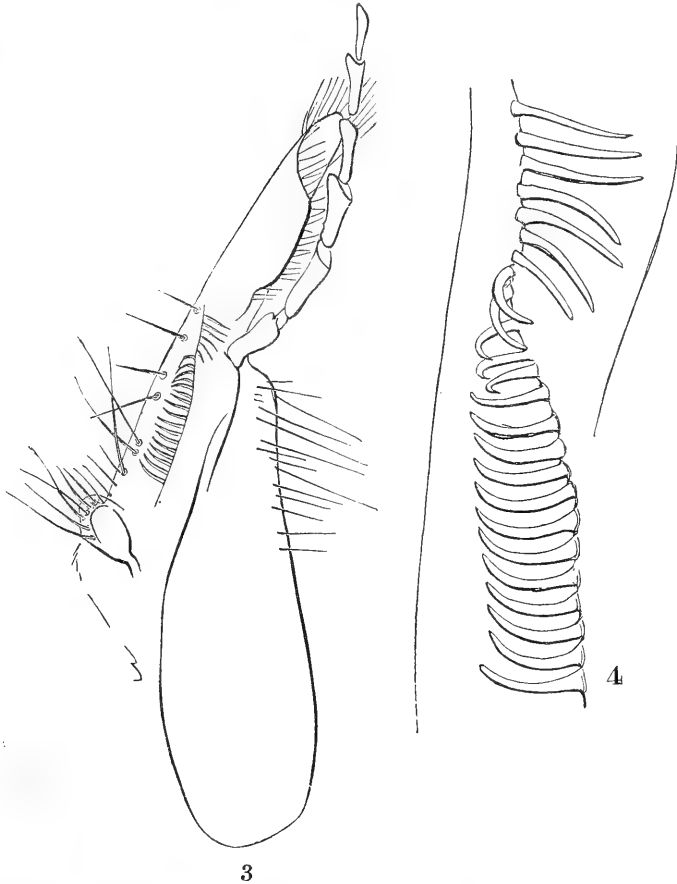
* Communicated by Dr. J. E. Gray with the following letter:—

“I beg of you to lay the following observations, which Miss Staveley has sent to me, before the Society. They indicate some characters which appear to have hitherto been overlooked.

“*Dr. Sclater, F.R.S., &c.*”

“*J. E. GRAY.*”

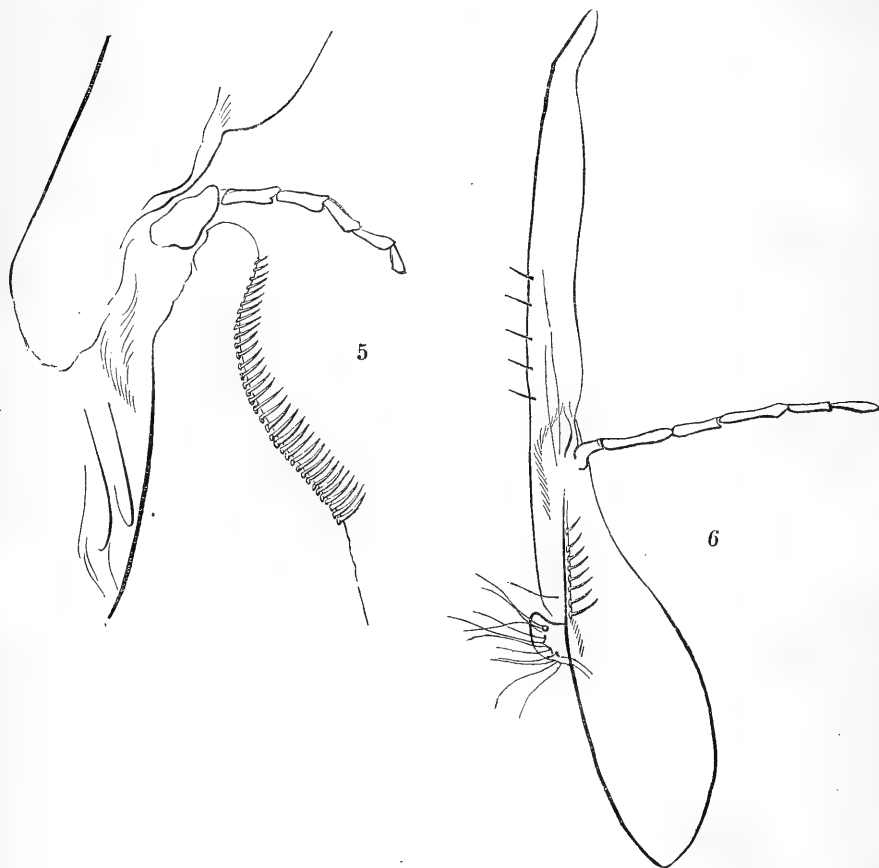
In some, as *Andrena nitida*, ♀ (figs. 3, 4), the direction of the teeth is reversed in the course of the row. The row of hairs is



figured by Kirby in his work on 'British Bees,' at t. 1. f. 4 e, and called by him, in the explanation of the plates at page 226, "*setæ rigidiusculæ*;" but I do not find any mention of them in any other part of the work.

In the *Apidae* it is invariably at the upper part of the lower joint

of the maxilla (fig. 5), and, with one exception, is marginal. In *Panurgus* (fig. 6, *P. banksianus*, ♀), the first genus of the *Apidæ*



(and of which Mr. Smith remarks that in habit it is precisely similar to *Andrena*), the comb resembles that of the *Andrenidæ* in not being marginal, while it agrees with that of the other *Apidæ* in being near the top of the second joint. This series of spines is also figured in Kirby, at t. 10. f. 1 c, t. 11. f. 2, t. 12. f. 6 c, and t. 13. f. 3 a; and in the chapter headed 'Termini,' at p. 94, is called the "pecten;" but, though several forms of it are figured as above, I do not find it mentioned in the description of the species.

I subjoin a list of the insects in which I have looked for it:—

ANDRENIDÆ.

Colletes daviesana, ♂ (teeth much the longest at the lower end).	} Comb not marginal, commencing near the base of upper joint of maxilla.
Andrena cingulata, ♀, figs. 1, 2.	
— nitida, ♀, figs. 3, 4 (comb reversed near the top).	
— clarkella, ♀ (comb reversed near the base).	
— —, ♂ (comb reversed).	
Cilissa leporina, ♀ (comb of four teeth).	} Comb not present.
— —, ♂ (comb of three teeth).	
Sphecodes subquadratus, ♀.	} Comb not present.
Halictus leucozonius, ♂.	
— morio, ♀.	
Dasygoda hirtipes.	

APIDÆ.

Panurgus banksianus, ♀, fig. 6.	} Comb not marginal.	} Comb on upper part of second joint of maxilla.
Eucera longicornis, ♀ (fig. 5).		
— —, ♂.	} Comb marginal.	
Bombus terrestris, ♀.		
— lucorum, ♀.		
— —, ♂.		
— —, ♀.		
— latreilliellus, ♂.	} Comb not present.	
Apathus campestris, ♀.		
Apis mellifica, ♂.	} Comb not present.	
Euglossa cordata.		
Nomada furva, ♀*.		
Epeolus variegatus, ♂*.		
Cœlixys vectis, ♀*.		
Osmia rufa, ♀.	} Comb not present.	
Chelostoma florissomne, ♂.		

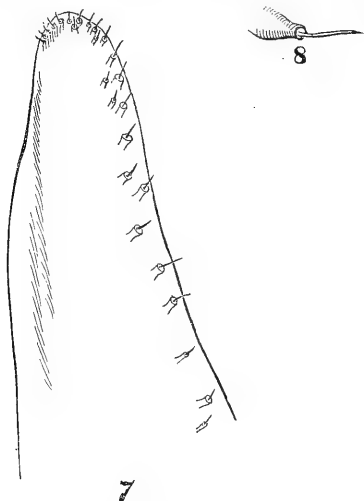
There is also an appendage to most of the maxillæ (and when absent it may possibly have been torn off in dissection), which seems too delicate to assist in the mechanical work for which the combs are probably used. It is a small membranous lobe, covered more or less thickly with long hairs, and situated on the lower joint of the maxilla, on the opposite side to that of the palpus (see figs. 1, 3, 6).

In many of the maxillæ there are several projections or small tubes (as I shall for convenience call them, having little doubt of their tubular construction) generally tipped by a hair, and in appearance strongly resembling the small tubes which exude the material of the web from the spinneret of a spider. They are in various situations: sometimes at the apex of the maxilla; forming sometimes an irregular line nearly the whole length of the upper joint; sometimes in a cluster close above or below the maxillary palpus; sometimes in two clusters, one above and one below the palpus. I would call your attention particularly to the straight tubes near the apex of the maxilla of *Epeolus variegatus* ♂ (fig. 7), and the flask-shaped tubes near the palpus in *Osmia rufa* ♀ (fig. 8) †.

* Parasites. I have as yet found no parasitic Bee with the comb.

† After writing the above paragraph, it occurred to me that Dr. J. Braxton Hicks, in a paper read before the Linnæan Society (and printed in their Trans. vol. xxiii. part 1, p. 139), had preceded me in the observation of these organs, and I hesitated to send the notes for printing; but, on examination of his paper, I am inclined to think that the tubes which I have described in the maxillæ of the Bees are not necessarily of the same nature as the organs observed by him in

Is it possible that these tubes, which, as I have observed, are remarkably similar in appearance to those in the spider's spinneret,



may be of the nature of salivary glands? It is easy to imagine the use of such a provision in the management of the materials of the nests and the storing of food, even if not also in the assistance of digestion; while it appears to me that there is analogy in favour of such a supposition, the House-fly exuding from its mouth a drop of moisture while feeding on sugar or other hard substance, while the Gnat, with still another form of mouth, is supposed to inject a poison into the wound inflicted by its proboscis.

I believe that somewhat similar tubes exist in the mandibles of some of the Bees and Wasps.

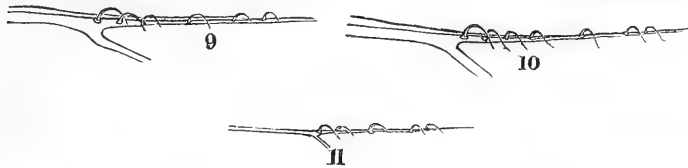
The mandibles of some of the *Apidæ* have a transverse ridge of strong hooked hairs (besides other hairs in various parts). In the mandible of *Apis mellifica* ♀, they are very visible.

With the above objects I send specimens of the hind wings of various Hymenopterous Insects, the observation of which has confirmed me in my former opinion as to their usefulness as distinctions; but as I have arrived at no new results, not having had the means as yet of representing more than a very limited number of genera, I will only remark on one variation from the usual arrangement of the distal hooks, which occurs in the genera *Sphecodes* and *Halictus*.

The distal hooks of the Bees are usually at regular or at regularly diminishing intervals; but in these two genera, one or two of those

various parts of insects, with the exception of those which he figures Tab. 18. R. *a*, and which I have mentioned above as tubes "in a cluster close above the maxillary palpus."

in the middle of the row are separated from the rest by a space double the size of that which is between the other hooks (figs. 9,



10, 11); and if this is found to be in all the species, it is a distinction easy to observe.

April 8, 1862.

Dr. J. E. Gray, V.P., in the Chair.

The Secretary announced the acquisition by the Society for their Menagerie of a pair of living Paradise-birds (*Paradisæa papuana*). Mr. A. R. Wallace (the well-known traveller and naturalist, who had been engaged these last eight years in exploring the more little-known islands of the Indian Archipelago) had for some time held a commission to obtain living Birds of Paradise for the Society. But though Mr. Wallace had visited in person the islands inhabited by several species of this magnificent group of birds, he had failed in his efforts to preserve the birds alive when captured, and had given up all hopes of being successful in his object. A short time before Christmas 1861, when in the interior of Sumatra, Mr. Wallace had received information of two specimens of the Lesser Birds of Paradise (*Paradisæa papuana*) being alive in captivity at Singapore. Mr. Wallace immediately proceeded to that place, purchased the birds, which were then in the hands of a European merchant, and left by the following mail for England, arriving in safety in London with his valuable burden on the 1st of the month.

The two Paradise-birds had been lodged in the upper part of the Zoological Society's old museum, a room having been fitted up for their reception with a large cage of galvanized wire, 20 feet long by 11 in width. As they were both males, it had been found necessary to keep them apart, the sight of one another, or even of a Paradise-bird's plume waved near them in the air, producing in them great excitement. The cage had been, therefore, divided by a screen which excluded the light, and the two birds placed in the separate compartments. The remarkable side-plumes which ornament the males of the true *Paradisææ* when in full dress were as yet but partially developed in these specimens, but in a few weeks, if the birds continue to thrive, would probably attain their full dimensions.

Mr. Gould exhibited to the Meeting and described two new species of Humming-Birds, which he had recently received from Ecuador; a new *Fregilus* from the Himalayas, which had hitherto been regarded as identical with the European bird of that form; and a species of *Prion*, which appears to constitute an additional member of that peculiar genus of oceanic birds.

The Humming-Birds were named, respectively, *Heliotherix longirostris* and *Aphantochroa hyposticta*; the *Fregilus*, *F. himalayanus*; and the *Prion*, *P. magnirostris*; and were thus described:—

HELIOTHRIX LONGIROSTRIS, Gould.

Male: upper surface and wing-coverts brilliant green; wings dark purplish brown; four middle tail-feathers bluish black, the remainder pure white; lores, line under the eye, and ear-coverts velvety black, terminating in a small tuft of violet-blue feathers; below the black line a stripe or moustache of glittering green; chin, throat, and under surface snow-white; bill black; legs and feet fleshy brown.

Total length $5\frac{1}{4}$ inches; bill $1\frac{1}{6}$; wing $2\frac{7}{8}$; tail $2\frac{1}{4}$.

Hab. Ecuador.

Remark.—I have been for years receiving from Ecuador examples of what I believed to be females of a new species of *Heliotherix*; but now in 1862 I have received an adult male, which convinces me that my opinion was correct, and I have therefore described it under the above appellation. In comparison with the other species of the genus, I find it to be most nearly allied to *H. auritus*, being similarly coloured to that bird; it is, however, of larger size, has a considerably longer bill, and in my specimen, which is doubtless adult, the crown is devoid of the glittering hue seen in *H. auritus*; at the same time, it is somewhat brighter than the back.

APHANTOCHROA HYPOSTICTA, Gould.

All the upper surface, wing-, and tail-coverts deep green; wings purplish brown; tail dull purplish green, deepening into blackish brown at the tip, the two outer feathers on each side very slightly fringed with white at the tip; feathers of the throat, breast, and centre of the abdomen dull white at the base, with a spot of dull green near the tip, giving those parts a spotted appearance; remainder of the under surface dull green; under tail-coverts dull green at the base, deepening into black near the end, and fringed with grey; tarsi and thighs rather thickly clothed with white feathers; bill black, except at the base of the under mandible, which appears to have been flesh-colour.

Total length $4\frac{1}{2}$ inches; bill $1\frac{3}{6}$; wing $2\frac{3}{4}$; tail $1\frac{7}{8}$.

Hab. Ecuador.

Remark.—I have several specimens of this bird all similarly coloured; and I believe the specimen from which the above description was taken to be fully adult. It differs from *A. cirrhochloris* in its spotted breast, in its shorter tail, and its rather more lengthened and

curved bill. I received the examples I possess from Quito, but I believe they were collected near the waters of the Upper Napo.

FREGILUS HIMALAYANUS, Gould.

Plumage of the head and the whole of the body, both above and beneath, deep glossy black; wings and tail black, glossed with purple and green; bill and feet coral-red; nails black.

Hab. The Himalayas.

Remark.—This fine Chough differs so greatly in point of size from the species killed in this country that I have no hesitation in describing it as distinct; and that ornithologists may more clearly perceive the great difference alluded to, I annex an accurate admeasurement of male examples from India and Europe.

<i>Fregilus himalayanus.</i>		<i>Fregilus graculus.</i>	
	Inches.		Inches.
Total length	15 $\frac{1}{2}$	Total length	14
Bill	2 $\frac{1}{4}$	Bill	1 $\frac{7}{8}$
Wing	12 $\frac{3}{4}$	Wing	10 $\frac{3}{4}$
Tail	6 $\frac{3}{4}$	Tail	5 $\frac{3}{4}$
Tarsi	2 $\frac{1}{4}$	Tarsi	1 $\frac{1}{4}$

I may add that specimens from Italy and from Wales are precisely alike in all their admeasurements.

PRION MAGNIROSTRIS, Gould.

Head, all the upper surface and sides of the chest blue-grey; lesser wing-coverts and the edge of the shoulder brown; the remainder of the wing blue-grey, deepening into slate-grey at the tips of the inner primaries; the outer primaries slaty black, fading into white on the inner edge; scapularies deepening into slate-grey near the end, and tipped with pale grey; tail very light grey, the centre feathers tipped with blackish-brown; chin, throat, centre of the breast, abdomen, and under surface of the wing creamy white; a faint wash of blue on the lower part of the flanks and the under tail-coverts; bill blue, deepening into black on the sides of the nostrils, at the tip and along the side of the lower mandible; irides brown, legs beautiful light blue.

Total length 11 inches; bill, base to tip 2, breadth at base $\frac{15}{16}$; wing 8; tail $4\frac{1}{2}$; tarsi $1\frac{1}{2}$.

Hab. Unknown.

Remark.—As the name I have assigned to it implies, this species differs from every other member of the genus in the extraordinary size of its bill. In form and colouring it is precisely similar to the other *Priones*, all of which are remarkably alike in these respects—not so, however, in their bills, which consequently present the best specific characters.

The following papers were read:—

I. REMARKS ON A SPECIMEN OF ALEPISAURUS FEROX RECENTLY OBTAINED AT MADEIRA. BY JAMES YATE JOHNSON, COTT. Mem. Z.S.

Having lately procured a specimen of this rare and interesting fish (which I have had the pleasure of presenting to the British Museum), I beg leave to lay before the Society the result of my observations upon it when in a fresh state. The remarks I shall make will be for the most part supplementary to Mr. E. T. Bennett's long description of another specimen from this locality, printed in the first volume of the 'Transactions of the Zoological Society*'; but I hope they will be found to have some bearing upon the question of the ichthyological position of the genus, which has been placed in no fewer than four families by different naturalists. Mr. Lowe, who founded the genus on the present species, placed it in Cuvier's family of *Tænioides*. M. Valenciennes referred the genus to the *Salmonidæ*. Sir John Richardson, in his article on Ichthyology in the 'Encyclopædia Britannica,' assigned it, on page 213, to the *Sphyrænidæ*, and on page 248 to the *Scopelidæ*. Lastly, that able ichthyologist, Dr. Günther, asserts that its natural affinity is decidedly Siluroid (Cat. Acanth. Fishes in Brit. Mus. ii. p. 353). A consideration of Mr. Bennett's description and of the additional points about to be mentioned, some of which appear to have been hitherto overlooked, will lead, I think, to the conclusion that the position assigned to this fish by Dr. Günther is the true one.

The specimen lately obtained is $53\frac{1}{2}$ inches long, the head measuring $7\frac{3}{8}$ inches. The height of the body in front of the pectoral fin is $4\frac{1}{4}$ inches. The branchiostegal membrane is supported by seven rays, which number may probably be taken as the normal one, as it agrees with one of Mr. Lowe's specimens, the other of which had six rays in that membrane. The fish has no barbels, in which negative character it resembles the genus *Batrachocephalus*, a member of the *Siluridæ*. The large eye ($1\frac{1}{8}$ inch in diameter) is surrounded by an adipose skin, which, on the posterior side, intrudes as a transparent veil upon the eye, covering it to the extent of one-third.

The *subopercle* of which Mr. Bennett spoke appears to be the *interopercle*, which has been extraordinarily developed at the expense of the *subopercle*, the latter being wanting. Both this and the *opercle* (which measures 2 inches across) are remarkable for their paper-like tenuity and the high radiating striatures on their surfaces. The hinder portion of the preopercle forms a strong bony ridge, also striated. The *coracoid* is very broad at its middle, where it is sculptured with radiating striæ like the clavicle. The suprascapular and the narrow scapular are longitudinally striated. The striæ on all the bones are strong.

The remarkably high first dorsal fin has forty-one rays, and the deeply-forked caudal fin nineteen rays, whilst the second dorsal is adipose—in these respects agreeing with Mr. Bennett's description ;

* See Trans. Zool. Soc. vol. i. p. 395.

but the pectoral fin has fourteen in place of fifteen rays, the ventral fin ten in place of nine rays, and the anal fin sixteen in place of seventeen rays. The first ray of the *pectoral* fin in the fish examined by Mr. Bennett was the longest. In this specimen the fifth and sixth rays are the longest (being $7\frac{1}{2}$ inches long), and they are rather more than twice the length of the strongly-serrated first ray, which is superior in length only to the three last. The first *dorsal* fin (the base of which is 32 inches long) arises out of a groove, each margin of which consists of a loose fold of adipose skin. The first ray is jointed above, and is strongly serrate along its free edge, like the first rays of the pectorals and ventrals. The first fifteen or sixteen rays appear to be simple, the others sparingly branched; but the only perfect ray in my specimen is the fourth, and that is 12 inches long. The first ray of the *ventral* fin, though simple and strong below, is jointed above and ends in a weak point. The first two rays of the *anal* fin are short, the succeeding four long, and the remaining rays short. The anterior part of this fin is fleshy, and at the base of this part there is a groove on each side. The length of the base of the whole fin, compared with the total length of the fish, is as 1 to $11\frac{1}{3}$, instead of as 1 to 10 in Mr. Bennett's example. The *caudal* fin measures $7\frac{1}{4}$ inches in length, and the tips of the lobes are 9 inches asunder.

Along the middle of each side on the posterior half of the body there is a low adipose keel of a black colour; and this marks the course, at this part, of the lateral line, which is unarmed throughout. The fish is covered with a thin smooth skin, and is entirely destitute of scales.

As to the *dentition*, there are at each side of the mandible, beginning at the posterior end, ten teeth of moderate size, directed backwards, and flattened, triangular, and pointed. Then come three long-pointed teeth, which decrease in length forwards; then five subulate teeth, having before them two long teeth on one side of the mandible, on the other only one; lastly, at the tip, one acicular tooth. The weak slender premaxillary is set with a single row of small sharp triangular teeth, about eighty-five on each side. The palatine bones are set posteriorly with a row of larger teeth, which, being flat, sharp, and triangular, resemble the teeth of a saw. They are directed backwards, and correspond in size and shape with the opposite teeth of the mandible. At the anterior part of each palatine bone is a row of seven or eight long formidable teeth, the hinder ones being larger; they are flattened, dagger-like, and are directed backwards. Behind these on one side are two long teeth, but only one such tooth on the other. The vomer is toothless.

With reference to the figure accompanying Mr. Bennett's description, it may be remarked that the nostrils are wrongly indicated, being much posterior to the place at which they are represented to be. They are really situated a little nearer the eyes than the snout. The two orifices of each pair, being small and close together, may have been overlooked; and a couple of slight depressions with a bony tubercle, in advance of their true position, have been apparently mis-

taken for them. Neither does the colouring of the figure well agree with my specimen, which, when fresh from the water, had a dark-bluish-grey back, with sides and belly of a silvery grey, reflecting a brassy lustre in certain directions of the light. The dorsal, pectoral, and caudal fins were a deep black; the ventral and anal fins a silvery grey. The indigo-blue spots in pairs near the lateral line in the figure seem to occupy the places of colourless mucous pores, which were observed in my specimen at irregular intervals near that line.

From this fish were obtained two species of Entozoa, viz. some large specimens of a *Distoma*, and several examples of a Tænioid worm, measuring altogether some feet in length.

2. REMARKS ON THE FRINGILLA INCERTA OF RISSO.

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

Mr. George Dawson Rowley has entrusted to me, for exhibition to the Society, a little bird which was brought to him alive at Brighton on the 13th of March last, having been caught in a net in that neighbourhood. It was ascertained by dissection to be a female; and, after examining it, I cannot but suspect that it may have been from specimens similar to it that the descriptions of the female of the so-called *Fringilla incerta* of Risso and other Continental writers have been drawn up. I have never before seen a specimen which agrees with these accounts, nor have I had access to the original authorities; but the compilation from them published by Dr. Degland (Ornith. Europ. i. p. 202) so accurately describes the present example that I do not hesitate to quote it.

“*Femelle*: Dessus de la tête, derrière du cou, scapulaires, dos et sus-caudales d’un brun olivâtre, plus clair à la tête, nuancé de gris sur les côtés du cou et sur le haut du dos; poitrine et flancs d’un gris olivâtre, avec des taches longitudinales plus foncées; abdomen et sous-caudales d’un blanc sale; rectrices et rémiges, d’un noir olivâtre, avec le bord externe liséré de vert grisâtre, les premières terminées de gris sale, ce qui forme deux bandes sur les ailes; rectrices de la couleur des rémiges; pieds d’un brun fauve.”

At the time of his writing the above passage, Dr. Degland states that the *Chlorospiza incerta* was unknown to him; but he subsequently says (*op. cit.* ii. p. 540) that he had obtained a male, taken in a net near Lille, in September, 1849, and adds that he was previously wrong in calling the species a *Chlorospiza*, for it was evidently a true *Pyrrhula*. This last assertion awakened the ire or the ridicule of Prince Bonaparte, who persists (*Revue Critique*, pp. 31, 32) in his former assignment of the bird to *Chlorospiza** (*Comp. List of Birds*, 1838, p. 30), as he also does later (*Consp.*

* There is apparently a misprint of 1852 for 1832, as the date of the establishment of this genus, in Mr. G. R. Gray’s most useful ‘*Catalogue of the Genera and Subgenera of Birds*,’ p. 77. In the ‘*List of the Specimens of British Animals*,’ &c., part iii. *Birds*, p. 100, the latter date is given, with the reference ‘*Pr. Bonap. Sagg. Distr. Met. Anim. Vert.*’; but I have been unable to consult the original work.

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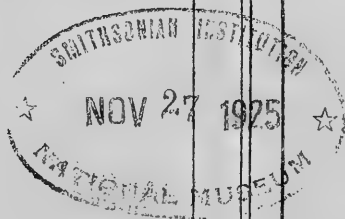
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OF THE
SCIENTIFIC MEETINGS
OF THE
ZOOLOGICAL SOCIETY
OF LONDON

FOR THE YEAR

1862.



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Avium, 1850, i. p. 513), though subsequently (Cat. des Ois. d'Eur. 1856, p. 4) he refers to it as the young of *Carpodacus erythrinus*.

Mr. Rowley's specimen, which I now offer for your inspection, seems to me without doubt to be a female of the common Greenfinch (*Chlorospiza chloris*), but is distinguished from the ordinary type by an entire absence of yellow colouring, which is replaced by nearly pure white, and the whole bird is generally of a paler hue. One or two friends to whom I have shown it are inclined to suppose it a hybrid between the Greenfinch and the Common Linnet (*Linota cannabina*); but of such an origin I perceive no indication either in the plumage or structure.

Now Dr. Jaubert, who is without doubt a naturalist peculiarly fitted to form an opinion on the subject, has stated—I may almost say, proved—that at least the male of the so-called *Fringilla incerta* is a curious variety, probably caused by confinement, of *Carpodacus erythrinus* (Rev. Zool. 1853, p. 109; 1856, p. 66); and his view of the case has been endorsed by Dr. Gloger (Journ. f. Orn. 1856, p. 313). It is certainly not for me, who know very little about the matter, to question his solution; but Prince Bonaparte is also no mean authority, and his so long referring the *Fringilla incerta* to the group *Chlorospiza*, rather than to *Carpodacus*, must not be forgotten. It appears, then, to me that the only way of reconciling these conflicting opinions is by the supposition that this *Fringilla incerta*, which has caused so much perplexity to ornithologists, has been made up of the abnormal plumages of two species,—the male being founded, as Dr. Jaubert says, on *flavescent* (if I may coin a word wanted to express a variation not uncommon in many classes of animals) examples of *Carpodacus erythrinus*, and the female, as I have here suggested, on under-coloured specimens of *Chlorospiza chloris*.

P.S. 5th May, 1862.—If uncertainty of opinion be ever allowed to a naturalist, perhaps it is pardonable in the case of *Fringilla incerta*. Since I communicated the foregoing conjecture to the Society, I have had an opportunity of examining Prince Bonaparte's great work the 'Fauna Italica.' I must honestly confess that the bills of both the birds represented in plate 38 have the convex character peculiar to the genus *Carpodacus*. Under these circumstances, I can only say that my supposition must go for what it is worth, which I fear may be very little; and I trust to the ornithologists of the south of Europe to clear up the matter more fully, by examining any specimens that may be contained in Prince Bonaparte's collection.

3. ON THE CRANIAL BONES OF LEPIDOSIREN ANNECTENS.

BY T. SPENCER COBBOLD, M.D., F.L.S., ETC.

(Plate XIII.)

The conformation of the skull of *Lepidosiren* is exceedingly peculiar, not only as regards its general outline and construction, but also

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in respect of the individual elements of which it is composed. Three, or at most four, bones enclose the cranial cavity; whilst four others form the face, two being concerned in the formation of the jaws. Besides these there are several osseous appendages, including the hyoid apparatus.

Commencing from behind forwards we find two lateral occipital bones (A, fig. 1), forming the posterior part of the cranial vault. From the side they exhibit a triangular outline; but their bases converge internally so as to form part of the floor of the cerebral cavity. At the middle line below, they unite, leaving, however, a small central interspace, through which may be seen the posterior part of the sphenoid bone; on this latter the occipitals rest. Intimately connected with the posterior border of these occipitals are two vertebral laminae (B) supporting a single neural spine (C); and immediately behind these there are two other laminae (D), surmounted by a double neural spine (E, E). All these elements rest upon the posterior part of the sphenoid bone, which may be looked upon as an ossified prolongation of the chorda dorsalis.

Opposite the point of union between the lateral occipitals and the sphenoid we find two remarkable appendages (F, F). These rib-like elements project obliquely backwards on either side, and form cylindrical rods, having a tolerably uniform thickness throughout. Notwithstanding the objections which may be raised, I am inclined to regard these bones as cranial ribs. They are placed above and behind the clavicular arch; and, as Bischoff remarks in *Lepidosiren paradoxa*, it is clear from their articular connexions that they cannot be regarded as styloid processes.

The sphenoid bone (G), seen from below (fig. 3), is spatulate. With the exception above mentioned, it forms the entire floor of the cranial cavity. It is concave at the anterior half, both above and beneath, and, consequently, also channeled out on either side. The posterior narrow end is convex inferiorly, where it likewise displays a T-shaped groove for the partial lodgement of the aorta. The sphenoid is relatively longer, and terminates more abruptly in front, than the corresponding bone in *Lepidosiren paradoxa*.

The vault of the cranium is also for the most part covered in by a single bone (H). This I believe to consist simply of the two conjoined parietals; but Bischoff thinks the frontals are likewise included in the mass. The appearance of the bone very strongly militates against this latter view, inasmuch as two ossific centres are clearly discernible at the anterior third on either side, and from these two points the osseous spiculæ radiate in all directions. Descriptively it may be regarded as consisting of three laminae united in the central line, the two lower forming the cranial roof, and the upper and somewhat thicker plate constituting a longitudinal vertical ridge, analogous to the parieto-occipital crest in Carnivora.

If the above view be correct, I think it will be admitted that the singular pair of bones overlapping the parietals can be none other than the frontals (I, I, figs. 1, 2); but Bischoff conjecturally assumes them to be the cheek-bones. That the malar bones should be found

extending as far back as the occiput is certainly not much more astonishing than that the frontals should do so. Anyhow, this singular disposition of parts is altogether unique; but in determining these elements to be frontals I am again guided by the centres of ossification, and especially also by the relative position of the bases of the bones. In this situation it will be noticed that they are conjoined in the middle line, whilst their lateral margins in front are directed at first outwards so as to form the upper part of the incomplete orbital ring. Viewed as a whole, these bones have been justly compared to a pair of horns; and their presence, more than any other of the osseous elements, imparts to the skull its unique character. It should be mentioned that the under surface of each bone presents near the inner border a well-defined longitudinal ridge, evidently for the firm attachment of the masseto-temporal muscles.

Immediately in front of the foregoing, there occurs a solitary bone having the form of an isosceles triangle, whose base is connected by ligaments with the anterior margin of the combined frontals. This bone (K, figs. 1, 3) is regarded by Natterer and Bischoff as the representative of the intermaxillary—their opinion being grounded on the circumstance of its supporting a pair of incisive teeth (L) at its anterior inferior surface. It is impossible, perhaps, to speak confidently on this point; but I may observe that the teeth in question are not actually implanted in this bone, but are moveably connected with it by ligamentous substance. I regard this fibrous matrix as homologous with the absent incisive elements (or intermaxillaries); whilst the triangular bone from which the teeth depend is the conjoined nasals. I find no trace of the transverse suture described by Bischoff as occurring in *Lepidosiren paradoxa*; but the tip of the bone in front and above is marked by a well-defined oval surface, roughened for the attachment of the thick cranial fascia.

Below the above we find a remarkable bone, which, at first sight, appears to be the upper jaw (M). Functionally, indeed, as acting in antagonism with the lower jaw, it may be so regarded; but morphologically and homologically it is clearly referable to the associated palatine bones, which are here of enormous size, intimately blended in front, and widely separated behind. Either division is extended in front so as to form three tooth-like projections, each of which is protected by a thick coating of enamel, the whole constituting a dental apparatus of the most formidable character. In the closed condition of the mouth these teeth become dove-tailed with the interspaces resulting from the similarly formed dentition of the jaw properly so called, the anterior palatine tooth-processes being then placed anterior to the corresponding dentations of the lower jaw. This arrangement is very peculiar; and its singularity is not lessened by the circumstance that the incisive teeth, above alluded to, have no antagonists. The true maxillary bones have no existence—a defect which, as Müller and Bischoff observe, also obtains in *Proteus*. The lip-cartilages, described by the latter author as occurring in *L. paradoxa*, I have not found to be present in this species.

The jaw proper (N) consists of several elements, as in reptiles

generally, three at least of these portions being recognizable, namely, the *dental*, *angular*, and *articular*. The anterior and posterior mental spines are conspicuously developed, the line of suture of the two halves of the jaw being entirely obliterated. As in the similar palatine dentition, the enamelled coverings of the teeth are not structurally connected in the middle line.

The *zygomatic* or *jugal* bone (O), to which the lower jaw appears to be exclusively articulated, is here very fully developed. This is the *os quadratum* of birds. The anterior inferior end is hollowed out for the reception of the articular process of the jaw, the upper portion being flat and directed inwards so as partly to overlap the border of the sphenoid.

Immediately below the above are two small osseous appendages, which Bischoff regards as opercular bones. The superior one (P) is styliform, and, from its position, seems to me to represent the *symplectic* bone, hitherto supposed to be peculiar to fishes. The inferior bone (Q) is comparatively broad, and by its position appears to correspond with the pre-opercular bone of the same class. Behind, below, and in ligamentous union with these bones, the hyoid apparatus (R) is connected. It here consists simply of two large, converging, curved cylinders, slightly flattened at either end, and which, stretching forwards and downwards, unite together anteriorly in the middle line. Bischoff calls them, taken together, the tongue-bone; but it appears to me that the two divisions are homologous with the *apophyses*, or anterior cornua of the hyoid.

4. ON THE SITUATION, FORM, AND CAPACITY OF THE GALL-BLADDER IN THE VERTEBRATA; ON ITS ABSENCE IN CERTAIN ANIMALS; AND ON THE COLOUR OF THE BILE. BY EDWARDS CRISP, M.D., F.Z.S., ETC.

In 1853 I read a paper at the London Physiological Society upon the Bile and Gall-bladder, but at that period my experience was comparatively limited. A very short abstract only of this communication was published in the 'Lancet' and 'Medical Times,' 1853.

As mentioned in the charter of this Society, one of the objects of its founders was the cultivation of anatomy and physiology—departments of zoology of much greater importance, as I believe, to the good of mankind than the external characters of animals, or of their too often fanciful division into genera and species. I therefore make no apology for the introduction of the present communication, which is partly physiological.

Every circumstance connected with the secretion, quality, and quantity of the bile—a fluid of such vast importance in the animal economy—must interest the zoologist; and, as I have stated in my papers "On the Causes of Death of the Animals dying in the Society's Collection" ('Proceedings,' 1860, pp. 175, 190) that diseases of the liver, and consequently derangements of the biliary secretion, are very frequent, the investigation, I think, must be profitable to the Fellows

of the Society—especially as the subject is one that may be divested of all scientific technicality, and may readily be understood by those unacquainted with anatomy.

The first part of my communication (on the Situation, Form, and Capacity of the Gall-bladder in the Vertebrata; on its Absence in certain Animals; and on the Colour of the Bile) I make this evening; the second part (on the Structure of the Gall-bladder; the place of Entrance of the Biliary Ducts into the Alimentary Tube; the Composition of the Bile, and its Morbid Conditions) I reserve for a future occasion.

As some of my hearers are to a great extent ignorant of anatomy, I may premise that the bile, secreted by the largest gland of the body, the liver, is poured into the alimentary tube, with that of the pancreatic juice, a short distance from the pyloric end of the stomach; that it is conveyed from the liver by small tubes or ducts, which vary in number in different animals; that the gall-bladder, a membranous bag, is a reservoir for the bile, so that a due supply of this important fluid is insured when perhaps the secretory action of the liver, from causes with which we are unacquainted, is impaired. Why certain animals should be supplied with this reservoir, and why others whose structure is nearly similar, and whose food is of the same kind, should be deprived of it, are questions to be considered hereafter.

In this communication I purpose giving the result chiefly of my own dissections, and I shall not allude much to the works of others; for it is only the combination of the deductions of labourers in the same field of investigation that will enable us *hereafter* to draw positive inferences. This method is especially necessary in investigating the anatomy and physiology of the gall-bladder, as there is probably no organ in which so many deviations occur.

For the purpose of showing the form and size of the gall-bladder, I place before the Society a diagram, in which I have sketched this viscus in 306 species (so-called) of animals, including 132 mammals, 99 birds, 43 reptiles, and 32 fishes; and I also place on the table the dried and distended gall-bladders of 49 different animals. I may likewise state that I have generally taken a sketch of the gall-bladder of all the animals I have dissected, and emptied the bile upon white paper or into a bottle; so that by this means I am enabled to exhibit the bile of nearly 600 species of animals. Some of this bile has been preserved for more than twelve years. I trust that I may be pardoned for these allusions, which to some may appear to be too egotistical; but I introduce them for the purpose of showing that I have paid much attention to the subject*.

Situation of the Gall-bladder.—In the vast majority of the Vertebrata, as in the human species, this organ is placed upon the right side of the liver, and, in Mammals, more or less imbedded in its sub-

* In the present International Exhibition (Class 2, No. 503) is a frame containing the bile of nearly 600 animals, which I have cut with a gun-punch from the papers which I now exhibit, for the purpose of showing the varieties of colour of this fluid, and its utility as a pigment when properly prepared.

stance, so that often on removing the gall-bladder a portion of the liver adheres to it. In birds there is seldom a depression in the liver for its reception; but in the Chelonian reptiles it is for the most part deeply imbedded in the hepatic substance; and the same remark will apply to many of the Saurians, although I have not found it so deeply placed as in the Chelonians. In the Ophidians it is mostly far removed from the liver, and in contact with the spleen and pancreas. Thus, in a *Python* (*P. molurus*), 10 feet long, I found it 18 inches from the liver; and this will be about the proportionate distance, taking the length of the reptile into account, in most of the true serpents. In the family of Orvets (*Anguis*), only three species of which I have examined, the gall-bladder was close to the liver; and the same description will apply to the Batrachians, many foreign species of which, besides the British, I have inspected. In the British bony fishes which I have dissected, the gall-bladder has been in contact with the liver; but my list includes only about forty species. In the Tunny (*Thynnus vulgaris*) I found the body of this viscus united to the liver by a long, narrow, spiral neck; it was 14 inches in length, and about $\frac{3}{4}$ of an inch in diameter.

The Form and Capacity of the Gall-bladder.—In Man it is of a pyramidal form, and holds from one ounce to two ounces of bile. In many of the Quadrumana its form has not so great a resemblance to that of the human species as in some of the lower Mammals; thus, in six Anthropoid Apes that I have examined (three Ourangs and three Chimpanzees) the gall-bladder was of a twisted irregular shape,—a fact of importance now that some zoologists are giving these brutes, as I believe, an undue elevation in the vertebrate scale. Among the Monkeys even of the same species I have found much deviation of form in the gall-bladder: thus, in a Capuchin it was triangular, with three mamillary projections at the base, and in others nearly cylindrical. The capacity of this organ in the Quadrumana varies from one to six drachms, according to the size of the animal; probably in the old Anthropoid Apes it would be proportionately more capacious than in Man, as is the case with the smaller Monkeys, all of which consume relatively a larger quantity of food.

In the Lemurs (*Lemuridæ*), five species of which I have inspected, the gall-bladder was of a pyramidal shape, and its capacity rather large.

In the Bats (*Cheiroptera*), my notes afford no information upon the subject worthy of record.

The *Insectivora*, as far as I have examined them, have a large gall-bladder.

In the Bears (six species of which I have inspected) it is generally large and pear-shaped. In the Polar Bear (*Ursus maritimus*) I found it more irregular in form. In the Raccoon (*U. lotor*), Coatimondi (*U. nasua*), Kinkajou (*U. caudivolvulus*), Wolverine (*U. gulo*), Badger (*U. meles*), Ratel (*U. mellivorus*), and Tayra (*Mustela barbara*), it is large and pyramidal; and the same remark will apply to the Weasels, Otters, Dogs, Hyenas, and Civets. In the Cats it is often of a somewhat irregular spiral form; this is the case in the Lion and in

some of the smaller Felidæ. In a new species of *Lynx* (*F. macrocelis*) the gall-bladder was of a triangular shape, with a long narrow twisted neck; and I have seen nearly the same form in a young Lion at birth. In the Ocelot (*F. pardalis*) the neck is coiled once round; and I have found a like shape in some of the smaller Cats. In the Otter (*F. lutra*) it makes a half turn. I may remark that the form of the gall-bladder can only be properly seen when it is distended with air.

In the Seals (*Phocidæ*) (three species examined) it is of a pyriform shape, and very capacious. In the Walrus (*Trichechus*) I also found it large.

I will mention the capacity of this organ in a few of the Carnivora, in which I measured the bladder by filling it with water. The gall-bladder of the Lioness which recently died at the Society's Gardens contained five fluid ounces of bile; that of a Polar Bear (*Ursus maritimus*), four ounces; Cape Hunting Dog (*Lycan pictus*), one ounce; Clouded Tiger (*F. macrocelides*), seven drachms; Ocelot (*F. pardalis*), seven drachms. In other animals of this order its capacity, in relation to the size of the body, is about the same.

In the *Marsupialia* the gall-bladder is generally of a more rounded form than in the last-named division, and of moderate capacity. In the Tasmanian Wolf (*Thylacinus*), it held about seven drachms; in the Great Kangaroo (*Macropus major*), five drachms; in the Red Kangaroo (*M. ruber*), about the same; in the Tree Kangaroo (*Dendrolagus inustus*), about three drachms; in the *Halmaturus xanthopus*, five drachms. In the Opossums, Dasyures, and Phalangers, such as I have examined, the form and capacity, in relation to the bulk of the quadruped, is nearly the same as in the above.

In such of the Rodents as possess a gall-bladder I have generally found it of a rounded or oval form, as in the Marmot (*Arctomys alpinus*), Hare (*Lepus timidus*), Rabbit (*L. cuniculus*), Beaver (*Castor fiber*), Agouti (*Dasyprocta*), Common Mouse (*Mus musculus*), Common Squirrel (*Sciurus vulgaris*), Grey Squirrel (*S. carolinensis*), West Indian Squirrel (—?), Flying Squirrel (*S. volucella*). The capacity is moderate and tolerably uniform in the above. In the Beaver, chiefly a ligneous feeder, the capacity is about two and one-half drachms.

It was absent in the Capybara (*Hydrochaeris capybara*), in the *Sciurus maximus*, Jerboa (*Dipus*), and Musquash (*Castor zibethicus*). In other species of Rodents my attention was not directed to this subject. Cuvier states that in the genus *Mus* the gall-bladder is absent; but I think many exceptions will be found to this.

Edentata. In the Great Anteater (*Myrmecophaga jubata*) I found the gall-bladder capacious and of a somewhat pyramidal shape; in two species of Armadillo (six-banded and nine-banded) it was more cylindrical; in one of the Monotremata, the *Ornithorhynchus*, it was very large, and its form pyramidal.

The Absence of the Gall-bladder.—As far as I have gone, with the exception of the Chiroptera, about which I am unable to speak from my own observations, as I omitted to look for this viscus in the British Bats and in many foreign species that I have dissected, all the animals I have spoken of, excepting the Rodents already mentioned

are furnished with a gall-bladder; but we now come to a division (the Pachydermata) in which this organ is generally absent. I have found it in the Wart Hog (*Phacochoerus aethiopicus*), in Ælian's Wart-Hog (*P. aliani*), in the Red River-Hog (*Potamochoerus africanus*), in the Javan Wild Hog (*Sus vittatus*); but in the Wild Boar of Europe (*S. scrofa*), and in the Indian Hog (*S. indicus*) I omitted to note its presence. In the above-named animals it is long and rather capacious, containing from one and a half to two and a half ounces of bile.

It was absent in two Tapirs (*Tapirus americanus*), in the White-lipped Peccary (*Dicotyles labiatus*), and in the Collared Peccary (*D. torquatus*), in two Asiatic Elephants (*Elephas indicus*), in the Hyrax (*Hyrax capensis*) (two specimens), in the Horse (*Equus caballus*), in the Ass (*E. asinus*), and in the Zebra (*E. zebra*). I have not examined the Hippopotamus or the Rhinoceros; but it is said to be absent in both; so that, with the exception of the Pigs (*Suidæ*), none of the Pachyderms have a gall-bladder.

Ruminantia. This is one of the most interesting divisions as regards the physiology of the gall-bladder. It has been always stated that the solid-horned Ruminants have no gall-bladder, and that in the hollow-horned it is present—an assertion that, like too many others in zoology, has been made without sufficient evidence.

In one of the most recent articles on the Ruminantia that I am acquainted with, by Dr. Cobbold (Todd's 'Cyclopædia of Anatomy and Physiology,' 1859), this author, in reference to the gall-bladder says, "This family (the *Camelidæ*), in common with the *Cervidæ* proper, is further distinguished by the absence of a gall-bladder, whereas the hollow-horned Ruminants invariably possess this structure." In speaking of the double gall-bladder of the Giraffe, described by Professor Owen, Dr. Cobbold thinks it a circumstance serving to illustrate a feeble alliance with the *Antilopidæ* on the one hand, and a nearer approach to the *Cervidæ* and *Camelidæ* on the other.

In my dissections of the Ruminants I have sometimes omitted to sketch the gall-bladder, or to name it in my notes; but the subjoined list of animals, I think, is sufficiently extensive to show that this supposed law is not always to be depended upon.

I found that it was absent in the Alpaca (*Lama pacos*), Lamas 2 (*L. glama*), Guanacos 2 (*L. huanaca*), Virginian Deer 2 (*Cervus virginianus*), Reindeer 4 (*C. tarandus*), Sambur Deer 2 (*C. hippelaphus*), Malacca Deer (*C. malaccensis*), Rocky-Mountain Deer (*C. —?*), Hog Deer 3 (*C. porcinus*), Brocket (*C. auritus*), Indian Deer 3 (*C. indicus*), Mexican Deer (*C. mexicanus*), and Elk (*C. alces*).

In Wapiti Deer (*C. canadensis*), Persian Deer (*C. wallichii*), Barbary Deer (*C. barbarus*), and Barasinga Deer (*C. duvaucellii*), I did not look for it.

I found it in the Musk Deer (*M. moschiferus*), Axis Deer 3 (*C. axis*), Brocket (*C. superciliaris*) (but absent in one specimen), Leucoryx 3 (*Antelope leucoryx*), Eland (*A. orcas*), Harte Beeste (*A. caama*), Isabelline Antelope (*A. isabellina*), Striped Antelope (*A. scripta*), Dorcas Gazelle (*A. dorcas*), Indian Gazelle (*A. bezoartica*), Bennett's Gazelle (*A. bennettii*), *Gazella vera*, Spring Boc (*Antelope*

euchore), Nylgau (*Portax pictus*) 2, also in the Mufflon (*Ovis musimon*) and Cape Sheep (*O. capensis*).

It was absent in three Giraffes (*Camelopardalis giraffa*) that I have examined, as well as in the following:—Duiker Boc (*Antilope mergens*), Bonte-boc (*A. pygarga*), Addax (*A. addax*), Bubaline Antelope (*A. bubalis*), Philantomba Antelope (*A. maxwellii*), Grys-boc (*A. melanotis*), Reh-boc (*A. capreola*), and Angora Goat (*Capra angorensis*); but, speaking from memory, I believe I have seen it in other specimens of the Goat.

[The figures after the names indicate the number dissected.]

The form of the gall-bladder of the Ruminants is generally somewhat pear-shaped; but the circumference of the neck is nearly equal to that of the fundus. It is generally of large proportionate size: that (of the Ox) on the table holds eleven ounces. In an old Leucoryx Antelope I found it nearly as capacious; but in two younger specimens the gall-bladders were much less. The capacity in the smaller Ruminants varies from six drachms to three ounces. The Ox, I believe, has the largest gall-bladder of any terrestrial animal—a fact of considerable interest when it is remembered that a vast number of Ruminants the food and digestive apparatus of which are of a very similar description are unprovided with this reservoir.

Birds. In the great majority of birds that I have dissected, the form is very similar: it is mostly ovoid; in some oblong; and in a few, as in the Cassowary (*Casuarus galeatus*), Cormorant (*Pelecanus carbo*), and Guan (*Penelope pileata*), nearly cylindrical. In the Double-wattled Cassowary (*Casuarus bicarunculatus*) it resembles more the gall-bladder of a mammal than that of any bird I have seen. The capacity is very uniform, and generally bears a near relation to that of the bird. As with quadrupeds, there appears to be no important difference between the animal and vegetable feeders, or in those that take a mixed diet. Its capacity is from three to four drachms in the Cranes and Storks, in the Cassowary about six drachms, in the Vultures and Eagles from two to three drachms, in the Great Bustard (*Otistarda*) four drachms, in the Brush Turkey (*Talegalla lathamii*) three drachms.

As is well known, the Pigeons, Parrots, Mackaws, Parrakeets, Lories, Toucans, Toracos, and some other birds are said to be without a gall-bladder. I have dissected many of the above-named; but, as I took it for granted that this organ did not exist, I was not so careful in the inspections as I should have been. Cuvier says it does not exist in the Cuckoos (*Cuculidæ*); but I have found it both in the Spotted Cuckoo of Europe (*Cuculus glandarius*) and in the Java Cuckoo (*C. orientalis*). In the Ostrich (*Struthio camelus*) and in the Rhea (*Rhea americana*) I examined, it was absent, but present (as I have stated) in both species of Cassowary. The Emu I have not dissected.

Reptiles. In the Chelonian Reptiles the gall-bladder is very large. In some of the large Turtles it will contain from two to three ounces of fluid. In the Saurians it is likewise capacious. In a large Alligator, weighing about two hundredweight, its capacity was about four ounces; but in many Alligators and Crocodiles that I have in-

spected it was proportionately smaller. In the Ophidians it is of moderate size. In a Python (*Python molurus*), weighing thirty-three pounds, its capacity was about two ounces. In the Batrachians its form is more globular, and its size (relatively) larger. I have not found the gall-bladder absent in any Reptile.

Fishes. In the British Fishes (forty-two species of which I have only examined for this purpose) I found a gall-bladder, the shape globular in all, with the exception of that of the Tunny before named: it is rather capacious in this division. In a Pike (*Esox lucius*) weighing twenty-eight pounds, the capacity was about one ounce. In a Wolf-fish (*Anarrhichas*) weighing twelve pounds, about the same. In the *Lophius piscatorius*, a very ravenous fish, it was much smaller. In the Shark (*Lamna cornubica*), Dog Fishes (*Scyllia*), and Rays (*Raiadæ*) its proportionate capacity is about the same as in the osseous fishes.

Before I finish this part of my subject, I will add a few remarks about the supposed absence of a gall-bladder in many fishes. Cuvier did not depend always upon his own observations. I believe that this organ has escaped notice in many instances, especially in the Fishes. The Giraffe was supposed not to possess a gall-bladder; but in two examined by Professor Owen, one was without a gall-bladder, the other had a double gall-bladder, as may be seen in the preparation in the Hunterian Museum.

As I have stated before, in three Giraffes that I have inspected, this viscus was wanting in all. I have met with one specimen of a double gall-bladder in the Sheep; and in the Hunterian Museum there is the liver of a small animal (unknown) with three distinct gall-bladders; so that I think it will be well for future observers not to assume that this reservoir is absent, but to look for it in all the Vertebrata. It is well to remember, too, that the gall-bladder in some reptiles and fishes is not always close to the liver—a circumstance, as stated by Cuvier, that may have led to its having been often undiscovered. Sir E. Home, as mentioned in the 'Museum Catalogue of the College of Surgeons,' described, in the 'Philosophical Transactions' for 1809, the Basking Shark (*Selache maxima*) as being without a gall-bladder. M. de Blainville (in the 'Annales du Muséum,' 1811) found a gall-bladder in this fish, 4 or 5 inches in diameter; but it was seated 6 feet from the liver. As I am speaking of the Hunterian Museum, I may add, for the purpose of showing how little this subject has been attended to, that only ten gall-bladders are to be seen in this collection—one of a Fish, three of Reptiles, three of Birds, and three of Quadrupeds.

I have only time for a passing remark on the quantity of bile secreted by various animals. The estimate must to a great extent be conjectural; but in the human subject, where fistulous communications have been accidentally established, and in Dogs and other animals where the ducts have been exposed, some indications of the average daily quantity of this secretion may be formed. Thus, in Man it is probably from six to ten ounces daily. In the domesticated Ox—a quadruped (as before stated) that has, I believe, a larger

gall-bladder than any land animal—from thirty to sixty ounces; by some physiologists a much larger quantity is given. The daily amount of bile secreted depends probably upon the quantity and quality of the food. Thus, animals that eat frequently have most likely a larger secretion; whilst those that fast for a long period (as some of the reptiles), although they possess large gall-bladders, have comparatively a small secretion of bile. There appears to be no important difference between the animal and vegetable feeders; nor does the absence of a gall-bladder, as far as we can ascertain, influence the quantity of the secretion.

The Colour of the Bile.—The specimens before the Society, from all divisions of the Vertebrata, show the great variety of colours exhibited by this fluid: all shades of brown, green, and yellow are present, and many of them very vivid and intense. It must be observed that animals in confinement often have the bile in an abnormal condition; and probably the colour is influenced to a great extent by the diseased or healthy condition of the liver—a matter to be spoken of hereafter.

In fishes the colour is generally of a light yellow, in some inclining to brown. In reptiles some of the most vivid browns, yellows, and greens are seen: the last-named colour is not unfrequent in the web-footed birds and in some of the Rapaces; but the prevailing colours in the birds are browns and yellows. In mammals the intense greens are rarely seen; but the colours vary from light green to shades of yellow or brown of every hue. The applicability of this fluid as a pigment cannot be properly touched upon here.

In this paper I have spoken entirely from my own observations, and I have handled the matter in a different manner to that of any previous inquirer; so that zoologists who may hereafter investigate this interesting subject may, by combining my labours with those of others in the same field of research, profit, I hope, by this investigation.

Mr. A. Murray pointed out the characters of a new Crocodile from the Old Calabar River, West Africa, for which he proposed the name *Crocodylus frontatus*, as indicative of the large size of the forehead in this species.

The following lists of the additions to the Menagerie during the months of January, February, and March were laid before the meeting:—

JANUARY.

		Presented by
1 Common Tench.....	<i>Tinca vulgaris</i>	C. D. Tanqueray Willaume, Esq.
1 Red and Yellow Maccaw.	<i>Ara ararauna</i>	Mr. Atcheler.
1 Bonnet Monkey.....	<i>Macacus radiatus</i>	R. Ridgley, Esq.
1 Chamelion	<i>Chamaeleo vulgaris</i>	Dr. Babington.
1 Pig-tailed Monkey.....	<i>Macacus nemestrinus</i> ..	E. Walden, Esq.
1 Maltese Pig	<i>Sus scrofa</i> , var.....	J. Cunningham, Esq.
1 Crested Curassow	<i>Crax alector</i>	Dr. Kelaart of Trinidad.
2 Common Ravens	<i>Corvus corax</i>	Rev. W. Willimott.

JANUARY (continued).

1 Rosy-crested Cockatoo ...	<i>Cacatua roseicapilla</i>	L. Blaize, Esq.
2 Albino Rats	<i>Mus rattus</i>	Rev. J. G. Hills.
1 Polecat	<i>Putorius fetidus</i>	} Purchased.
1 Spotted Cary	<i>Cælogenys paca</i>	
1 Podargus	<i>Podargus cuvieri</i>	
1 Blue-streaked Lory	<i>Eos riciniata</i>	
2 Buff-breasted Partridges ..	<i>Ptilopachys fuscus</i>	
2 Lesser Razor-billed Curassows.	<i>Pauxi tomentosa</i>	
1 Coquetteon	<i>Cephalophus rufilatus</i> ..	
2 Jerboas	<i>Dipus ægyptius</i>	
1 Douroucouli Monkey.....	<i>Nyctipithecus trivirgatus?</i>	
1 Sooty Monkey	<i>Cercocebus fuliginosus</i> ..	

FEBRUARY.

		Presented by
1 Capuchin Monkey.....	<i>Cebus capucinus</i>	Dr. Battershell Gill, F.Z.S.
1 Purple Heron.....	<i>Ardea purpurea</i>	Capt. Richardson.
1 Jerboa	<i>Dipus ægyptius</i>	B. Cochrane Willis, Esq.
1 young Sea Eagle	<i>Haliaeetus leucocephalus</i> ..	Dr. E. J. Longton.
1 Marmozet	<i>Hapale iacchus</i>	C. H. Smith, Esq., F.Z.S.
3 Chinese Sand-Grouse ...	<i>Syrrhaptes paradoxus</i> ..	A. O'Brien, Esq.
13 Undulated Parrakeets...	<i>Melopsittacus undulatus</i> ..	} Purchased.
1 Flying Fox	<i>Pteropus medius</i>	
1 Zenaida Dove	<i>Zenaida aurita</i>	
1 Lump Fish	<i>Cyclopterus lumpus</i>	
1 African Buzzard	<i>Buteo tachardus</i>	

MARCH.

		Presented by
1 Vulpine Opossum	<i>Phalangista vulpina</i>	The Earl of Kilmorey, F.Z.S.
1 Rosy-crested Cockatoo ...	<i>Cacatua roseicapilla</i>	Mrs. Clegg.
1 Cockateal	<i>Calopsitta novæ hollandiæ</i>	T. W. Nunn, Esq.
1 Rhesus Monkey.....	<i>Macacus rhesus</i> , var.....	G. Estridge, Esq.
3 Laughing Kingfishers ...	<i>Dacelo gigas</i>	Dr. Müller.
1 Crested Curassow	<i>Crax alector</i>	H. E. Crum-Ewing, Jun., Esq.
2 Rough-legged Buzzards...	<i>Archibuteo lagopus</i>	Sir T. F. Buxton, Bart., F.Z.S.
1 Golden Eye	<i>Clangula glaucion</i>	} Purchased.
1 Scaup Duck	<i>Fuligula marila</i>	
2 Lions	<i>Felis leo</i>	
1 Red Kangaroo	<i>Macropus rufus</i>	
2 Pademeleon Wallabies ...	<i>Halmaturus thetidis</i>	
1 Small Wallaby	<i>Halmaturus</i> — ?	
1 Palæornis	<i>Palæornis malaccensis</i> ..	
4 Flamingos	<i>Phænicopterus antiquorum</i> .	
6 Wheatears	<i>Saxicola ænanthe</i>	
4 Oyster-Catchers.....	<i>Hematopus ostralegus</i> ..	
2 Birds of Paradise	<i>Paradisea papuana</i>	

Of these, *Eos riciniata*, *Ptilopachys fuscus*, and *Paradisea papuana* were stated to have been exhibited for the first time.

May 13, 1862.

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

The Secretary reported that the 'La Hogue,' which had sailed from Sydney on the 16th of January, with the living Kagu (*Rhinocetus jubatus*) on board, shipped for the Society by Dr. Bennett, had arrived on the 22nd of April last, with this curious bird in perfect health. The Kagu had been transferred without delay to the New Aviary in the Society's Gardens. Dr. Bennett had also forwarded by the same vessel two Hornbills and a Pigeon from the Salomon Islands, and a *Porphyrio* from the island of Tanna, of the New Hebrides group, to be deposited in the Society's Gardens, and taken care of for H.R.H. the Duc de Brabant.

One of the Hornbills had died shortly before the arrival of the vessel, but, having been placed in spirits, had made a good skeleton. This and the skin had enabled the species to be determined. It appeared to be *Buceros ruficollis*, agreeing with Temminck's figure (Pl. Col. 557) of that bird. The male, still living, had the head and neck rufous white, darker posteriorly; in the female, which had died, these parts were black. Dr. Sclater had remarked a similar distinction of the sexes in the specimens of this bird in the Museum at Leyden.

The Pigeon appeared referable to *Carpophaga rubricera*, G. R. Gray, MS. (*Globicera rubricera*, Bp. Consp. ii, p. 31). The *Porphyrio* was much like *Porphyrio melanotus* (Gould's B. Austr. vi. pl. 69), already in the Menagerie, but smaller in dimensions, and apparently distinct.

The same vessel had also brought a large consignment of Parrots for sale, out of which the Secretary had secured for the Society's Menagerie examples of the following rare species, all new to the collection:—

1. *Calyptorhynchus banksii*, Vig. & Horsf., from New South Wales.

2. *Cacatua ducorpsii*, Hombron & Jacquinot, from the Salomon Islands—a very distinct species, allied to *C. moluccensis* and *C. cristata*, but readily distinguishable by the blue skin round the eye and the yellow-tinged crest, as shown in Mr. Wolf's drawing (Pl. XIV.).

3. *Pyrhulopsis personata* (G. R. Gray), from the Fiji Islands, agreeing with the bird figured, P. Z. S. 1848, Aves, Pl. III. p. 20.

Dr. Crisp exhibited the following specimens:—

1. The head of a Partridge (*Perdix cinerea*), shot in September last; the upper mandible much thickened and curved upwards, so that its point was three-fourths of an inch from the tip of the lower mandible. The bird was in tolerable condition, and had probably lived chiefly on green food, as turnip-tops were found in the crop and gizzard. Three birds were shot in the same locality with a similar

malformation, and it is believed that they belonged to the same covey.

2. The cæcal appendages of the Impeyan Pheasant (*Phasianus impeyanus*), for the purpose of showing their large size. The two when distended measured 18 inches in length, and held seven ounces of water. Dr. Crisp said that, with the exception of the larger size of these cæca and a larger number of tracheal rings, the visceral anatomy of this bird differed in no important points from that of our common Pheasant (*P. colchicus*).

3. The tail-glands of the Black Swan (*Cygnus atratus*) and of the Red-throated Diver (*Colymbus septentrionalis*). In both these birds the elevatores coccygis were seen to be firmly inserted into the posterior part of the glands, so as to aid materially in the expulsion of their contents.

Mr. Fraser exhibited for Lord Powerscourt an enormous pair of antlers with forty-four points, supposed to be those of the Red Deer, from the Carpathian Mountains. Their weight was stated to be seventy-four pounds; the length of each antler 5 feet 8 inches, following the curve, the distance direct from the base to the tip of each antler being 4 feet 3½ inches, the greatest width of the antlers 5 feet 5 inches. The following was Lord Powerscourt's memorandum respecting this remarkable specimen:—

“This pair of horns was bought for me by the Hon. Julian Fane, at Vienna, about six weeks ago. The history he got with them was that they had belonged to a person who lived near Kronstadt in Transylvania; that they were sold out of his Schloss, on his death lately, and bought by a travelling merchant, who again sold them to a burgher of Vienna, from whom Julian Fane bought them for me for £50.”

Mr. Alfred Newton exhibited some birds, collected in Madagascar by his brother Mr. Edward Newton and Dr. Roch (both Corresponding Members of the Society), who had formed part of the Mission lately sent to that island by the Government of Mauritius. He remarked that last autumn, when news of the despatch of the envoys reached England, regrets had been expressed in some of the public prints that no professional naturalist had been attached to the Mission, and that the Society's Secretary had then pointed out, in a letter to *The Times*, that the fears so manifested were groundless. The Secretary's opinion had been fully verified, as regarded Ornithology, by the collections transmitted home by those gentlemen. Though small, they consisted chiefly of specimens of great interest and rarity, few of the species being contained in any museum in this country. Dr. Hartlaub's description of one bird, entirely new to science, the Society would shortly hear read; and there could be little doubt that the notes and observations which Dr. Roch and Mr. Edward Newton were about to publish in 'The Ibis' would well deserve the notice of naturalists interested in the Fauna of Madagascar. Mr. Newton added that he understood that a collection of Reptiles

and Fishes had also been made by those gentlemen, but that it was unfortunately spoiled, after its arrival at Mauritius, by the dishonesty of a native servant, who had abstracted the spirit in which the specimens had been preserved.

The following papers were read :—

1. NOTICE OF A SPECIES OF *LASIURUS* SENT FROM THE SANDWICH ISLANDS BY MR. W. H. PEASE. BY DR. J. E. GRAY, F.R.S.

I have just received from Mr. W. H. Pease a specimen of *Lasiurus* or Hairy-tailed Bat, with the following observation, dated Honolulu, Nov. 20, 1861 :—“I have the pleasure of sending you a specimen of the Bat found on our islands, also a skull separate. It is the only mammal indigenous to our group (of islands). It is quite a curiosity to our natives, very few of them having ever seen one.”

I have carefully compared the specimen sent by Mr. Pease with the *Lasiuri* in the British Museum, which have been named by Mr. Robert Tomes in conformity with his paper on the species of the genus, printed in the ‘Proceedings of the Zoological Society’ for 1857.

I cannot find any distinction between it and the specimen named *Lasiurus grayii*, described in his paper. (See P. Z. S. 1857, p. 40.)

The Museum specimen was received from Mr. Bridges, who obtained it in Chili.

There is a second specimen in the Museum Collection named by Mr. R. Tomes *L. grayi*, which was collected by Mr. John E. Goodsir at Nasqually, Juan de Fuca. I may observe that the Sandwich Islands specimen is of the same size as the specimen from Chili, and considerably smaller than the one from Juan de Fuca, which has the arm-bone nearly a line and a half longer than the Chilian and Sandwich Islands specimens.

This Bat being found in the Sandwich Islands is curious, as showing the similarity of the fauna in some particulars with that of the Western Coast of America.

2. NOTICE OF A NEW SPECIES OF DOLPHIN (*DELPHINUS CATALANIA*), DISCOVERED IN NORTH AUSTRALIA BY MR. JOHN MACGILLIVRAY. BY DR. J. E. GRAY, F.R.S., ETC.

Mr. John Macgillivray has sent to Mr. Cuming, who has transferred them to the British Museum Collection, two skulls of a species of Dolphin or Bottlenose, which he regards as probably new.

These skulls were accompanied by the following notes :—

“*DELPHINUS*, n. s.

“*The larger of the two* skulls belonged to an individual killed off Cape Melville (within the Great Barrier Reefs), north-east coast of Australia, Sept. 5, 1860. It was a *female*, $7\frac{1}{2}$ feet in length; and

from it were taken two foetuses, each 10 inches in length. The adult was of a very light lead-colour above and on the sides, gradually passing into the dirty leaden white of the lower parts, which were covered (as also the flippers) with longitudinally elongated blotches of dark lead-colour.

"The smaller of the two skulls represents another Porpoise of the same species, harpooned off Cape Flattery, on the north-east coast of Australia, Oct. 9, 1860. It was considerably smaller than the first one, being only $6\frac{3}{4}$ feet in length. It was a *female*. The colour was *exactly* lead-colour, fading into whitish on the lower parts between the anus and the snout. The sides were marked with small oblong spots of the same colour as the back. Measurements when recent :—

"Total length, snout to centre of tail, 6 feet 9 inches.

"Snout to base of dorsal, 3 feet; length of anterior border of dorsal 13 inches; height of dorsal 8 inches; width of dorsal 12 inches; from posterior border of dorsal to tip of tail, 2 feet 8 inches.

"Swimming-paws (midway between snout and dorsal) 13 inches long, and $5\frac{1}{2}$ inches broad; from their base to end of snout, 13 inches.

"Tail 22 inches across from tip to tip.

"Anus 2 feet 2 inches in front of tail (centre of tip).

"Eye $\frac{3}{4}$ ths of an inch in diameter, situated $1\frac{1}{2}$ inch behind angle of mouth, and 12 inches from tip of upper jaw.

"Lower jaw projecting 1 inch beyond the upper.

"This Porpoise was occasionally seen, in small droves of from three to six, along the north-east coast of Australia, within the reefs. Two other species also were seen, but we could not fasten."

The two skulls slightly differ in shape and size.

No. 1 is 17 inches long; the beak to the notch is 10 inches, and the upper teeth-bone $8\frac{1}{2}$ inches long; the front lower teeth are worn away and truncated, like the teeth of the common *Delphinus tursio*, which was described as *D. brunatus* by Montague. There are twenty-seven teeth on each side in the upper, and twenty-five teeth on each side in the lower jaw.

No. 2 is 17 inches long; the beak $9\frac{1}{2}$, and the upper tooth-bone 8 inches long. The teeth, twenty-four above (perhaps one on each side is deficient, as the end of the jaw is very tender), twenty-three or twenty-four below. The front lower teeth are slightly truncated; but this skull chiefly differs from No. 1 in being rather more convex and rather narrower, especially in the hinder part, from the middle of its length.

I have compared these skulls with those of the different species of Bottlenoses (*Tursio*) in the British Museum; and they are perfectly distinct from any of them. The species may be called *Delphinus catalania*. It is smaller in size, and has a much smaller brain-cavity than *D. cymodice* (Gray, Zool. Erebus & Terror, t. 19) and *D. metis* (Gray, Zool. Erebus & Terror, t. 18); and the beak is not so tapering as in these species, and the teeth are rather more numerous.

It is equally distinct from *Delphinus eurynome* (Gray, Zool. Erebus & Terror, t. 17), believed to be from the North Sea.

It is not easy to point out the distinction of these species in words; but there cannot be a doubt about them when they are compared together.

I may here observe that *Delphinus eutropia* (Gray, Proc. Zool. Soc. 1849, 1; Zool. Erebus & Terror, t. 34 ined.), which, in the 'Catalogue of Cetacea' in the British Museum, I have placed in the first section of *Tursia*, with *D. tursio* and the species above named, should be formed into a section of itself, characterized by having a very broad muzzle shelving on the sides, and the skull shelving down over the orbits, and thirty-four or thirty-five slender teeth on each side of each jaw. This section may be called EUTROPIA.

3. NOTICE OF A WINGLESS BIRD, OR MOHO, AND A RAVEN FOUND IN THE ISLAND OF HAWAII BY MR. W. H. PEASE. BY DR. J. E. GRAY, F.R.S., ETC.

In a note lately received from Mr. W. H. Pease, dated Honolulu, Nov. 20, 1861, he observes, "I noticed in a late number of the 'Annals of Natural History' a description of a species of bird living in our islands (which was figured many years since in Dixon's 'Voyage'), by Mr. Gould; he refers it to the genus '*Moho*.'

"Please inform him that there is a *wingless bird* of small size living in the island of Hawaii, which the natives call '*Moho*,' which is now nearly extinct, having been killed off by the wild cats and dogs within late years; I have seen but a single specimen. There is also living there a species of Raven."

4. SOME REMARKS ON AQUILA DESMURSII (J. VERREAUX). BY J. H. GURNEY, M.P., F.Z.S.*

M. Jules Verreaux, who first recognized this Eagle as a distinct species, communicated his description of it to Dr. Hartlaub, by whom the species was made known to ornithologists in his admirable work on the Ornithology of West Africa.

My present object is to put on record some information as to this interesting bird, with which M. Jules Verreaux has been so good as to supply me, and also to give some indications of the changes of plumage to which this species appears liable, and which I have had the opportunity of examining in several examples which now form part of the collection of the Norwich Museum.

It may, however, be well to premise a few general remarks with reference to the geographical distribution of this Eagle, and to some of the peculiarities by which it is distinguished.

Aquila desmursii has hitherto only been found in Tropical Africa, north of the Equator,—specimens having been obtained at Bissao

* This paper will also be published in the Society's 'Transactions,' accompanied by a plate.

on the western coast, and also in Nubia and Abyssinia, and on the banks of the White Nile.

It is a small species, intermediate in size between *Aquila pennata* and *Aquila naevia*. From the former it is readily distinguishable by the greater length of all its measurements; from the latter (as also from *Aquila naevioïdes*) it may, on the contrary, be distinguished by its less size and, as Dr. Hartlaub well remarks, "by the more delicately shaped bill, and by the greater length of the tail" as compared with that of the wings.

Another well-marked distinction to which Dr. Hartlaub does not allude is to be found in the presence in *Aquila desmursii* of a well-defined, though small, occipital crest, consisting of from eight to nine pointed feathers, the longest of which are fully an inch and a half in length.

The colouring of this Eagle, described in Dr. Hartlaub's work, is that which characterizes what I believe to be the adult bird after it has newly moulted and has acquired its fresh plumage. In this dress the general colouring of *Aquila desmursii* closely resembles that of the adult of *Aquila naevioïdes* under similar conditions, being of a rufous brown, varying in intensity in different portions of the same feather.

Other specimens of *Aquila desmursii* exhibit a plumage of an extremely dark and almost uniform chocolate-colour. These individuals I believe to be immature birds, in which the feathers have been also newly acquired. In this stage they bear a considerable general resemblance in point of colouring to the immature specimens of *Aquila pennata*, though I have never met with an immature *Aquila pennata* quite so dark as some specimens I have seen of *Aquila desmursii*. In *Aquila desmursii*, as also in *Aquila naevioïdes*, both adult and immature birds appear liable to have their plumage exceedingly bleached by the action of the tropical sun; but it is remarkable that the feathers composing the occipital crest in *Aquila desmursii* appear to retain their original tint, notwithstanding the partial loss of colour from the above cause in the portions of the plumage immediately adjacent. It should also be remarked that, in some immature specimens, nearly the whole under surface is of a very pale whitish brown—a variation from the ordinary darker colouring which cannot be accounted for by the effect of sun and weather only.

In conclusion, I will add the remarks on this species communicated to me by M. Jules Verreaux, which are as follows:—"According to the notes of the collectors, the irides of the adult birds are of a chestnut-brown tinged with yellow; whilst in the young birds the yellow tint is absent, and the brown is deeper, with but little tinge of chestnut. The natives (at Bissao) give the name of 'Socolas' to this species only, it being well known to them as a very courageous bird, attacking even the small Gazelles (*Cephalophorus maxwelli*) which inhabit the same localities, and also preying on various birds, and especially the *Francolinus bicalcaratus*."

5. DESCRIPTION OF SEVERAL NEW SPECIES OF PHYLLOPODOUS CRUSTACEANS, BELONGING TO THE GENERA ESTHERIA AND LIMNETIS. BY W. BAIRD, M.D., F.L.S.

(Plate XV.)

1. ESTHERIA JONESI, Baird. (Pl. XV. figs. 1, 1a, 1b, 1c, 1d.)

Carapace of a comparatively hard, horny structure, and of a dark-brown colour. Valves ventricose, rounded, ovate. Umbones prominent, nearly central, but a little nearer anterior extremity; involute and representing exactly those of a bivalve shell. Dorsal margin short; ventral rounded. Anterior extremity swollen, rounded, shorter than posterior extremity, which is somewhat compressed and rounded. Ribs numerous and narrow. Those of the upper half of carapace, from the umbo downwards, strongly developed, the edges being raised and strongly beaded; the interstices hollow, and more sparsely dotted with rather small irregular-sized punctations. Ribs of lower half of carapace, as far as the ventral margin, much smaller than those of upper half, narrower, and much more numerous; they are punctate also; but the interstices are so very narrow that no sculpture can be seen. Internally the surface is quite smooth, and of a dark-purple colour.

Length of carapace, 6 lines; breadth at umbo, nearly 5 lines.

Hab. Brackish water, Island of Cuba (*Dr. Dunker*). Communicated by T. R. Jones, Esq. (*Mus. Brit.*)

2. ESTHERIA DUNKERI, Baird. (Pl. XV. figs. 6, 6a, 6b.)

Carapace-valves broadly ovate and somewhat elongate. Umbones prominent, and placed at some distance (rather more than a third) from anterior extremity. Dorsal margin short, rather sloping. Ventral margin nearly straight, or only slightly rounded. Anterior extremity swollen, very convex, and rounded. Posterior extremity elongate, more compressed, and not so rounded. The carapace is of a uniform yellow horn-colour, thin, and translucent. Ribs numerous, elevated, rather narrow, about twenty-seven in number, with the interstices marked with shallow pits and extremely fine punctations.

This species approaches somewhat to *E. brasiliensis*, but differs in the position of the umbones, those of *E. dunkeri* being further from the anterior extremity. The relative size of anterior and posterior extremities differs also, the former in *E. brasiliensis* being much broader than in the present species. It is a larger species also than *E. brasiliensis*.

Length of carapace, 7 lines; breadth at umbo, 4 lines.

Hab. Zimapan, Mexico; in fresh water (*Dr. Dunker*). Communicated by T. R. Jones, Esq. (*Mus. Brit.*)

3. ESTHERIA LOFTI, Baird. (Pl. XV. figs. 2, 2a, 2b.)

Carapace of a very light amber-colour, oval, rather swollen. Umbones very prominent, elongate, placed near the anterior extremity. Dorsal margin slightly sloping. Ventral margin rounded. Anterior

extremity swollen, rounded, and broader than the posterior, which is rather narrow, and somewhat compressed. Ribs of carapace few, broad; interstices marked with coarse-looking, raised, flexuous lines.

This species resembles in form the *E. tetracera* as represented by Krynicki, and found by him near Moscow and at Charkow, Russia.

Length of carapace, rather more than 4 lines; breadth at umbo, 3 lines.

Hab. Stagnant water on the banks of the Tigris, near Bagdad. Collected, along with *E. dahalacensis*, by the late W. R. Loftus, Esq., in May, 1855. (*Mus. Brit.*)

4. ESTHERIA RUBIDGEI, Baird. (Pl. XV. figs. 3, 3 a, 3 b.)

Carapace-valves ovate. Dorsal margin long, straight. Umbones small, placed near the anterior extremity. Ventral margin slightly rounded. Anterior extremity rounded. Posterior extremity emarginate at upper part, giving it somewhat the appearance of the shell of an *Avicula*. Anterior extremity rather the larger. Ribs of carapace not numerous, and wide apart, the surface in the interspaces marked with coarse and flexuously disposed raised lines.

This species partakes of the characters of straight-dorsal-margined species, *E. dahalacensis* and *E. macgillivrayi*. From the last species it differs in size, form of posterior extremity, and markings of interspaces between the ribs, as well as their comparative size and number, those of the present species being fewer and wider apart.

Length of carapace, about $3\frac{1}{4}$ lines; breadth at umbo, 2 lines.

Hab. A dried-up "vley" near Port Elizabeth, Cape Colony. Collected by Dr. Rubidge, and communicated to Henry Woodward, Esq., by W. S. M. D'Urban, Esq. (*Mus. Brit.*)

5. ESTHERIA MACGILLIVRAYI, Baird. (Pl. XV. figs. 5, 5 a, 5 b.)

Carapace-valves ovate. Dorsal margin long, straight. Umbones small, placed about 1 line from the anterior extremity. Ventral margin rounded. Anterior extremity rounded, as well as posterior, both being of nearly equal size. Ribs of carapace numerous, narrow, and finely punctate in the interstices.

In general outline this species resembles very much *E. dahalacensis*; but the ribs are narrower, more numerous, and the surface of the interstices is much more finely punctate.

Length of carapace, about 5 lines; breadth at umbo, 3 lines.

Hab. Brackish lake, Green Point, Cape of Good Hope (*J. Macgillivray*). (*Mus. Brit.*)

6. ESTHERIA CALDWELLI, Baird. (Pl. XV. figs. 4, 4 a, 4 b.)

Carapace-valves swollen, ovate, of a pale horn-colour. Umbones large, prominent, and ferruginous-coloured, placed at about one-third distance from the anterior extremity. Dorsal margin short, and nearly straight. Anterior extremity rounded, short, a little broader than posterior extremity, which is long and rounded. Ventral margin rounded. Ribs of carapace numerous, rather narrow. Interstices roughly and strongly punctate.

Length of carapace, nearly 4 lines; breadth at umbo, rather more than 2 lines.

Hab. Lake Winnipeg, N. America (*W. Caldwell, Esq.*). (*Mus. Brit.*)

7. *LIMNETIS GOULDII*, Baird. (Plate XV. figs. 7, 7 a, 7 b, 7 c.)

Carapace nearly quite globular, ventricose, and of a light horn-colour. Surface of valves smooth, not ribbed, and covered entirely with numerous very small hollow punctations exactly resembling those on the top of a thimble. The point to which the adductor muscles are attached is very marked, being slightly prominent, and very smooth and shining; and the branchial canals on the surface of the valves are strongly exhibited.

This species resembles very much *L. wahlbergii* of Lovén, from Port Natal. In addition, however, to the total difference of habitat, this species differs from the one described by Lovén in size, being double the dimensions of it. The animal, too, differs in some particulars; but as all the specimens I have examined are males, and the one figured by Lovén is a female, I do not know how far these differences may be merely sexual.

Diameter of carapace, about $1\frac{1}{2}$ line.

Hab. Fresh water at St. Ann's, twenty miles from Montreal, Canada. Collected by Charles Gould, Esq., June, 1857. (*Mus. Brit.*)

6. NOTE ON *FURINA TEXTILIS*. BY GERARD KREFFT, ACTING CURATOR AUSTR. MUS.

During my rambles in the neighbourhood of Sydney I have found a number of small Snakes, varying in length from 8 to 12", and answering to the description given by Duméril and Bibron of *Furina textilis*. None of the specimens obtained have exceeded 16" in length; and I have been naturally anxious to procure the young of this species. During two years I was unsuccessful, and I began to think at last that this Snake was only the immature form of some other species, which supposition became a belief when some months ago I found an egg containing as large a specimen of *Furina textilis* as I had ever met with before. On further investigation I found that the distinct bands and black spots of this Snake faded with the growth of the individual, and apparently vanished altogether in old specimens. As the egg and young in my possession are of a size generally produced by Snakes from 3 to 4 feet in length, and as I have a series of specimens in which the disappearance of the bands and markings may be clearly traced, I do not hesitate to assert that *Pseudonaja textilis* is only a young Snake. Inviting the scrutiny of more able naturalists than myself to this fact, I beg to refer at the same time to my collection forwarded to the International Exhibition, specimens Nos. 66 and 40, which I believe to be identical.

I have since forwarded a full-grown adult Snake of this species to

Dr. Günther, which I have stuffed, as in the dry specimens the remains of the rings on the body may be better observed than when preserved in spirits. I have been unable to find any description in Duméril and Bibron of the large *Furina* of which I suppose the *F. textilis* to be the young; and, not being in possession of the British Museum Catalogue, I do not know whether this Snake has been described at all.

7. NOTE ON THE DEER OF FORMOSA. BY P. L. SCLATER, M.A.,
PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plates XVI., XVII.)

In some remarks on the Japanese Deer received by the Society in 1860, which I made before the meeting of this Society in the month of November of that year*, I gave some reasons for considering *Cervus sika* of the 'Fauna Japonica,' *Cervus pseudaxis* of the French naturalists, and Dr. Gray's *Rusa japonica* as probably synonyms of the same species. In a communication made to the Society in the following year, Dr. Gray ultimately admits that his *Rusa japonica* is probably the same as *Cervus sika*, "though it differs so much from the figure and description of that animal in the 'Fauna Japonica'†;" and I believe there is now little doubt upon this point. Mr. Westerman, the Director of the Gardens of the Zoological Society of Amsterdam, to whom we parted with a pair of these Japanese Deer in 1861, has informed me that he was previously well acquainted with the species, and that it is certainly identical with the type of *Cervus sika* in the Leyden Museum. Since the arrival of the first example of this Deer (the pair presented to the Society by Mr. Wilks, July 21, 1860), we have received several others. In September, 1861, a female arrived from our Corresponding Member, Mr. Blyth of Calcutta, being one of the examples he has commented upon in the 'Journal of the Asiatic Society of Bengal' (xxx. p. 90); and in June of the same year we purchased a pair of these animals, the male of which was subsequently parted with to Mr. Westerman. On the 31st of August, 1861, the female presented by Mr. Wilks produced a male calf; and there seems every probability of this Deer doing well in this country.

With regard, however, to the Formosan Deer (*Cervus taïwanus* or *taïouanus*), I was certainly wrong in supposing it to be the same as the Japanese *Cervus sika*. Knowing nothing about it, except from Mr. Blyth's description, I supposed that he who created the species was to be trusted when he destroyed it. I therefore put faith in what Mr. Blyth wrote in a letter to me (dated July 4th, 1860), that he was then "satisfied" that the Formosan and Japanese Deer were of "one and the same species." It appears, however, from what Mr. Swinhoe says (see P. Z. S. 1860, p. 235), that all the living Deer

* See P. Z. S. 1860, p. 375.

† P. Z. S. 1861, p. 238.

sent to Mr. Blyth were of the Japanese species, and that Mr. Blyth never had the Formosan species alive*. Mr. Blyth's comparison, therefore, was made between animals of the same species.

All doubt, however, as to the perfect distinctness of the Formosan Deer from the Japanese *Cervus sika* is removed since we have received the fine male of the *Cervus taëvanus*, presented to us by our Corresponding Member, Mr. Swinhoe, in December last. It will be evident to any one who inspects this animal and compares it with the adjoining specimen of *Cervus sika*, that, though probably nearly allied to the latter and belonging to the same group of Deer, it is quite distinct specifically. Its larger size and the deep-red colouring of the posterior part of the neck are quite sufficient to distinguish it. With the true form of the horns in *Cervus taëvanus* we are not yet acquainted, owing to our specimen having broken and worn down his horns while in confinement.

But we have to thank Mr. Swinhoe (who is now Vice-Consul in Formosa) for another and most valuable addition to our series of Deer. On April 28th, a specimen of what I suppose Mr. Swinhoe to mean by the "Roe-Deer" † of Formosa arrived, and is now doing well in our Menagerie. It turns out to be a species of the *Rusine* group of Deer, quite distinct from any of the four species of this section ‡ we at present possess, and in all probability of a species hitherto unknown, and for which I propose the temporary designation *Cervus swinhoii*. It would appear, therefore, that there are four distinct species of Deer inhabiting the coasts of China and Japan, concerning which we require much more information :—

1. *Cervus sika*, Temm. & Sieb. (*Rusa japonica*, Gray), from Japan.

2. *Cervus pseudaxis*, Eyd. & Soul. (Gray, P. Z. S. 1861, p. 236, pl. xxvii.), from Northern China.

* Mr. Blyth says, "Mr. Sclater is wrong in identifying the Japanese and Formosan species" (Journ. As. Soc. Beng. 1861, p. 192, note); but he neglects to add that my mistake arose from the incorrect information with which he himself had furnished me.

† Mr. Swinhoe writes to me, "Four if not five Deer are on their way to you. The buck (*C. taëvanus*) left me in high condition; and a lovely animal he was. The doe of the same species sent was with young; and I have some apprehensions about her. The two buck Roe-Deer will, I think, delight the Society, as they must surely be new species. I did not know of their existence till my visit to Taiwanfoo. They are known to the Chinese here as Cheeangs, and are procured by them from the aborigines of the inner hills. The *C. taëvanus*, which is procured from the same savages, is distinguished as the Lok or Stag; and the *Cervulus* as the Kiung. I have seen nothing as yet of the Bear or the Mountain Sheep, said to be found in Formosa; but since my arrival here I have sent a fine pair of Monkeys to my friend in Hong Kong for transmission to the Gardens. They may turn out novelties, and I have no doubt you would like more; so I will try and procure a few more. The Tortoises from Southern Formosa I take to be peculiar, and I have accordingly forwarded you a few; I have also preserved some in spirits." [These Tortoises have arrived, and turn out to be *Emys bennettii*, Gray.—P. L. S.]

‡ *Cervus duvaucelii* et *C. aristotelis*, ex Ind. cont.; *C. rusa*, ex Malacca; *C. moluccensis*, ex ins. Molucc.

3. *Cervus taëvanus*, Blyth (Journ. A. S. B. xxix. p. 90), from Formosa (Pl. XVI.).

4. *Cervus swinhöi*, sp. nov., from Formosa (Pl. XVII.).

Our single male specimen of Swinhoe's Deer stands about 2 feet 8 inches in height, and presents the general appearance of a small Deer of the Sambur group (*Rusa*). The head, neck, and fore legs are greyish black, growing more rufescent on the back, and passing on the rump and hind-quarters into a deep chestnut. The tail is rather long and very bushy, and composed of grizzly blackish hairs. The inside of the thighs and belly beneath are fawn-colour, passing on the inside of the legs into pale ochraceous. The animal appears to be in about its second year. The present horns have been injured whilst growing, and are much broken.

8. ON A NEW BIRD FROM THE ISLE OF MADAGASCAR.

BY DR. G. HARTLAUB, FOR. MEMB.

(Plate XVIII.)

TYLAS*, n. g. (*Pycnonotinæ*).

Char. Gen.—*Rostrum satis robustum et elongatum, rectiusculum, emarginatum, dimidio apicali compressum, basin versus dilatatum; culmine carinato, subarcuato; naribus apertis, ovalibus; vibrissis rictalibus nonnullis conspicuis, mollibus. Alæ longiusculæ, caudæ dimidium superantes; remige prima subspuria, quarta et quinta longissimis, subæqualibus, tertia brevior, secunda multo brevior. Cauda longa, æqualis. Tarsi breviusculi; pedibus parvis; digitis gracilibus, debilibus, interno vix brevior; unguibus debilibus.*

TYLAS EDUARDI, sp. nov. *Supra subolivascenti-plumbea; capite toto nigro, nitore chalybeo; cauda dorso concolore; scapis reetricum supra nitide nigris, subtus albis; corpore subtus cum subalaribus et subcaudalibus ochraceo; capitis nigredine circumscripte albido circumdata; rostro nigro; pedibus fuscis.*

Long. tot. circa 8''; rostr. a fr. 9''', a rict. 11½''''; al. 4'' 5'''; caud. a bas. 3'' 4'''; tars. 9½''''; dig. med. c. ung. 9''''.

We have named this interesting new form after its discoverer, Mr. Edward Newton, a gentleman who has recently visited Madagascar, and whose zealous efforts have very materially forwarded our knowledge of the ornithology of the East-African Archipelago.

The genus *Tylas* is nearly allied to *Hypsipetes*, but differs in the beak being decidedly stronger, broader, and more inflated; in the longer wings, which in *Hypsipetes* do not reach to the middle of the tail; in the tail being proportionally shorter; and in the rictal bristles being much more developed. The under tail-coverts are very long. The iris is yellow—a colour not found hitherto in the genus

* τυλάς, "avis quædam ignota turdina."

Hypsipetes. The whole system of coloration is different from that of the latter genus.

Mr. Leadbeater exhibited a stuffed specimen of a Lesser Bird of Paradise from the collection of Lord Braybrooke, and stated that this individual had been formerly alive in England, at Windsor Castle, in the possession of the late Princess Augusta.

May 27, 1862.

Professor Huxley, F.R.S., V.P., in the Chair.

Mr. T. W. Wood made some remarks on the peculiarities of the habits of the Pinnated Grouse (*Tetrao cupido*), as displayed by the individuals of this species now living in the Society's Gardens, and exhibited some drawings of the male bird in the attitude assumed whilst setting his feathers.

The following papers were read:—

1. NARRATIVE OF SEARCH AFTER BIRDS OF PARADISE.

BY ALFRED R. WALLACE, F.Z.S.

Having visited most of the islands inhabited by the *Paradisææ*, in the hope of obtaining good specimens of those extraordinary birds, and some knowledge of their habits and distribution, I have thought that an outline of my several voyages, with the causes that have led to their only partial success, might not prove uninteresting.

At the close of the year 1856, being then at Macassar in the island of Celebes, I was introduced to the master of a prau trading to the Aru Islands, who assured me that two sorts of Birds of Paradise were abundant there, the large yellow and the small red kinds—the *Paradisææ apoda* and *regia* of naturalists.

He seemed to think there was no doubt but I could obtain them either by purchase from the natives or by shooting them myself. Thus encouraged, I agreed with him for a passage there and back (his stay being six months), and made all my preparations to start by the middle of December.

Our vessel was a Malay prau of about 100 tons burthen, but differing widely from anything to be seen in European waters. The deck sloped downwards towards the bows, the two rudders were hung by rattans and ropes on the quarters, the masts were triangles standing on the decks, and the huge mat sail, considerably longer than the vessel, with its yard of bamboos, rose upwards at a great angle, so as to make up for the lowness of the mast. In this strange vessel, which, under very favourable circumstances, plunged along at nearly

five miles an hour, and with a Buginese crew, all of whom seemed to have a voice in cases of difficulty or danger, we made the voyage of about a thousand miles in perfect safety and very agreeably; in fact, of all the sea voyages I have made, this was one of the pleasantest.

On reaching the Bugis trading settlement of Dobbo, I found that the small island on which it is situated does not contain any Paradise-Birds. Just as I was trying to arrange a trip to the larger island, a fleet of Magindano pirates made their appearance, committing great devastations, and putting the whole place in an uproar; and it was only after they had been some time gone that confidence began to be restored, and the natives could be persuaded to take the smallest voyage. This delayed me two months in Dobbo without seeing a Paradise-Bird.

When, however, I at length reached the main island and ascended a small stream to a native village, I soon obtained a specimen of the lovely *P. regia*, which, when first brought me, excited greater admiration and delight than I have experienced on any similar occasion. The larger species was still not to be seen; and the natives assured me that it would be some months before their plumage arrived at perfection, when they were accustomed to congregate together and could be more easily obtained. This proved to be correct; for it was about four months after my arrival at Dobbo that I obtained my first full-plumaged specimen of *P. apoda*. This was near the centre of the large island of Aru; and I there, with the assistance of the natives, procured the fine series which first arrived in England.

While at Dobbo I had frequent conversations with the Bugis traders and with the Rajah of Goram, who all assured me that in the northern parts of New Guinea I could travel with safety, and that at Mysol, Waigiou, Salwatty, and Dorey I could get all the different sorts of *Paradisææ*. Their accounts excited me so much that I could think of nothing else; and after another excursion in Celebes I made my way to Ternate, as the best head-quarters for the Moluccas and New Guinea. Finding a schooner about to sail on its annual trading voyage to the north coast of New Guinea, I agreed for a passage to Dorey, and to be called for on the return of the vessel after an interval of three or four months. We arrived there, after a tedious voyage, in April 1858, and I began my second search after the Birds of Paradise.

I went to Dorey in full confidence of success, and thought myself extremely fortunate in being able to visit that particular locality; for it was there that Lesson, in the French discovery-ship 'Coquille,' purchased from the natives skins of at least eight species, viz. *Paradisææ papuana*, *regia*, *magnifica*, *superba*, *sexsetacea*, *Astrapia nigra*, *Epimachus magnus*, and *Sericulus aureus*. Here was a prospect for me! The very anticipation of it made me thrill with expectation.

My disappointment therefore may be imagined when, shortly after my arrival, I found all these bright hopes fade away. In vain I inquired for the native bird-hunters; none were to be found there; and

the inhabitants assured me that not a single Bird of Paradise of any kind was ever prepared by the Dorey people, and that only the common yellow one (*P. papuana*) was found in the district. This turned out to be the case; for I could get nothing but *P. papuana* sparingly, a few females of *P. regia*, and one young male of *Seleucidés alba*, a species Lesson does not mention. Nevertheless Lesson did undoubtedly obtain all the birds he mentions at Dorey; but the natives are great traders in a petty way, and are constantly making voyages along the coast and to the neighbouring islands, where they purchase Birds of Paradise and sell them again to the Bugis praus, Molucca traders, and whale-ships which annually visit Dorey harbour. Lesson must have been there at a good time, when there happened to be an accumulation of birds; I at a bad one, for I could not buy a single rare bird all the time I was there. I also suffered much by the visit of a Dutch surveying-steamer, which, for want of coals, lay in Dorey harbour a month; and during that time I got nothing from the natives, every specimen being taken on board the steamer, where the commonest birds and insects were bought at high prices. During this time two skins of *Astrapia nigra* were brought by a Bugis trader and sold to an amateur ornithologist on board; and I never had another chance of getting a skin of this rare and beautiful bird.

The Dorey people all agreed that Amberbaki, about 100 miles west, was the place for Birds of Paradise, and that almost all the different sorts were to be found there. Determined to make an effort to secure them, I sent my two best men with ten natives and a large stock of goods to stay there a fortnight, with instructions to shoot and buy all they could. They returned, however, with absolutely nothing. They could not buy any skins but those of the common *P. papuana*, and could not find any birds but a single specimen of *P. regia*. They were assured that the birds all came from two or three days' journey in the interior, over several ridges of mountains, and were never seen near the coast. The coast people never go there themselves, nor do the mountaineers who kill and preserve them ever come to the coast, but sell them to the inhabitants of intermediate villages, where the coast people go to buy them. These sell them to the Dorey people or any other native traders; so that the specimens Lesson purchased had already passed through three or four hands.

These disappointments, with a scarcity of food sometimes approaching starvation, and almost constant sickness both of myself and men, one of whom died of dysentery, made me heartily glad when the schooner returned and took me away from Dorey. I had gone there with the most brilliant hopes, which I think were fully justified by the facts known before my visit; and yet, as far as my special object (the Birds of Paradise) was concerned, I had accomplished next to nothing.

My ardour for New Guinea voyages being now somewhat abated, for the next year and a half I occupied myself in the Moluccas; but in January 1860, being joined (when at Amboyna) by my assistant Mr. Allen, I arranged a plan for the further exploration of the country of the *Paradisææ*, by sending Mr. Allen to Mysol, while I

myself, after making the circuit of the island of Ceram, was to visit him with stores and provisions and proceed to Waigiou, both returning independently to meet at Ternate in the autumn.

I had been assured by the Goram and Bugis traders that Mysol was the very best country for the Birds of Paradise, and that they were finer and more abundant there than anywhere else. For Waigiou I had, besides the authority of the native traders, that of Lesson also, who visited the north coast for a few days, and mentions seven species of Paradise Birds purchased there by him.

These two promising expeditions turned out unfortunately in every respect. On reaching Goram, after much difficulty and delay, I found it impossible to make the voyage I had projected without a vessel of my own. I therefore purchased a small native prau of about 8 tons, and after spending a month in strengthening and fitting it up, and having with great difficulty secured a native crew, paid them half their wages in advance, and overcome all the difficulties and objections which every one of them made to starting when all was ready, we at length got away, and I congratulated myself on my favourable prospects. Touching at Ceramlaut, the rendezvous of the New Guinea traders, I invested all my spare cash in goods for barter with the natives, and then proceeded towards Mysol.

The very next day, however, being obliged to anchor on the east coast of Ceram on account of bad weather, my crew all ran away during the night, leaving myself and my two Amboyna hunters to get on as we could. With great difficulty I procured other men to take us as far as Wahai, on the north coast of Ceram, opposite to Mysol, and there by a great chance succeeded in picking up a makeshift crew of four men willing to go with me to Mysol, Waigiou, and Ternate. I here found a letter from Mr. Allen, telling me he was much in want of rice and other necessaries, and was waiting my arrival to go to the north coast of Mysol, where alone the *Paradiseæ* could be obtained.

On attempting to cross the strait, seventy miles wide, between Ceram and Mysol, a strong east wind blew us out of our course; so that we passed to the westward of that island without any possibility of getting back to it. Mr. Allen, finding it impossible to live without rice, had to return to Wahai, much against his will, and there was kept two months waiting a supply from Amboyna. When at length he was able to return to Mysol, he had only a fortnight at the best place on the north coast, when the last boat of the season left, and he was obliged to take his only chance of getting back to Ternate.

Through this unfortunate series of accidents he was only able to get a single specimen of *P. papuana*, which is there finer than in most other places, a few of the *Cicinnurus regius*, and of *P. magnifica* only a native skin, though this beautiful little species is not rare in the island, and during a longer stay might easily have been obtained.

My own voyage was beset with misfortunes. After passing Mysol, I lost two of my scanty crew on a little desert island, our anchor breaking while they were on shore, and a powerful current carrying

us rapidly away. One of them was our pilot; and, without a chart or any knowledge of the coasts, we had to blunder our way short-handed among the rocks and reefs and innumerable islands which surround the rocky coasts of Waigiou. Our little vessel was five times on the rocks in the space of twenty-four hours, and a little more wind or sea would in several cases have caused our destruction. On at length reaching our resting-place on the south coast of Waigiou, I immediately sent a native boat after my lost sailors, which, however, returned in a week without them, owing to bad weather. Again they were induced to make the attempt, and this time returned with them in a very weak and emaciated condition, as they had lived a month on a mere sand-bank, about a mile in diameter, subsisting on shell-fish and the succulent shoots of a wild *Bromelia*.

I now devoted myself to an investigation of the natural history of Waigiou, having great expectations raised by Lesson's account, who says that he purchased the three true *Paradisææ*, as well as *P. magnifica* and *P. sexsetacea*, with *Epimachus magnus* and *Sericulus aureus*, in the island, and also mentions several rare *Psittaci* as probably found there. I soon ascertained, however, from the universal testimony of the inhabitants, afterwards confirmed by my own observation, that none of these species exist on the island, except *P. rubra*, which is the sole representative of the *Paradisæidæ* and *Epimachidæ*, and is strictly limited to this one spot.

With more than the usual amount of difficulties, privations, and hunger, I succeeded in obtaining a good series of this beautiful and extraordinary bird; and three months' assiduous collecting produced no other species at all worthy of attention. The parrots and pigeons were all of known species; and there was really nothing in the island to render it worth visiting by a naturalist, except the *P. rubra*, which can be obtained nowhere else.

Our two expeditions to two almost unknown Papuan islands have thus added but one species to the *Paradisææ* I had before obtained from Aru and Dorey. These voyages occupied us nearly a year; for we parted company in Amboyna in February, and met again at Ternate in November, and it was not till the following January that we were either of us able to start again on a fresh voyage.

At Waigiou I learned that the Birds of Paradise all came from three places on the north coast, between Salwatty and Dorey—Sorong, Maas, and Amberbaki. The latter I had tried unsuccessfully from Dorey; at Maas, the natives who procured the birds were said to live three days' journey in the interior, and to be cannibals; but at Sorong, which was near Salwatty, they were only about a day from the coast, and were less dangerous to visit. At Mysol, Mr. Allen had received somewhat similar information; and we therefore resolved he should make another attempt at Sorong, where we were assured all the sorts could be obtained. The whole of that country being under the jurisdiction of the Sultan of Tidore, I obtained, through the Dutch resident at Ternate, a Tidore lieutenant and two soldiers to accompany Mr. Allen as a protection, and to facilitate his operations in getting men and visiting the interior.

Notwithstanding these precautions, Mr. Allen met with difficulties in this voyage which we had not encountered before. To understand these, it is necessary to consider that the Birds of Paradise are an article of commerce, and are the monopoly of the chiefs of the coast villages, who obtain them at a low rate from the mountaineers, and sell them to the Bugis traders. A portion is also paid every year as tribute to the Sultan of Tidore. The natives are therefore very jealous of a stranger, especially a European, interfering in their trade, and above all of going into the interior to deal with the mountaineers themselves. They of course think he will raise the prices in the interior, and lessen the demand on the coast, greatly to their disadvantage; they also think their tribute will be raised if a European takes back a quantity of the rare sorts; and they have besides a vague and very natural dread of some ulterior object in a white man's coming at so much trouble and expense to their country only to get Birds of Paradise, of which they know he can buy plenty at Ternate, Macassar, or Singapore.

It thus happened that when Mr. Allen arrived at Sorong and explained his intentions of going to seek Birds of Paradise in the interior, innumerable objections were raised. He was told it was three or four days' journey over swamps and mountains; that the mountaineers were savages and cannibals, who would certainly kill him; and, lastly, that not a man in the village could be found who dare go with him. After some days spent in these discussions, as he still persisted in making the attempt, and showed them his authority from the Sultan of Tidore to go where he pleased and receive every assistance, they at length provided him with a boat to go the first part of the journey up a river; at the same time, however, they sent private orders to the interior villages to refuse to sell any provisions, so as to compel him to return. On arriving at the village where they were to leave the river and strike inland, the coast people returned, leaving Mr. Allen to get on as he could. Here he called on the Tidore lieutenant to assist him and procure men as guides and to carry his baggage to the villages of the mountaineers. This, however, was not so easily done; a quarrel took place, and the natives, refusing to obey the somewhat harsh orders of the lieutenant, got out their knives and spears to attack him and his soldiers, and Mr. Allen himself was obliged to interfere to protect those who had come to guard him. The respect due to a white man and the timely distribution of a few presents prevailed; and on showing the knives, hatchets, and beads he was willing to give to those who accompanied him, peace was restored, and the next day, travelling over a frightfully rugged country, they reached the villages of the mountaineers. Here Mr. Allen remained a month, without any interpreter through whom he could understand a word or communicate a want. However, by signs and presents and a pretty liberal barter he got on very well, some of them accompanying him every day in the forest to shoot, and receiving a small present when he was successful.

In the grand matter of the Paradise-Birds, however, little was done. Only one additional species was found, the *Seleucides alba*,

of which he had already obtained a specimen on the island of Salwatty on his way to Sorong; so that at this much-vaunted place in the mountains, and among the bird-catching natives, nothing fresh was obtained. The *P. magnifica*, they said, was found there, but was rare; the *Sericulus aureus* also rare; *Epimachus magnus*, *Astrapia nigra*, *Parotia sexsetacea*, and *Lophorina superba* not found there, but only much further in the interior, as well as the lovely little Lory, *Charmosyna papuana*. Moreover, neither at Sorong nor at Salwatty could he obtain a single native skin of the rarer species.

Thus ended my search after these beautiful birds. Five voyages to different parts of the district they inhabit, each occupying in its preparation and execution the larger part of a year, have produced me only five species out of the thirteen known to exist in New Guinea. The kinds obtained are those that inhabit the districts near the coasts of New Guinea and its islands, the remainder seeming to be strictly confined to the central mountain-ranges of the northern peninsula; and our researches at Dorey and Amberbaki, near one end of this peninsula, and at Salwatty and Sorong, near the other, enable me to decide with some certainty on the native country of these rare and lovely birds, good specimens of which have never yet been seen in Europe. It must be considered as somewhat extraordinary that during five years' residence and travel in Celebes, the Moluccas, and New Guinea I should never have been able to purchase skins of half the species which Lesson, forty years ago, obtained during a few weeks in the same countries. I believe that all, except the common species of commerce, are now much more difficult to obtain than they were even twenty years ago; and I impute it principally to their having been sought after by the Dutch officials through the Sultan of Tidore. The chiefs of the annual expeditions to collect tribute, have had orders to get all the rare sorts of Paradise-Birds; and as they pay little or nothing for them (it being sufficient to say they are for the Sultan), the head men of the coast villages would for the future refuse to purchase them from the mountaineers, and confine themselves instead to the commoner species, which are less sought after by amateurs, but are to them a profitable merchandise. The same causes frequently lead the inhabitants of uncivilized countries to conceal any minerals or other natural products with which they may become acquainted, from the fear of being obliged to pay increased tribute, or of bringing upon themselves a new and oppressive labour.

I have given this short sketch of my search after the Birds of Paradise, barely touching on the many difficulties and dangers I experienced, because I fear that the somewhat scanty results of my exertions may have led to the opinion that they failed for want of judgment or perseverance. I trust, however, that the mere enumeration of my voyages will show that patience and perseverance were not altogether wanting; but I must plead guilty to having been misled, first by Lesson and then by all the native traders, it never having occurred to me (and I think it could not have occurred to any one), that in scarcely a single instance would the birds be found to

inhabit the districts in which they are most frequently to be purchased. Yet such is the case; for neither at Dorey, nor at Salwatty, nor Waigiou, nor Mysol are any of the rarer species to be found alive. Not only this, but even at Sorong, where the Waigiou chiefs go every year and purchase all kinds of Birds of Paradise, it has turned out that most of the specimens are brought from the central mountain-ranges by the natives of those places, and reach the shore in places where it is not safe for trading praus to go, owing to the want of anchorage on an exposed rocky coast.

Nature seems to have taken every precaution that these, her choicest treasures, may not lose value by being too easily obtained. First we find an open, harbourless, inhospitable coast, exposed to the full swell of the Pacific Ocean; next, a rugged and mountainous country, covered with dense forests, offering in its swamps and precipices and serrated ridges an almost impassable barrier to the central regions; and lastly, a race of the most savage and ruthless character, in the very lowest stage of civilization. In such a country and among such a people are found these wonderful productions of nature. In those trackless wilds do they display that exquisite beauty and that marvellous development of plumage, calculated to excite admiration and astonishment among the most civilized and most intellectual races of man. A feather is itself a wonderful and a beautiful thing. A bird clothed with feathers is almost necessarily a beautiful creature. How much, then, must we wonder at and admire the modification of simple feathers into the rigid, polished, wavy ribbons which adorn *P. rubra*, the mass of airy plumes on *P. apoda*, the tufts and wires of *Seleucidés alba*, or the golden buds borne upon airy stems that spring from the tail of *Cicinnurus regius*; while gems and polished metals can alone compare with the tints that adorn the breast of *Parotia sexsetacea* and *Astrapia nigra*, and the immensely developed shoulder-plumes of *Epimachus magnus*.

I will now point out the distribution of the species of Birds of Paradise, as far as I have been able to ascertain it. The Aru Islands contain *P. apoda* and *P. regia*; and we have no positive knowledge of *P. apoda* being found anywhere else. Mysol has *P. papuana*, *P. regia*, and *P. magnifica*; Waigiou *P. rubra* only. Salwatty, though so close to New Guinea, has no restricted *Paradisææ*, but possesses *P. regia*, *P. magnifica*, *Ep. albus*, and *Sericulus aureus*. The island of Jobie, and the Mysory Islands beyond it, certainly contain true *Paradisææ*; but what species beyond *P. papuana*, is unknown. The coast districts of the northern part of New Guinea contain *P. papuana* and *P. regia* pretty generally distributed, while *P. magnifica*, *P. alba*, and *Sericulus aureus* are scarce and local. Lastly, the central mountains of the northern peninsula are alone inhabited by *Lophorina superba*, *Parotia sexsetacea*, *Astrapia nigra*, *Epimachus magnus*, and *Craspedophora magnifica*; and here also probably exist the unique *Diphyllodes wilsoni* and *Paradigalla carunculata*.

The most widely distributed of the *Paradisææ* is therefore the little *P. regia*, which is found in every island except Waigiou. Next, and probably most abundant in individuals, comes the *P. papuana*,

wanting only in Aru, Salwatty, and Waigiou. The next most widely spread species is *P. magnifica*, occurring in two islands (Salwatty and Mysol) as well as on the mainland. The other species are all found on the mainland only—with the exception of *P. apoda* (probably restricted to Aru), and *P. rubra*, which, being certainly confined to the small island of Waigiou, offers the most restricted range of the whole family.

It is interesting to remark that all the islands on which true *Paradiseæ* are found are connected by banks of soundings to the mainland of New Guinea. The *hundred-fathom line* includes the islands of Aru, Mysol, Waigiou, and Jobie, which have probably been, at no distant geological period, connected with New Guinea; while Ké, Ceram, &c., are separated from it by deep sea, and on them no *Paradiseæ* exist.

The island of Gilolo, on which the genus *Semioptera* occurs, extends towards Waigiou, and has the island of Guebe exactly between the two, suggesting the probability of a connexion there; but the depth of the intervening sea is unknown.

It may be considered as certain that every species of Paradise Bird yet obtained from the natives has come from the north peninsula of New Guinea, that being the part most frequented by the Malay traders. The vast extent of country east of long. 136° is quite unknown; but there can be little doubt that it contains other and perhaps yet more wonderful forms of this beautiful group of birds. If we look round the whole circumference of the globe, we shall be unable to find a region at once so promising to the naturalist and so absolutely a “terra incognita” as this great tropical land; and it is to be hoped that our explorers and naturalists may soon be induced to direct their attention to this hitherto neglected country.

2. ON A NEW SPECIES OF CHLAMYDERA, OR BOWER-BIRD.

BY JOHN GOULD, ESQ., F.R.S., ETC.

I am indebted to the researches of F. T. Gregory, Esq., the West Australian explorer, for a knowledge of a new species of this group of birds, which are rendered remarkable by their habit of constructing bowers or playing-places. It was collected by Mr. Gregory in North-western Australia, and is doubtless the species which constructs the bowers described by Captain (now Sir George) Grey in the first volume of his ‘Travels,’ pp. 196 and 245, where he states that on gaining the summit of one of the sandstone ranges forming the watershed of the streams flowing into the Glenelg and Prince Regent’s Rivers, “we fell in with a very remarkable nest, or what appeared to me to be such. We had previously seen several of them, and they had always afforded us food for conjecture as to the agent and purpose of such singular structures.” This “very curious sort of nest, which was frequently found by myself and other individuals of the party, not only along the sea-shore, but in some instances at a distance of six or seven miles from it, I once conceived must have

belonged to a Kangaroo-rat, until Mr. Gould informed me that it is the run or playing-ground of the bird he has named *Chlamydera nuchalis*. These nests were formed of dead grass and parts of bushes, sunk a slight depth into two parallel furrows in sandy soil, and then nicely arched above. But the most remarkable fact connected with them was, that they were always full of broken shells, large heaps of which protruded from each extremity of the nest; these were invariably sea-shells. In one instance, in the nest the most remote from the sea that we discovered, one of the men of the party found, and brought to me, the stone of some fruit which had evidently been rolled in the sea. These stones he found lying in a heap in the nest; and they are now in my possession."

The specimen sent to me by Mr. Gregory bears a very general resemblance to the *Chlamydera maculata*, being spotted all over like that species; but it differs in the guttations of the upper surface being of a larger size and much more distinct, in the abdomen being buff, and in the shafts of the primaries being straw-yellow. In all probability, the specimen is a female, since there is no trace of the beautiful lilaceous nuchal mark seen in the males only of *Chlamydera maculata* and *C. nuchalis*. Of this well-defined group there are now known three very distinct species, viz., the *C. maculata*, of the east coast; the *C. nuchalis*, which frequents the northern parts; and the *C. guttata*, of the north-western provinces of Australia.

CHLAMYDERA GUTTATA, Gould.

General tint of the upper surface and wings deep-brownish black, with a spot of rich buff at the tip of each feather, those of the head and nape being very small, while those on the body and wings are of large size, accordant, in fact, with the increased size of the feathers; the spots on the tips of the greater wing-coverts are not so round as those on the back; the primaries are very pale brown, fading into white on the basal portion of their inner webs, which is yellow on the under surface; their shafts straw-yellow; tail-feathers pale brown, with buff shafts and white tips; throat-feathers brown at the base, with an arrow-head-shaped mark of pale buff at the tip of each, the buff tips becoming much larger on the chest; centre of the abdomen pale buff; flanks, thighs, and under tail-coverts buff, barred with light brown; bill black; gape rich yellow; feet apparently very dark olive.

Total length $11\frac{1}{2}$ inches; bill $1\frac{1}{2}$; wing 6; tail $4\frac{3}{4}$; tarsi $1\frac{3}{4}$.

Hab. North-western Australia.

Remark.—The primaries of the specimen described are much worn; they are doubtless tipped with white in fresh-moulted specimens.

June 10, 1862.

Professor Busk, F.R.S., in the Chair.

Dr. Sclater exhibited, on behalf of Capt. J. W. P. Orde, F.Z.S., a specimen of a black variety of the Water-Vole (*Arvicola amphibius?*), also remarkable for its posteriorly elongated hairs and rather long tail, obtained in Argyllshire; and a Red-crested Duck (*Branta ru-fina*), shot January 1862 on a freshwater lake in the same county, where it was observed in company with Golden-eye (*Clangula glaucion*).

Dr. Sclater also exhibited some drawings representing the four generally recognized species of Wild Asses, and made some remarks on the geographical distribution and distinctive peculiarities of these animals, and on the specimens of them exhibited in the Society's Menagerie. The species, as commented upon, were as follows:—

1. *ASINUS HEMIONUS*, ex Asia boreali.

The Kiang or Tibetan Wild Ass, of which the Society had a fine female specimen in the Menagerie, presented by Major Hay in 1859*, seemed to be without doubt the true *Equus hemionus* of Pallas, and as such entitled to bear that name, as proposed to be restored to it by Dr. Gray in his 'List of Ungulata,' published in 1852.

2. *ASINUS INDICUS*, ex deserto Indico.

The Wild Ass of Cutch, of which the Society had in their Menagerie a single example, presented by Sir T. Erskine Perry in 1849, had been commonly called *Equus hemionus*. It was, however, obviously distinct from the Tibetan animal, but apparently hardly separable from the next species.

3. *ASINUS HEMIPPUS*, ex Persia et Syria.

Of this Ass, lately named *Asinus hemippus* by M. I. G. St.-Hilaire†, but which was probably the *E. onager* of Pallas, and seemed hardly different from the Indian animal, the Society possessed two specimens, both females. One of these was from Persia, having been presented by the Hon. Charles Murray in 1859‡, and represented

* See Proc. Zool. Soc. 1859, p. 353.

† Compt. Rend. xii. p. 1214.

‡ Mr. Murray has kindly furnished me with the following note concerning this animal:—"The Ghour or Kherdecht of the Persians is doubtless the Onager of the ancients. Your specimen was caught, when a foal, on the range of mountains which stretch from Kermanshah on the west in a S.E. direction to Shiraz. These are inhabited by several wild and half-independent tribes, the most powerful of which are the Buchtzari. The Ghour is a remarkably fleet animal, and moreover so shy and enduring that he can rarely be overtaken by the best-mounted horsemen in Persia. For this reason they chase them now, as they did in the time of Xenophon, by placing relays of horsemen at intervals of eight or ten miles. These relays take up the chase successively, and tire down the Ghour. The flesh of the Ghour is esteemed a great delicacy, not being held unclean by the Moslem, as it was in the Mosaic code. I do not know whether this species is ever known to

the "Ghour" or "Khur" of travellers in that country. The second was from Syria, having been presented by the late W. Burkhardt Barker, Esq., in 1854, and was of much interest as being, doubtless, of the same race as the "Wild Ass" of the Holy Scriptures.

4. *ASINUS TÆNIOPUS*, ex Abyssinia.

The only Wild Ass not represented in the Society's collection was that of Eastern Africa. It was curious that the only species of this section of the *Asini* which occurred in the African continent was that which approached most nearly to the Zebras in possessing a distinct dorsal cross, and in having the strongest indications of Zebra-stripes. Dr. Sclater had examined the animal in the Jardin des Plantes, which is mentioned in the 'Comptes Rendus' * by M. I. G. St.-Hilaire as the *Onagre d'Abyssinie*, and had obtained, by the permission of the authorities of that institution, an accurate drawing of it. The example in question had been transmitted to the Jardin des Plantes by M. Delaporte, French Consul at Cairo, and M. Degoutin, French consular agent at Massouah. The fact of Wild Asses being found in Eastern Abyssinia had long been well known. To the authorities mentioned by Mr. Blyth in his article on Wild Asses, in the twenty-eighth volume of the Journal of the Asiatic Society of Bengal (p. 229), might be added Leipsius†, as quoted by Dr. Wagner, and Mr. John Petherick, H. B. M. Consul at Khartoum, who noticed these animals in herds of from five to eight on the elevated sandy plains of Taka. But the animal now in the Jardin des Plantes was believed to be the first of this species brought to Europe.

This Wild Ass had also been obtained by Dr. Th. v. Heuglin during his last expedition to Eastern Africa, and had been described and figured in the twenty-eighth volume of the 'Acta Acad. Leopoldino-Carolinæ,' under the name *Asinus tæniopus*. There seemed every reason to believe that our domestic Asses were descended from this Abyssinian species.

The following papers were read:—

1. ON SOME NEW AND RARE BIRDS FROM NEW GUINEA. BY ALFRED RUSSEL WALLACE.

(Plates XIX., XX., XXI.)

The birds now brought before the Society were collected by my assistant, Mr. Allen, on his last voyage. They comprise several in-

bray like the ordinary domestic Ass. Your animal, while under my care, used to emit short squeaks and sometimes snorts, not unlike those of a Deer; but she was so young at that time that her voice may not have acquired its mature intonation. I do not remember to have heard or read of this species braying, though the animal is frequently spoken of by Taverner, Porter, and all our travellers in Persia."—P. L. S.

* Comptes Rendus, xli. p. 1221.

† Briefen aus Aegypten, p. 154.

interesting species, hitherto only known by specimens in the French or Dutch collections, and now, I believe, for the first time exhibited in England, viz. :—

Nasiterna pygmaea, Q. & G. Remarkable as being the smallest of the *Psittaci*, and for its curious, rigid, spined tail.

Tanysiptera nympha, G. R. Gray. This specimen decides the locality of this interesting and beautiful bird to be the N.W. peninsula of New Guinea, in the interior.

Peltops blainvillii, Garn. This rare bird also inhabits the island of Mysol, where a single specimen was obtained by Herr Rosenberg. Mine came from the N.W. of New Guinea.

Eupetes cærulescens, Temm. This bird and the last seem quite out of place in New Guinea, as we must pass over all the Moluccas and Celebes to find their nearest allies in Borneo, Java, and Sumatra.

Ptilorhynchus buccoides, Müll.

Hierococcyx leucolophus, Müll.

Campephaga melas, Müll.

Besides these, adult specimens of the fine *Talegalla cuvieri* were also obtained, and Mr. Allen's collection also comprises five new species of great interest—a Pigeon, a Kingfisher, a Parrot, and two Passeres, of which the descriptions follow.

1. CORIPHILUS RUBRONOTATUS.

Above dark green; beneath yellow green; a large spot on the forehead, sides of the breast, and under wing-coverts bright red; a spot on the upper tail-coverts dull red; ear-coverts deep blue; wings and tail as in *C. placentis*. Bill and cere carmine-red; feet pale red.

Total length $9\frac{1}{2}$ in.; wings $3\frac{3}{10}$ in.

Allied to *C. placentis*, but smaller, and wants the red face and blue rump which distinguish that species, as well as the yellow-tinged crown, which is replaced by a red spot.

Hab. Salwatty, and the N.W. extremity of New Guinea.

2. HALCYON NIGROCYANEA. (Pl. XIX.)

Back, and sides of the head and neck, deep black; throat, lower part of the breast, and belly white; forehead and crown deep blue, margined from the eyes round the nape with lighter blue; a band across the breast, the shoulders, and wing-coverts deep blue; quills dusky black, margined with blue to near the tips; middle of the back narrowly white, shading into blue, which becomes dark on the tail-coverts; tail deep blue, inner margins of the feathers and beneath black; under tail-coverts black, tipped with blue; sides of the breast and flanks black; under wing-coverts black, with a white central band. Bill black, pale in the centre beneath; feet black.

Total length 9 in.; wing $3\frac{5}{8}$ in.

The young bird has slightly rufous lores, and the pectoral band rufous mingled with black and blue.

Hab. N.W. peninsula of New Guinea.

3. TODOPSIS GRAYI.

Beneath bluish white, almost white on the throat; head light-greenish blue, the centre of the crown dusky; a black spot on the ear-coverts extending towards the nape; back dusky, the feathers margined with greenish blue; wings dusky, the quills margined with rufous olive, shoulder-coverts margined with greenish blue; tail dusky olive, with a minute whitish spot at the tips of the feathers; thighs rufous-tipped. Bill black; feet dusky.

Total length $5\frac{3}{8}$ in.; wing $2\frac{1}{2}$ in.; bill from gape $\frac{8}{10}$ in.

The bill in this species is nearly as broad as in *Machærirhynchus*. I have named this interesting bird after Mr. George Robert Gray, who has described the other species of this genus sent home by me.

Hab. N.W. peninsula of New Guinea: Mountains of Sorong.

4. GRACULA PECTORALIS. (Pl. XX.)

Black, the feathers broadly margined with metallic green and purple; plumes of the neck and breast decomposed, and of a rich orange-buff colour, as are also the vent, rump, and upper tail-coverts; on the nape a collar of whitish buff reaching round to the orange of the throat; under tail-coverts cream-white, tinged with orange at the base; a white band across the wings towards the tips. Iris yellow; bill and feet pale yellow.

Total length 10 in.; wing $5\frac{3}{4}$ in.

The young bird has the breast and belly black, uniformly margined with light orange.

This species differs from the rest of the genus in having neither wattles nor naked skin on the face, but in general structure and coloration closely resembles the other species.

Hab. N.W. peninsula of New Guinea: Sorong.

5. PTILONOPUS HUMERALIS. (Pl. XXI.)

Very near *P. iozonus*, G. R. Gray, but a little larger, and at once distinguished by the violet-grey patch on the shoulder having its lower half deep purple; the tail also wants the grey apical band of that species, which is replaced by a subapical narrow one, only visible on the lateral feathers and beneath. The wing-coverts are all of a rich violet grey, margined with green. Chin ashy; the rest as in *P. iozonus*. Bill greenish, tipped with bright yellow, base above red and swollen; feet purple red.

Total length $8\frac{3}{4}$ in.; wing $4\frac{7}{8}$ in.

Hab. Salwatty, and the adjacent coast of New Guinea.

2. DESCRIPTIONS OF SOME NEW GENERA AND SPECIES OF FISHES OBTAINED AT MADEIRA. BY JAMES YATE JOHNSON, CORR. MEM. Z. S.

(Plates XXII., XXIII.)

Order MALACOPTERYGII APODES, Cuv.

Sect. PHANEROMYCTERES, Kaup.

Fam. MURÆNIDÆ.

PSEUDOMURÆNA, gen. nov.

Dorsal, anal, and caudal fins united; no pectoral fins; gill-openings lateral; no teeth on the mesial line of the palate; in the jaws uniserial serrate teeth, having a tubercle at the posterior base.

This genus differs from *Muræna* in having no teeth on the mesial line, and in the form of the jaw-teeth.

PSEUDOMURÆNA MADERENSIS, sp. n.

Body anguilliform, attenuating backwards from the nape, which is deep and thick. Skin soft, thick, scaleless. Colour a yellowish brown, darker on the head; the anterior fourth of the body marked with undulating lines, or narrow bands, of deeper brown, which are arranged longitudinally before the gill-openings, and transversely behind them, the change of direction being gradual.

The head is gibbous behind the small eyes, which are oval, covered with skin, and placed over the middle of the upper jaw. The snout is obtuse and rounded; the throat swollen. The posterior nostrils are small, with slightly raised borders, and are placed a little in front of the vertical through the middle of the eye. The anterior nostrils issue in free tubes, which do not quite reach to the tip of the snout. The jaws are of moderate length and subequal; the lips moderately thick; the inside of the mouth fuscous. The teeth are uniserial, rather stout, pointed, conico-compressed, with serrate edges, and a



tubercle at the posterior base. They are slightly curved backwards, and are longer in front than behind. In the upper jaw there are about 16; in the lower jaw from 24 to 34. No teeth on the mesial line or on the vomer. Rictus moderate. No barbel. Gill-openings small, round, placed at the sides of the body about the middle of the height. No pectorals or visible lateral line. The dorsal fin commences at the nape, in front of the gill-openings, and is continuous with the caudal and the anal fins; it is higher behind than in

front. The vent is in the hinder half of the body, and about $\frac{1}{6}$ th of the total length behind the middle. The anal fin commences within a short distance of the vent; it is very low in front, where it is cloaked by thick skin, and where there is a furrow at each side of and parallel with its base; further behind there are two parallel furrows. The tail is compressed, the fin narrow and rounded. All the fins are covered with a thick skin.

Although several specimens of this Eel have been obtained (some of which have been sent to the British Museum), it must still be considered as a rare fish. In colouring it resembles *Thyrsoidea unicolor*, Kaup, from which it differs generically in the uniserial dentition.

The following measurements were taken from a specimen having a total length of $40\frac{3}{4}$ inches, with a depth, near the gill-openings, of $3\frac{1}{2}$ inches:—

	Inches.
Rictus	$2\frac{4}{10}$
Gill-openings, distance from snout	5
Vent, distance from snout	$22\frac{1}{4}$
Dorsal fin, distance from snout	$4\frac{1}{2}$

In another specimen, $36\frac{1}{2}$ inches long, the longer axis of the eye measured $\frac{3}{10}$ inch, and the longest teeth were less than $\frac{1}{8}$ th of an inch in length. The rictus was $1\frac{8}{10}$ inch in depth.

THYRSOIDEA ATLANTICA, sp. n.

Anguilliform, compressed; attenuate both ways from middle of body. Skin smooth, scaleless, white, with one dusky oval blotch on one side of body, and two or three such blotches on the other side, unsymmetrically placed. The longer axis of these blotches is from one-third to one-half an inch across. On the fins near the posterior extremity of the body are several similar blotches.

A single specimen of this Eel has occurred, the dimensions of which are embodied in this description.

Total length 23 inches; depth $1\frac{4}{10}$ inch, taken about an inch in advance of the vent.

Head compressed, rising behind the eyes; depth through head and swollen throat, $1\frac{4}{10}$ inch. Eyes covered with skin, placed a little in advance of the middle of the upper jaw, rather less than one-fifth of an inch in diameter. Hinder nostril-tubes shorter than anterior, placed a little in front of the vertical from the anterior orbit of eye. Front nostril-tubes reaching a little beyond lip. Mouth cleft rather more than an inch deep. Jaws rather slender, somewhat curved, and not capable of shutting closely on account of the length of the front teeth and the curvature of the jaws. Lower jaw a little longer than the upper, without a barbel. Teeth in both jaws slender, pointed, somewhat compressed, curving backwards. In the upper jaw there are two rows at each side, those of the inner row being longer. A row of seven teeth along the middle of the palate. The longest teeth in the jaw are rather more than one-fifth of an inch in length. In the lower jaw there is a single row at each side; in front

there appear to be two rows. Gill-clefts $\frac{3}{10}$ inch long, narrow, placed about the middle of the sides, a little posterior to commencement of dorsal fin, and $2\frac{1}{2}$ inches from snout. The dorsal fin commences at the nape, $2\frac{1}{10}$ inches from snout, is lower in front than behind, and unites with the caudal fin, like the anal fin, without a break. Vent about 9 inches from tip of mandible, in anterior half of body. Anal fin commences near vent, and is very low at first. All the fins are covered with skin like that of the body.

The specimen was taken in the sea near Madeira, in the month of June 1859, and has been deposited in the British Museum.

Fam. SYNAPHOBRANCHIDÆ.

SYNAPHOBRANCHUS, gen. nov.

Dorsal, anal, and caudal fins united. Pectoral fins present. Gill-openings in close proximity on the under side of the body, having a single external aperture, with an internal dividing membrane. Branchiæ four. A row of acute teeth in each jaw, with an external band of minute teeth. Teeth on the vomer and on the mesial line of the palate. Scales on the skin.

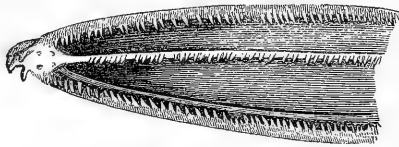
This genus forms the type of a new family of Malacopterygian Apodals, which differs from all previously established families, except the *Symbranchidæ*, in having the gill-openings close together on the ventral aspect; and from the *Symbranchidæ* it is distinguished by the presence of fins. Moreover, from the *Muraenidæ* it is separated by the possession of pectoral fins, and from the *Congridæ* by the possession of scales and by the vent being before the commencement of the dorsal fin.

SYNAPHOBRANCHUS KAUPII, sp. n.

Anguilliform, compressed, attenuate in both directions from the neighbourhood of the vent; of a dull-brown colour, darker on the belly. The skin contains small oval scales, set obliquely and at right angles to each other.

The head is subcompressed, depressed, and flat above; it exhibits no gibbosity, nor is the throat swollen. The eye is covered with skin; it is of moderate size, and placed at the side of the head, over the middle of the oral cleft, three diameters distant from the tip of the snout. The posterior nostril is in front of the eye and has a raised border. The anterior nostril has a short tube, which does not quite reach to the lip, and is attached in front to the snout, the orifice being directed forwards. Rictus deep. The jaws are narrow, pointed, subequal, and without barbels. The lips are cartilaginous, especially the upper lip, which forms a conical snout, projecting much beyond the jaw. There are teeth in both jaws, consisting of an inner row of short, slender, conical, pointed, closely-set teeth, with an exterior band of scobinate teeth, which become reduced to a single row in front. On the vomer is a group of from nine to fifteen conical teeth, the first two or three of which are short, the others rather longer than those in the jaw. On the mesial line of the palate there is a row of minute,

sharp teeth curving backwards; and the pharyngeals are armed with scobinate bands of teeth. The inside of the mouth is black, as well



as the tongue, which is small, toothless, and free at the tip. The gill-openings are side by side on the ventral aspect of the body, in advance of the pectoral fins; they are separated by a membrane placed inside a single external aperture. The dorsal fin commences behind the vent, a little posterior to the commencement of the second third of the total length, and joins the caudal, like the anal fin, without a break. It is higher behind, but is throughout much lower than the anal; the greater part of it is covered with a scaly skin, as is also the greater part of the anal fin. The pectoral fins are well developed, pointed, and situate a little behind the gill-openings, below the middle of the height. The ventral fins are wanting. The vent is in the first third of the total length. The anal fin commences just behind the vent; it is considerably higher about the middle and behind than in front. The caudal is rounded. The lateral line is distinctly marked; it falls gently from the shoulder, but for the greater part of its length is straight along the middle of the body. The air-bladder is long, being more than one-third of the length of the body. The food found in the stomachs of dissected specimens consisted of the remains of fishes and crustaceans. The peritoneal lining is of a dark-blue colour.

Dedicated to Dr. Kaup of Darmstadt, who has well studied this order of fishes. Specimens have been sent to the British Museum.

The following figures give the dimensions in inches of one of the larger examples:—

Total length	32
Depth in the neighbourhood of the vent	3
Thickness	$1\frac{3}{10}$
Distance from snout to pectoral	$4\frac{1}{2}$
— from snout to vertical of vent	$9\frac{1}{2}$
— from snout to vertical of commencement of dorsal	$11\frac{1}{4}$
Eye, diameter, nearly	$\frac{1}{2}$
Rictus, depth	$2\frac{1}{5}$
—, width at back	$\frac{9}{10}$
Length of bone of upper jaw	$2\frac{1}{10}$
— of gill-openings	$\frac{9}{10}$
— of pectoral	$1\frac{1}{2}$
Width of base of pectoral, nearly	$\frac{1}{2}$
Length of rays at middle of anal	$1\frac{7}{20}$
— of rays of caudal	$\frac{7}{10}$

Order ANACANTHINI, Müll.

Fam. GADIDÆ.

LÆMONEMA, Günther, MS.

The genus *Læmonema*, established by Dr. A. Günther on a Mediterranean fish hitherto assigned to *Phycis*, is distinguished from the latter genus by the shortness of the base of the first dorsal fin, and by the rounded outline of the patch of vomerine teeth. A full diagnosis of the genus will appear in the forthcoming fourth volume of the 'Catalogue of Fishes in the British Museum.' A second species of the genus having occurred, I proceed to describe it.

LÆMONEMA ROBUSTUM, sp. n.

1st D. 5. 2nd D. 50, 51. A. 48. V. 1. P. 28. C. 16.
M. B. 7. Scales of lateral line about 126.

Body *Phycis*-like, thick before, much compressed behind, of a dull-brown colour; the rays of the dorsal, anal, and pectoral fins being of a dull-purplish red. The scales are very small; between the base of the first dorsal fin and the lateral line fifteen rows of scales may be counted. The length of the head is equal to the height of the body under the first dorsal fin, and, compared with the total length of the fish, is as 1 to 4. It is depressed, unarmed, flat between the eyes, with a longitudinal depression at the nape; the snout short and rounded; the cheeks convex and scaly. The round eye is placed high up, so as to take part in the profile; it is contained four times on the head, and is distant one and one-third of its diameter from the tip of the snout; the space between the eyes is equal to one diameter. The nostrils are rather small; at the posterior edge of the anterior one there is a strap-shaped skinny appendage. The mouth is wide, and when open the jaws form a broad oval; its anterior, as well as the tongue, is of a pale-grey colour. The upper border of the mouth is formed by the premaxillary; the maxillary is broad below, and reaches back to the vertical from the middle of the eye; the skin covering it is colourless, for when the mouth is closed it slides underneath the skin covering the posterior bones. The under jaw closes inside the upper one. There are scobinate bands of conical teeth in both jaws, those of the outer rows being rather larger. The band of the upper jaw is broader in front than the band of the lower jaw, but it narrows behind. There is a small round patch of similar teeth on the vomer, and also patches on the pharyngeals; but the palatines and the tongue are unarmed. The tongue is thick, broad, and pointed.

The gill-openings are large. The edges of the opercle and preopercle are rounded; and the edge of the latter is distinctly visible, not concealed by the skin. The chin carries a barbel. The first dorsal fin is short, having only five rays, of which the first is elongate, its upper part being setaceous; the length of this ray to the total length of the body is as 1 to $5\frac{1}{4}$. The interval between the two dorsal fins is short. The second dorsal fin has its base about 16 times longer than the base of the first, and its highest portion is less than

half the length of the first ray of the first dorsal; it falls about the middle, and then rises again, its termination being prolonged and pointed. The specimen has been wounded in the back during its life, and, though the wound has healed, a few (but probably not more than two or three) of the rays have been carried away. The remaining rays are forty-eight in number. None of the dorsal or anal fins are fleshy, neither are there any scales upon them. The pectoral fins are inserted a little in front of the first dorsal, and rather above the middle of the height; their apices are pointed, and they are of moderate length, reaching back beyond the commencement of the anal fin. The jugular ventral fins are forked, the longer division becoming filiform and reaching back considerably beyond the commencement of the anal fin, and a little beyond the tips of the pectoral fins. These fins are longer than the head, and, compared with the total length of the fish, they are as 1 to $3\frac{1}{2}$. The difference between the lengths of the two divisions of the ray is to the length of the longer as 1 to $4\frac{1}{3}$. The vent is surrounded by a black ring, and is placed under the fourth ray of the second dorsal fin. The anal fin commences under the seventh or eighth ray of the second dorsal fin. It is highest in front; at the middle it falls in, and then ends a short distance in front of the second dorsal with an acute prolongation. The caudal fin is truncate, and rather more than a ninth of the total length. The tail is much compressed and attenuate. The lateral line is a groove that forks above the opercle. After the junction of the divisions it rises a little, and then falls gradually; but under the anterior portion of the second dorsal fin there is a rapid descent, after which it is straight along the tail.

The single example on which this species has been founded was taken near Madeira, in the month of March, and is now in the British Museum. Its dimensions, expressed in inches, are given in the following table:—

Total length	14 $\frac{1}{8}$
Height under first dorsal	3 $\frac{3}{8}$
Thickness near base of pectorals	2
Head	3 $\frac{1}{2}$
Eye, diameter	$\frac{1}{10}$
Mouth, width from side to side	1 $\frac{3}{4}$
Barbel, length	$\frac{1}{10}$
First dorsal fin, distance from snout	3 $\frac{9}{10}$
— — —, length of first ray	2 $\frac{7}{10}$
— — —, length of second ray	1 $\frac{9}{10}$
— — —, length of last ray	$\frac{7}{10}$
— — —, base of fin	$\frac{5}{10}$
Second dorsal, distance from first dorsal	$\frac{1}{10}$
— — —, length of base	8 $\frac{1}{2}$
— — —, height in front	1 $\frac{2}{10}$
Pectorals, distance from snout	4
— — —, length	2 $\frac{7}{10}$
— — —, width of base	$\frac{6}{10}$
Ventrals, distance from tip of mandible, mouth open	2 $\frac{8}{10}$
— — —, length	4

Anal, distance from tip of mandible, mouth open . .	$6\frac{1}{8}$
—, height in front	$1\frac{1}{4}$
Caudal, length	$1\frac{1}{2}$
Tail, height behind second dorsal	$\frac{4}{10}$

Order ACANTHOPTERYGII, Cuv.

Fam. TRICHIURIDÆ.

NESIARCHUS, gen. nov.

Body elongate, covered with small scales. Cleft of mouth deep. Several strong teeth in the jaws; none on the palatine bones or the vomer. First dorsal not extending to the second. No finlets behind either the dorsal or anal fin. Perfect thoracic ventral fins present. Caudal fin well developed. A dagger-shaped spine behind the vent. No keel on the tail. One lateral line. Seven branchiostegal rays. An air-bladder. Pyloric cæca in moderate number.

This genus may be entered in the Synopsis of Trichiuroid genera, given in the Cat. of the Brit. Mus. Collection, thus:—

“Ventrals present: a dagger-shaped spine behind the vent.”

NESIARCHUS NASUTUS, sp. n. (Pl. XXII.)

1st D. 20. 2nd D. 2. 21. A. 22. P. 13. V. 1. 4. C. vii. 8 + 7.
vii. M. B. 7.

This fish has much of the external aspect of *Thyrstites prometheus*. The body is very elongate, compressed, covered with small, deciduous, cycloid scales, which are elegantly marked with concentric striæ; the height of the body, compared with the total length, is as 1 to 13. The head is scaly in every part, but unarmed; it is compressed, and the cheeks are flat. There is a broad groove between the eyes and on the snout, as in *Aphanopus*. The length of the head, compared with the total length, is as 1 to $4\frac{3}{4}$. The round eye is placed at the side of the head, and does not quite reach to the outline; it is contained $9\frac{1}{2}$ times in the head, is rather more than a diameter distant from the other eye, and each is distant about $4\frac{1}{4}$ diameters from the tip of the snout. The members of each pair of nostrils are distant from each other, and the hinder one is a small oblique slit. The bones of the scaly opercle and subopercle are thin and radiostriate; the border of the former has an angular projection. The gill-openings are wide. The snout is long, and is terminated by a large conical cartilaginous process, which projects much beyond the jaw. The mandible has a similar but longer cartilaginous process. These processes (some rudiments of which may be seen in *Aphanopus*) bestow on the head somewhat of the appearance of *Sphyræna vulgaris*. The rictus is large. The upper border of the mouth is formed entirely of the premaxillary, which is broad above and narrow below. The scaly maxillary, which lies exposed behind, and is broad below and narrow above, does not quite reach back to the vertical from the middle of the eye. The mandibular bones project a little beyond those of the upper jaw.

The dentition bears much resemblance to that of *Aphanopus*. In each jaw there is a single series of moderately strong teeth, which are pointed, compressed, and subtriangular; those of the lower jaw are about thirteen in number on each side, and are rather larger than those of the upper jaw, where there are also thirteen on each side, in addition to three pairs of considerably larger teeth, which stand a little within the line of the others, near the fore end of the jaw. These teeth increase in size backwards, the last pair being about four-tenths of an inch long.

All these are pointed and compressed, and have a slight double curvature. The three pairs stand opposite the second, third, and fourth pairs of teeth on the lower jaw. There are no teeth on the palatine bones or on the vomer. The tongue is smooth, narrow, and black like the pharynx and the inside of the gill-covers.

The first dorsal fin commences at the nape in front of the root of the pectoral fins. It rises from a groove, is moderately high, and its spines are weak, distant, and grooved, but not tuberculated. It is rather higher behind than in front, and there is an interval equal to about one-fifth of the length of the head between it and the second dorsal, which is high in front, where it is subtriangular. The fourth and fifth rays are the longest. The last four or five rays are short and much branched, the last ray being elongated*. The anal fin is preceded by a stout broad two-edged spine, similar to that possessed by *Aphanopus*. This fin is opposite and similar in shape to the second dorsal. The first ray is weak, but appears to be a simple spine; and the last ray is somewhat prolonged. The pectoral fins are pointed, and inserted below the middle of the height. The ventral fins are thoracic, being placed close together a little behind the pectoral fins; they are small, being only equal to one-eleventh of the head, but consist of a spine, which is stout below and slender above, and four soft rays connected by membrane. The ray next to the spine is the longest. The caudal fin is well developed and deeply cleft; its rays are very broad below.

The unarmed lateral line falls gently from the shoulder to the middle of the body, whence it is horizontal to the caudal fin. The tail has no keel, and is not depressed behind the second dorsal. There is no barbel nor any prominent papilla near the vent.

The body of the fish is uniformly lead-coloured, with black fins; its skin, when the scales have been removed, is black.

The peritoneum is black; the stomach long and simple; the intestinal tube straight. There are about eight pyloric cæca, and a long narrow air-bladder with thin walls.

Only a single specimen has occurred, and this was taken in the month of April last. It had a length of $36\frac{1}{2}$ inches, a height at the ventral fins of $2\frac{8}{10}$ inches, and a thickness at the same place of $1\frac{3}{10}$ inch. Decidedly Trichiurid as it is, it differs from all the genera

* The membrane connecting the last four or five rays of the second dorsal and the last five or six rays of the anal fin is much torn in the specimen. In an older fish they might possibly form detached finlets, the structure of the rays bearing much resemblance to those of the finlets possessed by some Trichiurid genera.

of that family hitherto known, and a new genus must be established for its reception. From *Aphanopus*, with which it agrees in having a dagger-shaped spine behind the vent, it differs in being possessed of scales and ventral fins; from *Lepidopus* it is distinguished by having two dorsals and scales, and by the absence of teeth from the palatine bones; from *Trichiurus* by having two dorsal fins, a well-developed caudal fin, and many-rayed ventral fins; from *Epinnula* by having a single lateral line, and by the separation of the dorsal fins; from *Thyrsites* by having no teeth on the palatine bones, and by the separation of the dorsal fins; from *Dicrotus* in having scales and many-rayed ventrals; and from *Gempylus* by the presence of scales and the absence of finlets. Moreover in the two known species of the last-named genus each ventral fin is represented by a spine. From the *Sphyrænidæ*, it may be mentioned in passing, it differs by the ventral fins being thoracic, and by the proximity of the dorsal fins.

The following are the dimensions in inches of the principal parts of the specimen, which has been added to the collection of fishes at the British Museum:—

Length of head	$7\frac{7}{10}$
Eyes, diameter	$\frac{3}{10}$
—, distance apart	$\frac{9}{10}$
—, distance from tip of snout	$4\frac{1}{2}$
Upper jaw bones, length	$3\frac{3}{10}$
First dorsal, distance from tip of snout	$6\frac{3}{4}$
— — —, length of base	$16\frac{1}{2}$
— — —, highest spines	$1\frac{1}{2}$
— — —, interval between first and second dorsal	$1\frac{1}{2}$
Second dorsal, length of base	6
— — —, length of fourth and fifth rays	$2\frac{1}{2}$
Pectorals, length	3
— — —, width of base	$\frac{1}{2}$
— — —, distance from snout	$7\frac{1}{8}$
Ventrals, length	$\frac{7}{10}$
Vent, distance of its vertical from tip of mandible	24
— — —, distance from anal	1
Spine before anal, length	$\frac{7}{10}$
Caudal, length of external rays	$5\frac{1}{3}$

Fam. SCOMBRIDÆ.

SCHEDOPHILUS ELONGATUS, sp. n.

D. 39. A. $\frac{3}{21}$. P. 21. V. $\frac{1}{5}$. C. iii. 9 + 7. iv. M. B. 7.

Uniformly purplish black, somewhat paler on the belly. The body is elliptico-oblong and much compressed, the height, compared with the total length, being as 1 to $4\frac{1}{2}$, and the length of the head to the total length as 1 to 5.

The head is scaleless above, gelatinous, punctate, and arched. The snout is abbreviate and abrupt, but does not form a quadrant with the head, as is the case in *S. berthelotii*. The opercle and subopercle are scaly and striate, the striæ ending at the margin in minute teeth. The preopercle is scaleless, the border being striate, and the striæ projecting as blunt teeth*. The eye is round, its centre is placed about the middle of the height, and it is surrounded by radiating grooves; it is contained five times in the head; the space between it and the tip of the snout is equal to a diameter and a half. The mouth is of moderate size, and the jaws are equal; each is set with a single series of small sharp teeth. There are no teeth on the palatines or the vomer. The tongue is broad, smooth, and white.

The long scaly dorsal fin commences behind the root of the pectoral fin; it is low in front, highest at the middle, and has an angular termination. The spinous rays are not to be distinguished from the others. The pectoral fins are pointed, and have broad roots; they are inserted below the middle of the height, and their fourth and fifth rays are the longest; they scarcely reach more than halfway to the vent. The pointed ventral fins are inserted near together, just under the posterior angle of the root of the pectoral fins. The second soft ray is the longest; this fin does not reach halfway to the vent. The scaly anal fin is high in front and pointed behind; it terminates opposite, or perhaps a little behind, the termination of the dorsal; its base is about half as long as that of the dorsal fin. The caudal fin is deeply emarginate; its membrane has scales upon it between the rays.

The lateral line rises slightly on the shoulder, then descends gently to the middle of the height, and from a little behind the middle of the total length it is horizontal. The scales are very small, cycloid, and concentrically striate; those of the lateral line are about 160 in number.

The single individual from which these characters have been drawn up, though bearing considerable resemblance to *S. berthelotii* (which occasionally occurs at Madeira), is sufficiently distinct from that and other known members of the genus to warrant the definition of a new species. From *S. berthelotii* it is easily distinguished by the smaller scales, the longer body (height to length as 1 to $4\frac{1}{2}$, instead of 1 to 3), the shorter head (head to length as 1 to 5, instead of 1 to 4), the longer snout (equal to $1\frac{1}{2}$ diam. of the eye, whereas in *S. berthelotii* it is less than one diameter of the eye), by the shorter pectoral and ventral fins only reaching about halfway to the vent (whereas in *S. berthelotii* they extend backwards as far as the vent), and by the commencement of the dorsal fin being placed behind the root of the pectorals, whereas in *S. berthelotii* that fin commences considerably in front of that point. A thick purple fluid exuded from the vent of the dead fish; and the same thing has occurred in the case of all the

* In describing *S. berthelotii* (Ichth. Canarienne, p. 45), M. Valenciennes says that the opercle, subopercle, and interopercle are not scaly, whereas all the opercular pieces are most certainly scaly.

specimens of *S. berthelotii* that have occurred. The fishermen give to both these species the name of "Praga."

The total length of the specimen (which was taken in the month of April last) is $14\frac{7}{10}$ inches; the height between the ventrals and the vent is $3\frac{3}{10}$ inches, and its thickness thereabouts is $\frac{11}{16}$ inch. The dimensions of the principal parts are expressed in inches in the following table:—

	inches.
Length of head	$2\frac{8}{10}$
Diameter of eye, rather more than	$\frac{1}{2}$
Dorsal, length of base	$6\frac{1}{2}$
—, height at middle	$\frac{7}{8}$
—, distance from snout.....	$3\frac{5}{8}$
Pectorals, length	$1\frac{1}{2}$
—, breadth of base	$\frac{6}{10}$
—, distance from snout.....	$3\frac{1}{10}$
Ventrals, length.....	$1\frac{1}{4}$
Vent, distance of its vertical from snout	$6\frac{1}{4}$
—, distance from anal	$\frac{1}{2}$
Anal, length of base	$3\frac{3}{10}$
—, height in front.....	$\frac{9}{10}$
Caudal, length of longest rays	$2\frac{1}{2}$

FAM. TRIGLIDÆ.

SETARCHES, gen. nov. (Pl. XXIII.)

Head and body compressed; no transverse groove at the occiput; vertex without spines; preoperculum armed; body covered with cycloid scales; without skinny appendages. One dorsal fin divided by a notch into a spinous and a soft portion. No pectoral appendages. Villiform teeth in the jaws, on the vomer, and on the palatine bones. Lateral line a broad scaleless groove. Six or seven branchiostegal rays. Pyloric appendages in small number. No air-bladder.

It will be observed that this new genus is closely related to *Sebastes* and *Scorpæna*, but more nearly to the former than to the latter. From both it is distinguished by the cycloid scales, the scaleless lateral line, and the absence of spines from the vertex. The single individual on which it has been founded was taken in the month of December 1861, and is now in the British Museum. It was at first assigned to the genus *Sebastes*, but was at once discriminated from all the species of that genus previously taken at Madeira. With these species I shall compare it throughout my description, with the view of aiding other observers in identifying specimens, if they should occur.

SETARCHES GÜNTHERI, sp. n.

D. $11\frac{1}{9}$. A. $\frac{3}{5}$. P. 22. V. $\frac{1}{5}$. C. iv. 7+7. iv.

The height, compared with the total length, is as 1 to 4. The
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head is large, being contained in the length only $2\frac{3}{4}$ times. It is scaleless, and without prominent spines on the vertex; the bones are cavernous; the space between the eyes is flat and marked by several low ridges. At the back of the head are two broad flat spines pointing backwards.

The eye is contained $5\frac{1}{3}$ times in the head, and is distant from the tip of the scaleless snout about a diameter and a half. The space between the eyes is considerably more than equal to the diameter, and is to the length of the head as 1 to $4\frac{1}{2}$. There are no spines above the postero-superior part of the orbit. The snout is rounded and truncate; its length is equal to one-third of the length of the head. There is a skinny appendage at the posterior margin of the anterior nostril. The opercle is scaly, and is crossed by two strong crests terminating in long spines, which reach up to its edge; the higher of these spines is to the length of the head as to 1 to $7\frac{1}{2}$. At the border of the scaly preopercle there are five spines, pointing backwards, of which the three highest are long, narrow, and parallel, the middle one of the three being equal in length to the larger of the opercular spines: these five spines occupy the position of those of *Sebastes dactylopterus*.

The mouth is moderately large. The maxillary is broad below, is vertically truncate, and reaches back to the posterior margin of the eye. The under jaw is a trifle longer than the upper, which is notched in front. Both jaws, the palatines, and the vomer are set with bands of villiform teeth. The tongue is free near the apex, is very thick, and has a thin spatuliform projection in front similar to that seen in front of the tongue of *S. kuhlii*, which, however, does not reach so far forward as in the case of the present species. The tongue and pharynx are black. The branchiostegal membrane, when the mouth is closed, is almost concealed by the opercular pieces and the very broad mandibular bones.

The dorsal fin is long, commencing before the root of the pectoral; its spines are stout, and the soft portion rounded. The anal fin is short, and terminates opposite the termination of the dorsal fin; its third spine is the longest, and is to the length of the head as 1 to $3\frac{1}{3}$, but it is shorter than the first three soft rays. The pectoral fin is broad and long, reaching back to the commencement of the anal fin, its length being to the total length as 1 to $3\frac{2}{3}$. The first two and the last five rays are simple, the others branched. The tenth, eleventh, and twelfth rays are the longest, and the last rays are the shortest. None of them project beyond the membrane. The ventral fins are placed together under the roots of the pectoral fins; they are pointed, and extend over rather more than half the distance between their roots and the commencement of the anal fin. The spine is stout; the two first soft rays longer than the others. The caudal fin is truncate, and is scaly only at the base. The vent is far back, being under the base of the twelfth dorsal spine.

The scales are very small, and cycloid, offering no roughness to the finger when drawn from tail to head. The broad and scaleless lateral line descends gently from the shoulder to the tail, where it is straight;

its membrane has thirty divisions, but the rows of scales that abut upon it are about eighty-six in number.

The cæcal stomach was found to be of moderate length, and there were only two pyloric cæca. The intestine was long, having one convolution. No air-bladder was observed. Its colour was a uniform pinky red, minutely dotted with black.

In consequence of the anterior part of the dorsal fin having been injured, the comparative length of the spines could not be ascertained. The number of the branchiostegal rays on one side is six, on the other seven.

From *Sebastes dactylopterus*, *S. kuhlii*, and *S. maderensis*, the only three Madeiran species of that genus hitherto known, it is well distinguished by the flatness of the head between the eyes, by the absence of prominent spines from the vertex, by the third (not the second) anal spine being the longest, by the broad membranous lateral line, and by the cycloid scales. From the first-named species it is further distinguished by the soft rays of the dorsal fin being nine in number, in place of twelve; and from the two latter species by the black pharynx. With *Sebastes filifer*, Val. (Ich. Can. p. 21, pl. 2. fig. 2), this fish agrees in having scales with simple borders; but it differs (in addition to the characters by which the genus *Setarches* is separated from the genus *Sebastes*) in the number of the rays of the pectoral fin (22 in place of 16), in having, not all, but only the two first and the last five rays of that fin simple, in possessing five in place of four preopercular spines, and in the smaller scales (86 in place of 62 along the lateral line).

Dedicated to my friend Dr. A. Günther, the well-known ichthyologist, to whom I am indebted for much valuable instruction.

The following are the dimensions in inches of the principal parts of the specimen, which is now in the British Museum:—

Total length	9
Height	$2\frac{1}{4}$
Length of head	$3\frac{1}{10}$
— of second preopercular spine	$\frac{4}{10}$
Diameter of eye	$\frac{11}{20}$
Length of maxillary	$1\frac{6}{10}$
— of base of dorsal fin	$3\frac{1}{2}$
— of pectoral fin	$2\frac{1}{2}$
— of base of pectoral fin	$\frac{7}{8}$
— of ventral fin	$1\frac{1}{2}$
— of base of anal fin	$\frac{3}{4}$
— of third anal spine	$\frac{19}{20}$
— of caudal fin	$1\frac{8}{10}$
Distance of vertical of vent from snout	$5\frac{1}{4}$

Fam. PERCIDÆ.

PRIACANTHUS INSULARUM, sp. n.

D. 10. 15. A. 3. 15. Scales of lateral line, about 76.

This species has a close resemblance to *P. macrophthalmus*, from

which, however, the following differences distinguish it:—1. The height of the body to the total length is as 1 to $3\frac{3}{4}$, not as 1 to $2\frac{2}{3}$. 2. The diameter of the eye is to the length of the head as 1 to $3\frac{1}{5}$, not as 1 to $2\frac{2}{3}$. 3. The number of soft rays in the dorsal fin is 15, not 13 or 14. 4. The length of the second dorsal spine is to the last as 1 to 2, not as 1 to $1\frac{2}{3}$. 5. The edge of the opercle has one flat spine, and above this there is a rounded plate; whereas the edge of the opercle of *P. macrophthalmus* has two flat spines. 6. In *P. macrophthalmus* the two borders of the preopercle form a right angle, and the margins are strongly denticulated. In the present species the angle formed by the free borders of the preopercle is obtuse, and the margins are very finely serrate. 7. The caudal is slightly emarginate. 8. The fins have not black edges, as is the case with *P. macrophthalmus*.

This species is established on a single specimen, taken last May, which had a length of $14\frac{1}{2}$ inches, and a height of $3\frac{2}{3}$, the head being $3\frac{5}{8}$ inches long. The eye had a diameter of $1\frac{1}{5}$ inch. The example was coloured a uniform red, and it is now in the British Museum.

3. LIST OF MAMMALIA FROM THE CAMAROO MOUNTAINS, COLLECTED BY CAPT. BURTON, H.M. CONSUL, FERNANDO PO. BY DR. J. E. GRAY, F.R.S.

(Plate XXIV.)

CROCIDURA MORIO, sp. nov.

Uniform rather brownish black, rather paler and browner beneath. Teeth white. Feet very slender, weak. Tail nearly as long as the body and head, very slender, annulated, covered with very short closely adpressed hair.

Length of body and head, dry, $2\frac{3}{4}$ inches; tail, dry, 2 inches.

“*Mole* from Camaroon Mountains, 7000 feet above the level of the sea, January 1862.”

SCIURUS ISABELLA, sp. nov. (Pl. XXIV.)

Yellowish brown, minutely grizzled, with four broad dorsal streaks—the two central from the crown of the head to the base of the tail, the side ones from the shoulder only; the underside whitish grey. Tail slightly annulated.

Length of body and head 7 inches; tail 5 inches.

“*Squirrel* from the Camaroon Mountains, 7000 feet above the level of the sea, January 1862.”

I have great pleasure in naming this beautiful new species after Mrs. Isabel Burton,—her husband, the discoverer of it, having requested that any novelty that might be in the list should be so named.

ANOMALURUS BEECROFTII, Fraser.

“A *Flying Squirrel*, shot in the Camaroon Mountains, 7000 feet

above the level of the sea. Colour of the eyes dark grey. January 18, 1862.”

MUS MAURA, sp. nov.

Fur very soft and silky; above black, slightly marked with brown from the minute brown tips of the hairs; beneath whitish—the hair of the underside black, white-tipped. Teeth very narrow, orange. Ears rounded, moderate. Sides of the nose and edge of the orbits black. Eyes covered with very short close-pressed hairs. Tail very long, slender, closely annulated with very slender, very short adpressed hair.

Length of body and head $4\frac{1}{2}$ inches; tail 5 inches; hind foot very nearly 1 inch.

“Cameroon Mountains, 7000 feet above the level of the sea.”

EURYOTIS IRRORATA, sp. nov.

“Rat from the Cameroon Mountains, 7000 feet above the level of the sea. January 1862.”

I am not certain about this species until I can compare the skull with those of the other species of the genus from Africa, as they are all very similar externally.

With these animals was sent the skin of a Chimpanzee without its skull, but with the bones of the hand and feet enclosed in the skin. This skin differs from all the other specimens of this species which I have seen, in being covered with much more abundant and softer fur, and in the fur of the back being of a brown colour from the large brown tips to the blackish hair. It would seem to indicate a distinct variety or species, which may be designated, until we receive better specimens and more particulars, *Troglodytes vellerosus*.

4. DESCRIPTIONS OF NEW OPERCULATED LAND SHELLS.
BY DR. H. DOHRN.

1. LEPTOPOMA PAPUANUM.

Testa anguste umbilicata, globoso-conica, tenuis, concentricè subtilissime et confertissime striata, hyalina, varie fusco maculata, fasciis albis hydrophanis cingulata; spira turbinata, acuta; anfr. 5, modice convexi, ultimus subcompressus; apertura vix obliqua, circularis, alba; peristomium album, late expansum, marginibus disjunctis, columellari angulatim reflexo. Operc. normale.

Diam. maj. 15, min. 11, alt. 11 mill.; ap. 11 mill. longa.

Hab. In Nova Guinea (*Wallace in Mus. Cuming.*).

Exstant varietates 1, unicolor hyalina albicincta; 2, medio et ad suturam fusco cingulata; 3, varie fusco maculata et fulgurata.

Differt a *L. pellucido* anfr. planioribus, apertura minus obliqua, umbilico minus obtecto, &c.

2. LEPTOPOMA MATHILDÆ.

Testa anguste umbilicata, globoso-conica, tenuis, sericata, spiraliter confertim tenuistriata, lineis subelevatis 6-7 distantibus cincta, albido-hyalina vel cornea, intus interdum late fusco fasciata, pone aperturam late transverse fusco zonata, pellucida; spira conica, apice nigro vel corneo; anfr. 5, convexi, ultimus magnus, infra medium plerumque albido fasciatus, obsoletius sculptus; apertura obliqua, circularis; peristomium undique æqualiter angulatim reflexum et expansum, marginibus callo angusto crassiusculo junctis.

Diam. maj. 14, min. 11, alt. $9\frac{1}{2}$; ap. diam. 6 mill.

Hab. In Zamboanga insulæ Mindanao, unde misit *Dr. C. Semper*.

3. LEPTOPOMA PFEIFFERI.

Testa perforata, turbinato-conica, tenuiuscula, subtiliter et confertim spiraliter striata, alba, strigis irregularibus cærulescenti-corneis ornata; spira conica, acutiuscula; anfr. 6, convexiusculi, ultimus inflatior, medio obtuse angulatus; apertura ovalis rotundata; peristomium undique expansum, marginibus callo tenui junctis, columellari arcuato, basin versus angulum formante. Operc. normale.

Diam. maj. 18, min. 14, alt. $13\frac{1}{2}$; ap. long. 10, lat. $7\frac{1}{2}$ mill.

Hab. In insula Camiguin (*Coll. Semper*).

4. LEPTOPOMA TROCHUS.

Testa angustissime perforata, trochiformis, tenuis, pellucida, spiraliter confertissime tenuistriata, obsolete 5-sulcata, hyalina, pallide virente maculata, fasciis albidis cincta; spira turbinata, apice acuto; anfr. $5\frac{1}{2}$, subplani, ultimus medio acutissime et compressè carinatus, basi vix convexior; apertura obliqua, subrhombæa; peristomium duplex, externum breviter reflexum, incrassatum, umbilici $\frac{2}{3}$ tegens, marginibus callo tenui junctis, internum continuum, rectum; faux late piceo transverse fasciata. Operc.?

Diam. maj. 15, min. 13, alt. 14; ap. intus long. $6\frac{1}{2}$, lat. 7 mill.

Hab. In Maligi insulæ Mindanao (*Coll. Semper*).

5. LEPTOPOMA CAROLI.

Testa perforata, turrato-conica, tenuiuscula, oblique striatula, spiraliter confertim capillaceo striata, nitida, albida; spira elongata, apice obtusiusculo; anfr. $6-6\frac{1}{2}$, vix convexiusculi, ultimus infra medium angulatus, subtus paullo convexior, apertura perobliqua, basi protracta, subeffusa, oblonga; peristomium expansum, marginibus callo tenui junctis, columellari superne dilatato, reflexo, perforationem fere tegente, basi subangulato. Operc. normale.

Diam. maj. 13, min. 11, alt. 17; ap. long. 8 mill.

Hab. In provincia Nueva Ecija insulæ Luzon, ubi legit *Dr. Carolus Semper*.

6. *CALLIA SPLENDENS*.

Testa ovato-conica, tenuis, nitida, pellucida, pallide rufo-cornea, sutura impressa, marginata, callo obducta; anfr. 5, convexiusculi, ultimus dimidium longitudinis æquans, convexus, axin non excedens; apertura verticalis, subcircularis; peristomium expansiusculum, incrassatum, circa columellam callum formans. Operc. normale.

Long. 7, diam. 4; ap. diam. $2\frac{1}{4}$ mill.

Hab. In "Lizard Islands" Australiæ (*Macgillivray in Mus. Cuming.*).

7. *PUPINA OTTONIS*.

T. ovato-conica, tenuis, glaberrima, pellucida, aurantiaca; spira obtusiuscula; sutura impressa, submarginata, vix callosa; anfr. 6, convexiusculi, ultimus antice breviter ascendens, spiram subæquans; apertura circularis, subverticalis; lamella parietalis arcuata, cum latere dextro peristomatis canalem latum formans; columella oblique dissecta; peristomium subreflexum, margine dextro arcuato, columellari incrassato, flavidum. Operc. normale.

Long. 11, diam. 6 mill.

Hab. In Mariveles insulæ Luzon, unde misit *Dr. C. Semper*.

8. *PUPINA VENTROSA*.

Testa ovata, tenuis, pellucida, nitida, rufo-cornea; spira sursum attenuata; sutura vix impressa; anfr. 5, supremi convexi, penultimus planulatus, ultimus $\frac{1}{2}$ longitudinis subæquans; apertura subverticalis, circularis; lamella parietalis valida, triangularis; peristomium incrassatum, subexpansum, margine columellari plano, dilatato. Operc. normale.

Long. $7\frac{1}{2}$, diam. 4 mill.

Hab. In Cape York Australiæ (*Macgillivray in Mus. Cuming.*). Nonne potius varietatibus *P. bilinguis*, Pfr., adnumeranda, quæ species quoad staturam pervariabilis esse videtur?

9. *PUPINA PFEIFFERI*.

Testa pupæformis, tenuis, nitidissima, pellucida, cornea; spira ovato-conoidea; sutura callosa, submarginata; anfr. $5\frac{1}{2}$, convexiusculi, ultimus $\frac{1}{2}$ longitudinis subæquans, basin versus attenuatus, basi axin vix excedens; apertura basi valde protracta, obliqua, circularis; lamella parietalis acuta, intrans, cum peristomio canalem angustum formans; columella transverse dissecta; peristomium incrassatum, expansiusculum. Operc. normale.

Long. $5\frac{3}{4}$, diam. $2\frac{1}{2}$ mill.

Hab. Ad Cape Flattery Australiæ (*Macgillivray in Mus. Cuming.*). Differt a *P. strangei*, Pfr., cui proxime affinis, lamella parietali, apertura obliqua, sutura callosa, etc.

10. ARINIA SCALATELLA.

Testa subobtecte perforata, ovato-oblonga, tenuis, costis distantibus transversis regulariter sculpta, pellucida, flavido-cornea; spira ovata, apice acuto; sutura valde impressa; anfr. 5½, turgidis, ultimus attenuatus; apertura parum obliqua, circularis; peristomium late expansum, marginibus ad anfractum ultimum vix disjunctis. Operculum extus concavum, lamelloso-arcit-spirum, corneum.

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

Unicum specimen in monte Arayat insulæ Luzon repertum in collectione Semperiana exstat.

Genus verisimiliter cum *Pupinacis* collocandum; statura proxime affine *Streptaulo* Bens., a quo deficiente tuba differt; operculum valde a *Diplommatinæ* operculo discrepat.

The following lists of the additions made to the Menagerie during the months of April and May were read:—

APRIL.

3 American Crows	<i>Corvus americanus</i>	Presented by Andrew Downs, Esq., Corr. Mem. Z.S.
1 American Raven	— <i>carnivorus</i>	
4 Australian Shieldrakes ..	<i>Casarca tadornoides</i>	Hon. J. C. Hawker, Speaker of the House of Assembly of S. Australia.
1 Rosy Cockatoo	<i>Cacatua roseicapilla</i>	T. Scrutton, Esq.
1 Stump-tail Lizard	<i>Trachydosaurus rugosus</i>	Rev. W. H. Hawker, F.Z.S.
1 Vervet Monkey	<i>Cercopithecusalandii</i>	B. B. Sapwell, Esq.
1 Barbary Dove	<i>Turtur risorius</i>	Mrs. Bruce.
A collection of Tritons... {	<i>Triton cristatus</i>	} T. C. Eyton, Esq., F.Z.S.
	— <i>punctatus</i>	
2 Necklaced Doves	<i>Columba speciosa</i>	Capt. Taylor.
4 Badgers	<i>Meles taxus</i>	Duke of Richmond.
1 Bonnet Monkey	<i>Macacusradiatus</i>	— Mayhew, Esq.
1 Tigress	<i>Felis tigris</i>	M. H. Scott, Esq.
1 White-eyebrowed Guan...	<i>Penelope superciliaris</i>	Duke of Richmond.
1 Kagu	<i>Rhinocetus jubatus</i>	Dr. G. Bennett, F.Z.S.
1 Goat	<i>Capra hircus</i> , var.	Colonel Tapp, C.B.
2 Indian Ratels	<i>Ratelus indicus</i>	} A. Grote, Esq.
2 Indian Porcupines	<i>Hystrix leucura</i>	
4 Geckos	<i>Gecco verus</i>	
1 Ring-necked Parakeet ...	<i>Palaoernis torquata</i>	Madame van Dervin.
1 Swinhoe's Deer	<i>Cervus swinhoii</i>	} R. Swinhoe, Esq., Corr. Mem. Z.S., H. B. M. Vice-Consul in For- mosa.
2 Bennett's Water Tortoises	<i>Emys bennettii</i>	
1 Bonnet Monkey	<i>Macacusradiatus</i>	} Dr. Travers Twiss, F.Z.S.
2 Birds of Paradise	<i>Paradisepapua</i>	
7 Indian Grey Francolins...	<i>Francolinusponticercianus</i>	} Purchased.
1 Mona Monkey	<i>Cercopithecus mona</i>	
1 Capuchin Monkey	<i>Cebus capucinus</i>	
1 Indian Civet	<i>Viverricula indica</i>	

APRIL (continued).

1 Blossom-headed Parakeet	<i>Palaornis bengalensis</i> ...	} Purchased.
1 Indian Mynah	<i>Aceridotheres ginginianus</i>	
1 Indian Rock-Snake	<i>Python molurus</i>	
1 Lapland Bunting	<i>Plectrophanes lapponicus</i>	
2 Yellow Conures.....	<i>Conurus luteus</i>	
1 Prehensile-tailed Porcupine.	<i>Cercolabes prehensilis</i> ...	
2 Blue-eyed Cockatoos.....	<i>Cacatua ducorpsii</i>	
4 Modest Finches	<i>Amadina modesta</i>	
1 Black Cockatoo	<i>Calyptorhynchus banksii</i>	
4 Blue Bonnet Parakeets...	<i>Psephotus hamatogaster</i>	
4 Many-coloured Parakeets	— <i>multicolor</i>	} In exchange.
1 Masked Parrot	<i>Pyrrhulopsis personata</i> ..	
2 Mealy Rosella Parakeets	<i>Platycercus pallidus</i>	
1 American Crocodile	<i>Crocodylus americanus</i> ...	
2 Little Green Pigeons.....	<i>Chalcophaps</i> —?	
1 Male Emeu	<i>Dromæus nova-hollandiæ</i> ..	
2 Cockateels	<i>Calopsittanovæ-hollandiæ</i> ..	
1 Aoudad	<i>Ovis cycloceros</i>	
1 Zebu	<i>Bos indicus</i> ?	
1 Sambur Deer, fem.	<i>Cervus hippelaphus</i>	
1 Magellanic Goose	<i>Chloëphaga magellanica</i> ..	Hatched.

Of these, *Corvus americanus*, *Corvus carnivorus*, *Casarca tador-noides*, *Rhinocetus jubatus*, *Ratelus indicus*, *Cervus swinhoii*, *Emys bennettii*, *Paradisæa papuana*, *Cacatua ducorpsii*, *Amadina modesta*, and *Pyrrhulopsis personata* were stated to have been exhibited for the first time.

MAY.

		Presented by
1 Golden Agouti.....	<i>Dasyprocta aguli</i>	G. Palmer, Esq.
1 Common Partridge	<i>Perdix cinerea</i>	Mr. Neil.
2 Green Lizards	<i>Lacerta viridis</i>	Rev. E. C. Taylor, F.Z.S.
1 Macaque Monkey	<i>Macacus cynomolgus</i>	Mrs. Boteler.
2 Horned Owls	<i>Bubo virginianus</i>	Martin Ware, Esq., F.Z.S.
1 pair of Brahmin Cattle..	<i>Bos indicus</i> , var.	} Her Majesty the Queen.
1 Aoudad, fem.	<i>Ovis tragelaphus</i>	
2 Marmosets from Bahia..	<i>Hapale iacchus</i>	G. Eveniss, Esq.
1 Diamond Snake	<i>Morelia variegata</i>	} G. MacLeay, Esq., Corr. Mem. Z.S.
2 Ocellated Skink	<i>Tropidolepisma majus</i> ...	
3 Australian Tree-Frogs...	<i>Pelodyras cærulea</i>	
2 Sugar-Squirrels	<i>Belideus sciureus</i>	Dr. Mueller, C.M.Z.S.
2 Black-and-white Geese.	<i>Anseranas melanoleuca</i> ...	Mrs. Dudley F. Cater.
1 Bennett's Kangaroo ..	<i>Halmaturus bennettii</i> ...	S. Gurney, Esq., M.P., F.Z.S.
8 young common Trout ...	<i>Salmo fario</i>	A. Shoobred, Esq.
1 pair of Wild Boars	<i>Sus scrofa</i>	R. Cockerton, Esq.
1 Prehensile-tailed Porcupine.	<i>Cercolabes prehensilis</i> ...	} W. D. Christie, Esq., F.Z.S.
3 White-masked Whistling Ducks.	<i>Dendrocygna viduata</i> ...	
1 Black-fronted Lemur ...	<i>Lemur nigrifrons</i>	
8 Ruffs.....	<i>Machetes pugnax</i>	} Purchased.
8 Godwits	<i>Limosa melanura</i>	

MAY (continued).

1 Diana Monkey.....	<i>Cercopithecus diana</i>	} Purchased.
1 Yellow Wagtail	<i>Motacilla rayi</i>	
12 Tree-Frogs	<i>Hyla viridis</i>	
1 Capromys.....	<i>Capromys brachyurus</i> ..	
1 Turkey	<i>Meleagris gallopavo</i>	
1 Indian Rock-Snake	<i>Python regius</i>	
1 Spectacle Cobra	<i>Naja tripudians</i>	
2 Guillemots	<i>Uria troille</i>	
2 Razor-bills	<i>Alca torda</i>	
2 Puffins	<i>Fratercula arctica</i>	
4 Kingfishers	<i>Alcedo ispida</i>	
1 Blood-rumped Parrakeet, male.	<i>Psephotus hæmatonotus</i> ..	
4 African Waxbills.....	<i>Estrelida cinerea</i>	} Born.
2 Black-headed Finches...	<i>Amadina cucullata</i>	
1 Echidna	<i>Echidna hystrix</i>	
5 Indian Pastors.....	<i>Pastor malabaricus</i>	
2 Punjab Wild Sheep ..	<i>Ovis cycloceros</i>	
3 Silver Foxes.....	<i>Canis argentatus</i>	} Hatched.
3 Wolves.....	— <i>lupus</i>	
6 Pintail Ducks	<i>Dafila acuta</i>	
13 Sonnerat's Jungle-Fowls (hybrids).	<i>Gallus sonneratii</i>	
3 Ashy-headed Geese	<i>Chloëphaga poliocephala</i> .	

Of these, *Tropidolepisma majus* and *Pastor malabaricus* were stated to have been exhibited for the first time.

June 24, 1862.

E. W. H. Holdsworth, Esq., F.L.S., in the Chair.

Dr. Sclater called the attention of the Meeting to some interesting additions lately made to the Society's Menagerie. These were—

1. Two Spider Monkeys, purchased of Mr. Edward Greey, of the Royal Mail Company's Service. These Monkeys had been obtained by Mr. Greey on the Rana River, Gorgon Bay, near San Juan del Norte, in Nicaragua. They appeared referable to two different species:—*Ateles frontatus*, Gray [*Brachyteles (Eriodes) frontatus*, Gray, Zool. Voy. Sulphur], smaller and parti-coloured; and *Ateles hybridus*, I. G. St.-Hil., larger and of the same form, greyish brown. The former species had been already noticed as occurring in Central America*; the latter was generally considered to be a New-Granadian species.

2. Two young Bears brought from Japan and deposited in the Gardens by Captain Ward. The only Bear hitherto recorded as

* See the article "On the Northern Limit of the *Quadrumanus* in the New World," in Nat. Hist. Review, 1861, p. 507.

being found in Japan was the Indian *Ursus torquatus* (sive *tibetanus*)*. These young Bears appeared to be distinct from the Indian species, resembling in some respects rather the American *Ursus americanus*. There were slight indications of a white mark on the throat, but this seemed likely to be wholly obliterated as the animal increased. Dr. Sclater considered these animals, in all probability, referable to a distinct species, for which he suggested the name *Ursus japonicus*.

The following papers were read :—

I. DESCRIPTIONS OF THREE NEW SPECIES OF PITTA FROM THE
MOLUCCAS. BY ALFRED RUSSEL WALLACE.

These birds are brought before the Society, detached from the collections of which they form a part, because a Monograph of the *Pittidae*, by Mr. Elliot, is now in course of publication, and it is desirable that they should be described in England before appearing in a foreign work.

They are interesting as showing the permanent modifications in form of these semiterrestrial birds, in islands within sight of each other. I may mention as a curious fact, that the great island of Ceram appears to contain no *Pitta*, although one or two species occur in almost all the other islands of the Moluccan group. I have myself collected for several months in various parts of Ceram and Amboyna, without seeing or hearing of the genus; and the natives were positive no such bird was to be found in their country. The naturalists collecting for the Leyden Museum were not more successful; and recently a German ornithologist, Mr. Rosenberg, has resided some years in the island, and up to the time of my departure had seen no *Pitta*. This is the more remarkable, as in the little island of Banda, within sight of Ceram, a species exists which, with two others, I now proceed to describe.

PITTA RUBRINUCHA.

Head reddish brown, darker behind, where there is a subquadrangular spot of bright red, and above it an obscure blue vertical stripe; back dull olive-green, shading into slaty blue on the wings and tail; quills blackish, with a white spot on the third and fourth; a small white spot on the shoulder; underside with the slaty-blue breast and crimson belly, exactly as in *P. celebensis*, but the black line separating the two colours is narrower. Bill blackish horn-colour; feet light dull blue; iris pale olive-brown.

Total length 7 inches; wing $3\frac{3}{4}$ inches; bill, from the gape, 1 inch.

Hab. Island of Bouru (Moluccas).

Remark.—This species is at once distinguished from its near ally, *P. celebensis*, by the red nuchal spot, and by having much less blue on the wing- and tail-coverts. It is also considerably smaller.

* See Temminck and Siebold's 'Fauna Japonica.'

PITTA VIGORSI.

Pitta vigorsi, Gould, Birds of Australia, vol. iv. pl. 2.

I had proposed a name for this species, supposing it to be new, and misled by Bonaparte's 'Conspectus,' which gives "*gula nigra*" as a character of *vigorsi*. Having since, at Mr. Gould's suggestion, compared my bird with the type in the Museum of the Linnean Society, I find it to be the same. My specimen is a fine adult male, and differs from Gould's figure and description in having the bill entirely black, and in the red of the under parts being much mixed with black on the breast.

Total length 7 inches; wing $4\frac{3}{8}$ inches; bill, from gape, $1\frac{1}{8}$ inch.

Hab. Banda Island (Moluccas).

Remark.—The habitat "Australia" is probably a mistake, as the birds of this genus are very local, and no well-authenticated specimen has ever been received from that country.

PITTA CRASSIROSTRIS.

Similar in colour to *P. vigorsi*; but the superciliary stripes are altogether pale rufous, the colour beneath is lighter (agreeing with *P. concinna*), and the chin is black, which colour extends in a triangle on to the throat, without being produced into a stripe, as in *P. concinna*. Bill black, with the base of the lower mandible horny; feet very pale flesh-colour; iris black.

Total length $7\frac{1}{4}$ inches; wing $4\frac{5}{8}$ inches; bill, from gape, $1\frac{1}{8}$ inch.

Hab. Sula Island (Xulla of the English maps), E. of Celebes.

Remark.—This species differs from its nearest allies by its very strong bill, as well as by the peculiarities of colouring above described. It is very like Temminck's figure of *P. irena* from Timor; but that species appears to have much more blue on the back, and the bill entirely black, and not so strong. It is also highly improbable that the same bird should be found in such distant localities, when so many of the neighbouring islands have each their peculiar species.

2. DESCRIPTIONS OF NEW SPECIES OF REPTILES AND FISHES IN THE COLLECTION OF THE BRITISH MUSEUM. BY ALBERT GÜNTHER, M.A., M.D., PH.D., F.Z.S.

(Plates XXV., XXVI., XXVII.)

CHLOROSCARTES.

(Fam. AGAMIDÆ.)

Head short, body and base of tail compressed, tail exceedingly long. Head covered with numerous smooth, small shields; all the scales keeled, small, those of the belly and tail being the larger; scales on the throat conical. Femoral pores very prominent, in a longish series; præanal pores none. A low crest of triangular scales on the neck; a series of enlarged, sharp scales along the median line

of the back and tail. Fingers five, and toes five, all elongate, and armed with sharp claws; the middle toe fringed along the basal joints. Throat with a small pouch and cross fold. No prominent scales at the ear.

CHLOROSCARTES FASCIATUS. (Pl. XXV.)

Grass-green, with three very broad dark-green cross-bands.
Feejee Islands.

Description.—Head rather elevated and obtuse; pouch below the throat and transverse fold in front of the shoulder well developed; body and basal portion of the tail compressed, the latter rounded in the middle and posteriorly, tapering, three or four times as long as the body. The fore limbs extend backwards to the loin; the third and fourth fingers are equal in length. The hind limbs are as long as the trunk; the third toe has a series of enlarged triangular scales along its inner margin, forming a serrated edge.

Shields on the upper and lateral parts of the head very numerous and smooth. Nostril in a single somewhat elevated shield, situated above the second and third upper labials. Rostral shield much broader than high, subtriangular; nine upper labials, the posterior being considerably lower than the anterior; there are three or four series of small shields between the labials and the eyelid; eyelids entirely scaly. Seven lower labials; scales on the throat conically elevated. Scales of the upper parts of the body very small, of equal size, each with a short keel or conical protuberance. A low crest, formed by compressed triangular scales, runs from the occiput towards the middle of the tail, where it is gradually lost. Scales on the belly in transverse, slightly oblique series, small, but much larger than those on the sides, strongly keeled. Limbs with keeled scales of moderate size. The scales of the middle and posterior parts of the tail are much larger than those on its basal portion; all are keeled, the keels forming continuous longitudinal ridges. Each femur with a series of twelve to fourteen large pores filled with a greasy substance; præanal pores none.

Tympanum larger than the eye.

Each jaw with eighteen to twenty teeth on each side; teeth tricuspid, the lateral points being small; palatines with small teeth posteriorly.

Bright grass-green; head and nape of the neck, three broad cross bands on the trunk, and about fourteen broad rings round the tail dark green. Nasal shield white.

	inches.	lines.
Total length	27	0
Length of head (to tympanum)	1	2
„ trunk (from tympanum to vent)	4	5
„ tail	21	6
„ fore limb	2	11
„ third finger	0	9
„ hind limb	4	0
„ third toe	1	0
„ fourth toe	1	3

PHRYNOBATRACHUS.

(Fam. RANIDÆ.)

Skin with large flat warts. Fingers quite free; toes half-webbed; head pointed; tongue elongate, deeply notched behind; vomerine teeth none; eustachian tubes small, tympanum entirely hidden.

Port Natal.

PHRYNOBATRACHUS NATALENSIS.

A fold of the skin between the fore limbs; greyish olive, marbled with darker. Metatarsus with two tubercles, tarsus with a third on the middle of its inner edge.

Description.—Forehead flattish, without canthus rostralis; sides of the head subvertical; snout somewhat pointed and rather longer than the eye; eyes of moderate size, with round pupil, rather distant; a fold in front and behind the orbit. Inner nostrils and eustachian openings small; lower jaw without prominences; tongue longish, deeply nicked behind. Body and limbs rather stout; back and sides with numerous large, smooth glands; belly smooth; an indistinct cross fold between the fore legs. The fore leg, if laid backwards, does not extend to the vent; fingers and toes tapering; the first and third fingers are equal in length, and longer than the second and fourth. Hind legs much longer than the body; toes two-thirds webbed, the third a little longer than the fifth. Dark-greyish olive, marbled with darker; an indistinct light streak between the eyes. Lower parts dirty whitish; throat with some obscure dark spots.

	lines.
Length of the body	15
„ fore leg	8
„ hind leg	23
„ tarsus with fourth toe	7½

A single specimen was in a collection sent by Mr. T. Ayres from Port Natal.

CENTROPOGON MARMORATUS. (Pl. XXVII. fig. B.)

D. $\frac{16}{9}$. A. $\frac{3}{6}$. V. $\frac{1}{5}$. L. lat. 68.

The third to sixth dorsal spines are the longest, half as long as the head; the second anal spine longer and stronger than the third. Yellowish, marbled with brown.

Moreton Bay.

Description.—This species is similar to *Centropogon australis*, from which it will be readily distinguished by the shorter third dorsal spine, which in *C. australis* is two-thirds as long as the head. The height of the body is contained thrice and a half in the total length; the length of the head thrice and a quarter. Head slightly compressed, with deep grooves along the interorbital space, which is concave and much narrower than the orbit; there is a slight groove behind the orbits, across the occiput. Snout shorter than the eye,

the diameter of which is scarcely more than one-third of the length of the head. Cleft of the mouth slightly oblique, of moderate width, the maxillary extending beyond the front margin of the orbit; jaws equal in length anteriorly. Each turbinal bone with an obtuse spine superiorly; præorbital spine strong; præoperculum with five spines, the upper of which is the longest; operculum with two ridges; spines on the occiput small and obtuse. Head naked, without cutaneous appendages; vomerine teeth in a narrow angular band.

The dorsal fin commences immediately behind the occiput, its spines are of moderate length and strength; the third to the sixth are the longest, half as long as the head; the following decrease in length, the last, again, being a little longer than the penultimate; the soft dorsal rather more elevated than the spinous, short, the length of its base being contained thrice and a fifth in that of the spinous dorsal. Caudal fin scaleless, rounded, contained four times and two-thirds in the total length. The anal commences opposite the fourteenth dorsal spine; its second spine is the longest, contained twice and two-thirds in the length of the head. The pectoral has the rays branched, and extends nearly as far backwards as the ventral, which is composed of a strong spine and five soft rays; the region round the base of the pectoral and ventral fins is naked, covered with soft skin.

The gill-membranes are scarcely united below the throat. There is a distinct cleft behind the fourth gill*.

Length of the specimen, 3 inches.

CATOPRA SIAMENSIS. (Pl. XXVI. fig. A.)

D. $\frac{13}{15}$. A. $\frac{3}{9}$. L. lat. 27. L. transv. $\frac{5\frac{1}{2}}{13}$.

The height of the body is contained twice and a third in the total length. Cheek with six series of scales, the lower of which covers the præopercular limb. Body with eight dark cross bands; scales on the nape with some minute whitish dots; the outer edge of the ventral white.

Siam.

Description.—The height of the body is contained twice and a third in the total length, the length of the head thrice and a third; head as high as long. Snout rather shorter than the eye, the diameter of which is one-fourth of the length of the head, and equal to the width of the interorbital space. The lower jaw is scarcely longer than the upper, and the maxillary extends slightly beyond the anterior margin of the orbit. Two nostrils remote from each other, both very small. Præorbital and angle of the præoperculum slightly serrated; opercles, throat, and isthmus entirely scaly. The dorsal fin commences above the end of the operculum, and terminates close by the caudal; its spines are very strong, and can be received in a

* I have been induced by that circumstance to re-examine *C. australis*, and have found a very small opening behind the fourth gill; so that the presence of such a narrow cleft is to be introduced into the diagnosis of the genus *Centropogon* (Catal. Fish. ii. p. 128).

groove; the fifth, sixth, and seventh are the longest, not quite half as long as the head; the last spine is shorter than the penultimate; the soft dorsal is elevated and scaly at the base. The second anal spine is exceedingly strong, rather stronger and longer than the third, and not quite half as long as the head; the soft anal is similar to the soft dorsal. Caudal fin rounded, slightly produced, one-fourth of the total length; its basal half is scaly. Pectoral rather narrow, as long as the head without snout. The ventral is inserted immediately behind the base of the pectoral; it has a strong spine, and extends to the vent.

Scales minutely ciliated; the upper part of the lateral line terminates below the last dorsal rays, the lower commences above the third anal spine.

Gill-membranes united below the throat, not attached to the isthmus, scaly. Four gills, a slit behind the fourth; pseudobranchiæ none.

The jaws, vomer, palatines, and upper and lower pharyngeals are armed with bands of small villiform teeth. Very remarkable are two large, ovate, dentigerous plates, one at the roof, the other at the bottom of the mouth, in front of the pharyngeals; these plates are slightly concave in the middle, pavimentated with molar-like teeth, and have evidently the same function as the pharyngeal dentigerous plates of the true Pharyngognathi.

Total length 52 lines.

When I composed the generic characters of the genus *Catopra* from Bleeker's accounts, I had not seen a specimen of these fishes, and I described their peculiar dentition in very indistinct terms. The teeth ought to be described thus:—Villiform teeth in the jaws and on the vomer and palatine bones; a large patch of molar-like teeth on the prephenoid and on the basi-hyal.

CATOPRA TETRACANTHUS. (Pl. XXVI. fig. B.)

D. $\frac{15-16}{11}$. A. $\frac{4}{8}$. L. lat. 26. L. transv. 3/9.

The height of the body is nearly one-third of the total length. Cheek with four series of scales, the lower præopercular limb being naked. Coloration uniform?

East Indies.

Description.—The height of the body is nearly one-third of the total length, the length of the head two-sevenths; head a little longer than high. The length of the snout equals the diameter of the eye, which is contained thrice and two-thirds in the length of the head. The width of the interorbital space is considerably less than that of the orbit. The lower jaw is scarcely longer than the upper, and the maxillary extends slightly beyond the anterior margin of the orbit. Two nostrils remote from each other, the anterior minute. Præ-orbital and angle of the præoperculum slightly serrated; opercles, throat, and isthmus entirely scaly. The dorsal fin commences above the root of the pectoral, and terminates at a short distance from the caudal; its spines are of moderate strength, those in the middle being

the longest, a little more than one-third of the length of the head ; the last spine is a little longer than the penultimate ; the soft dorsal is somewhat elevated and not scaly. The three posterior anal spines are nearly of equal length and strength, two-fifths of the length of the head. Caudal rounded, scaly at the base, one-fourth of the total length.

Scales minutely ciliated.

The jaws, vomer, palatines, and upper and lower pharyngeals are armed with bands of small, villiform teeth, the jaws having a pair of small canine-like teeth anteriorly. The roof and the bottom of the cavity of the mouth have an elongate band of granular teeth, the lower not being confluent into one plate.

The coloration appears to have been uniform.

Two specimens, 54 lines long, were transferred from the collection of the East India Company to the British Museum.

PSEUDOCROMIS PERSPICILLATUS. (Pl. XXVII. fig. C.)

D. $\frac{3}{25}$. A. $\frac{3}{14}$. L. lat. 45.

Reddish-olive (in spirits), with a chestnut-brown band running from the extremity of the upper jaw through the middle of the eye to the middle of the base of the dorsal fin ; the band is very dark and slender anteriorly, gradually becoming lighter and broader posteriorly.

China.

Description.—The height of the body equals the length of the head, and is contained thrice and a third in the total (without caudal). Head longer than high ; cleft of the mouth oblique, with the jaws subequal anteriorly, and with the maxillary extending to behind the vertical from the front margin of the orbit. Snout a little longer than the orbit, the diameter of which is one-fourth of the length of the head. The width of the interorbital space, which is scaly, is less than that of the orbit. The lower jaw with two, the upper with three pairs of canine teeth. Scales on the cheek in six series. Caudal fin subtruncated, with an upper and lower ray produced into a filament.

Several specimens are in the collection of the British Museum ; one of the largest is 42 lines long.

AMBLYOPUS SAGITTA. (Pl. XXVII. fig. A.)

D. $\frac{6}{21}$. A. $\frac{1}{20}$.

The height of the body is one-twelfth of the total length ; vertical fins united ; caudal very long, arrow-shaped ; teeth small, in a single series ; eyes rudimentary.

California.

Description.—Body elongate, compressed, covered with small, imbricate, cycloid scales, which become larger posteriorly. Head elongate, subquadrangular, one-seventh of the total length (with the caudal), and two-thirds of the distance between vent and base of the

ventral fin. Teeth very small, subhorizontal, in a single series. Cleft of the mouth oblique, rather wide, the maxillary extending to behind the eye; lower jaw prominent; eye very small. Ventral fins confluent; caudal arrow-shaped, nearly one-fifth of the total. Pectoral as long as the ventral, and half as long as the head. Upper parts grey, lateral and lower silvery; an ovate grey spot before each dorsal ray; caudal grey.

Four specimens of this fish have been procured for the British Museum. The largest of them is $9\frac{1}{2}$ inches long.

This is the most aberrant form of the genus *Amblyopus*; although closely allied to *A. broussonetii*, it differs in its more feeble dentition and in its larger scales. *A. broussonetii* has 11/16 vertebræ, *A. sagitta* 11/20. If the genus *Gobioides* of Lacépède be adopted, another must be created for *A. sagitta*, and the sections may be arranged as follows:—

AMBLYOPUS, Gthr.

A. Teeth in a band, with an outer series of stronger ones.

* More than twenty-five soft dorsal rays: *Amblyopus*, C. & V. East Indies.

* Less than twenty soft dorsal rays: *Gobioides*, Lacép. Peru and Guayaquil.

B. Teeth in a single series: *Tyntlastes*. California.

3. DESCRIPTIONS OF SOME NEW CORALS FROM MADEIRA.

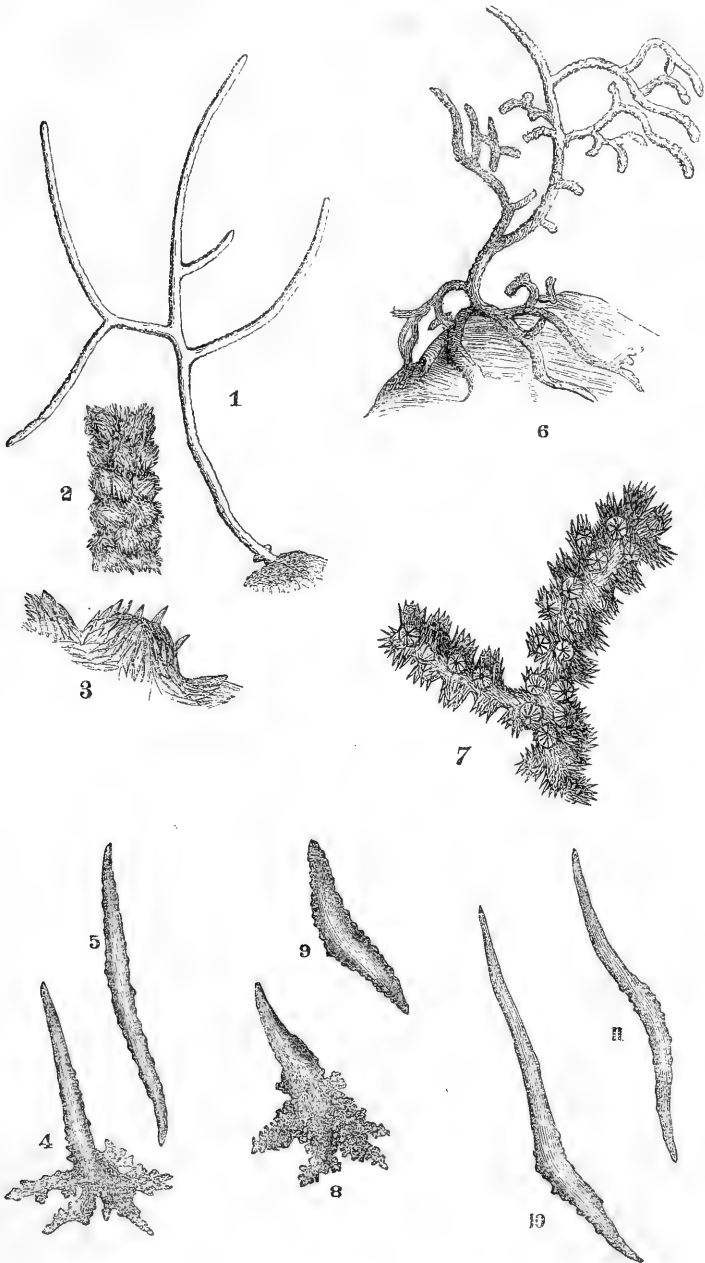
BY JAMES YATE JOHNSON, COR. MEM. Z.S.

Fam. ACANTHOGORGIAE, J. E. Gray.

ACANTHOGORGIA ATLANTICA, sp. n.

Since the occurrence of a specimen of *Acanthogorgia grayi*, of which I laid a description before the Society last year (Proc. Z. S. 1861, p. 296), another form of the genus has been discovered. This was brought up from deep water at Madeira, having become entangled in a fisherman's line. As there are obvious distinctions from the two other species of this genus, I shall venture to describe it as new.

It is of a dark-brown colour, and is very sparingly branched in one plane. The base spreads out in thin branching sheets amongst small shells and fragments of stone which adhere to it. The stem and branches, with their closely packed cells, are cylindrical, the former not much thicker than the latter. The branches are rounded at their extremities. The cells are short, cylindrical, sessile, and so crowded on all sides of the stem that they conceal it from view; whilst in the two other species of this genus the cells are widely separated, and the bark is seen between them. When the polypidom is dry, a brown, slender, horny axis, without spinulæ, stands distinct from the bark, as in the other species. This axis, when softened and submitted under pressure to the microscope, is seen to



consist of fibres bearing a general similarity to those composing the axis of *Antipathes*. Round the orifice of each cell project large spicula, and smaller spicula strengthen the sides of the cells and the bark. The spicula are intermediate in character between those of *A. hirsuta* and *A. grayi*, being less slender than those of the first species, and less stout than those of the second. The great spicula round the mouth of the cell have their exposed portions spinulose or tuberculated (not smooth as in *A. hirsuta*); their bases are branched (as in *A. grayi*), and they are much less marked with the tubercles which roughen the bases of the last-named species so remarkably.

This species is distinguishable from the other two by the greater crowding of the cells, by the cells themselves being sessile and being therefore less prominent, by the paucity of the ramifications, and by the differences in the spicula already pointed out. In habit it is very distinct.

The specimen (which is now in the British Museum) has a height of 13 inches, and its branches have a spread of about 11 inches. The stem, with its cells, has a diameter of $3\frac{6}{10}$ of an inch, and the branches with their cells are only reduced to two-thirds of that diameter. Near the base are the stumps of two branches which have been broken off. Above, on one side, are two simple branches, and on the other a single forking branch. These three branches are placed not far apart near the middle of the main stem.

It ought to have been mentioned, with reference to the woodcuts of *A. grayi* and *A. hirsuta* (Proc. Z. S. 1861, p. 297), that the figures are considerably larger than the natural size.

Fam. STYLASTERIDÆ.

ALLOPORA MADERENSIS, sp. n.

Opake white. Much and closely branching nearly in one plane, the branches becoming gradually of less diameter, and sometimes anastomosing. They zigzag from cell to cell; and the surface is finely reticulato-striate, but is without any tubercles. The cells are oblong, sessile, and always placed transversely to the branch, upon one face of the plane. The terminating cells, with their pedicels, are trumpet-shaped, but with oblong mouths, which are much wider than the stalk below. The margin of each cell is elegantly notched with from twelve to sixteen notches, with laminæ between.

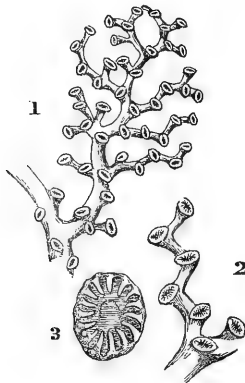
The dimensions of the single specimen that has occurred (now in the British Museum) were $3\frac{1}{2}$ inches high and $2\frac{1}{4}$ inches across. The base had been broken away, and the thickest part of the remaining stem was $\frac{1}{2}$ th of an inch in diameter. The longer axis of the terminal cells measured the twentieth of an inch.

The specimen was brought up by a long fishing-line on the coast of Madeira. Two examples of that curious patelliform shell the *Pedicularia sicula* were found seated on the branches. With respect to this circumstance, I may mention that Mr. S. P. Woodward has shown me a coral from the coast of Sicily, belonging to a totally distinct genus, with *Pediculariæ* upon it; and in the Coral Room

at the British Museum there is another coral with the same shell still adhering to it.

The present form, though at the first glance it seems to have a general resemblance to *A. flabelliformis*, is quite distinct from that species, having the cells much larger and transversely oblong, not round. Moreover, the zigzag character of the branches is much more marked. It may, however, be worth inquiry whether it may not be the *A. infundibulifera* of Lamarck.

A. maderensis appears to show that the genera *Stylaster* and *Al-*



lopora ought to be united; for though there are no “petites pointes” or “tubercules vésiculaires” upon this coral (M. Milne-Edwards giving this as one of the characters of *Stylaster*), yet the gemmation is alternate and distichal—the same writer saying of *Allopora* that its gemmation is “tout-à-fait irrégulière.”

DESCRIPTION OF THE WOODCUTS, pp. 195 and 197.

Acanthogorgia atlantica.

- Fig. 1. Outline of the entire specimen, on a reduced scale.
 Fig. 2. Portion of a branch, enlarged.
 Fig. 3. A cell more highly enlarged.
 Fig. 4. A spiculum from the edge of a cell.
 Fig. 5. A spiculum from the side of a cell.

Acanthogorgia grayi.

- Fig. 6. Outline of a portion of the coral, on a reduced scale.
 Fig. 7. A branch, enlarged, for comparison with fig. 2.
 Figs. 8, 9. Spicula from the edge and side of a cell.

Acanthogorgia hirsuta.

- Figs. 10, 11. Spicula from the edge and side of a cell.

Allopora maderensis.

- Fig. 1. A branch, with its ramuli, of the natural size.
 Fig. 2. A ramulus magnified.
 Fig. 3. A cell more highly magnified.

4. DESCRIPTION OF TWO NEW SPECIES OF CORALS BELONGING TO THE GENUS FLABELLUM. BY E. W. H. HOLDSWORTH, F.L.S., ETC.

(Plate XXVIII.)

1. FLABELLUM CAMPANULATUM. (Pl. XXVIII. figs. 1-3.)

Compressed, campanulate; borders straight or slightly convex; without spines. Base usually terminating in a small pedicel, sometimes irregularly compressed. Superior margin slightly arched. Cell deep and narrow. Border of lamellæ entire, sloping inwards from the apex for about one-third of their length, thence continuing straight to the bottom of the cell. Columella indistinct. Five principal lamellæ in half an inch. Height 14 lines; breadth 16 lines; proportion of axes 7 : 16.

Specimens in the British Museum are rather longer in proportion than those in my possession; but the variation is not very great.

Hab. Philippines.

This coral is very neat and symmetrical, and can hardly be confounded with any other species.

2. FLABELLUM NOBILE. (Pl. XXVIII. figs. 4, 5.)

Much compressed throughout, elongated. Borders rather concave, with four or five root-like appendages more or less distant from the base, but closely united throughout their length to the lower half of the coral. These appendages spring from and are continuous with the transverse epithelial ridges which mark the successive periods of increase in the coral, and, although now intimately united to the main stem, are evidently of extraneous growth, corresponding in origin and nature with the ordinary form of spines, but taking a downward direction to increase the basal area. Upper margin of the coral slightly arched. Cell very deep and narrow. Margin of lamellæ entire, and gradually curving from apex to base, at which point opposite series of the larger plates almost unite. No columella perceptible. Four principal lamellæ in half an inch.

The two specimens which have furnished the above description are of different ages. The smaller and more perfect example is attached to the upper margin of the flat side of the larger one, and has grown in nearly the same vertical direction. It measures 2 inches 6 lines in height, and 1 inch 10 lines in greatest breadth. The older example is 2 inches 6 lines in the long diameter, and 1 inch 3 lines in the short. The base of this specimen is imperfect; so that the original length of the coral cannot be certainly ascertained.

This species is intermediate between the genera *Flabellum* and *Rhizotrochus*, having the usual compressed shape of the former, with a partial development of the radiciform appendages of the latter remarkable genus. The peculiar situation of the smaller specimen is perhaps worthy of notice, as being one in which the supplemental props are especially useful in aiding the attenuated base to support the long and heavy coral. A similar tendency to parasitic growth,

or rather adhesion to another individual of its own species, may be observed in Milne-Edwards's figure of the type-specimen of *Rhizotrochus**. The species now under consideration should, I think, be placed in the genus *Flabellum*, although differing in some of its characters from most of the typical forms; and as it is the largest member of the genus, I propose to call it *nobile*.

The precise habitat of this coral is unknown. It was brought to this country by the late Sir Everard Home; and as that gentleman's collections were principally made in the neighbourhood of Australia and New Zealand, these corals were probably obtained from the same part of the world.

The specimens are now in the Museum of the Royal College of Surgeons of England.

5. ON THE OCCURRENCE OF *CARYOPHYLLIA CLAVUS* ON THE COASTS OF BRITAIN, WITH SOME REMARKS ON THE CIRCUMSTANCES AFFECTING THE DISTRIBUTION OF CORALS AROUND THE BRITISH ISLANDS. BY E. W. H. HOLDSWORTH, F.L.S., F.Z.S., ETC.

By the kindness of the Rev. Thomas Hincks of Leeds, I have recently been enabled to examine some specimens of coral which had been forwarded to him from Shetland, and from Loch Fyne on the east coast of Scotland. They prove to be new to Britain, and are identical with the *Caryophyllia clavus* of the Mediterranean, first described as a fossil by Scacchi in 1833, and figured and described from recent specimens under the name of *Cyathina turbinata* by Philippi in his 'Catalogue of Sicilian Mollusca,' published in 1836. Several examples of this coral have been obtained from deep water in the above-mentioned localities; and an examination of characteristic specimens of different ages has enabled me also to identify with this species two small and much-worn corals which, in June 1857, were dredged from a depth of 60 fathoms, about forty miles west of Scilly, by Mr. S. P. Woodward of the British Museum, and kindly placed in my hands a short time ago by that gentleman.

This species of *Caryophyllia* may be readily distinguished from its near ally, our common *C. smithii*, by its conical form and finely pointed base, as well as by the thinness of its walls and lamellæ. The general character of the polype, as described by Philippi†, agrees with that of *C. smithii*; the integuments, however, are said to be excessively delicate and transparent, so that the borders of the lamellæ can be seen through them. The body is of an orange-colour, and the capitate tentacles whitish with metallic-green reflections. The coral is frequently attached to a tube of *Ditrupea*, or the shell of some deep-water univalve, or, in some cases, is entirely free. In

* Milne-Edwards et J. Haime, Ann. des Sc. Nat. 3^e sér. t. ix. p. 282, pl. 8. f. 16, 1848.

† Philippi, Arch. für Naturgesch. t. i. p. 42, 1842.

the British Museum are several specimens of this coral which were brought from Sicily. These are all attached to a species of *Turritella*. The occurrence of this second species of *Caryophyllia* in three distinct localities on our coasts entitles it to a place among our British corals; and further investigation will probably show it to be generally distributed in the deep water along our western shores.

It may not be uninteresting to inquire here into the distribution of corals around the British Islands, and to trace, as far as possible, the cause of their frequenting only particular lines of coast.

The existence of the coral-polype in our seas is mainly dependent on the warmth and purity of the water. A tolerably high temperature is undoubtedly one of the most necessary conditions for the well-being of the delicate polypes whose calcareous lamellated skeletons constitute the true stony corals. Only within the tropics do we meet with those vast reefs and extensive accumulations of coral-growth which form so characteristic a feature of the seas in those warm latitudes. The surface-water there becomes heated by the direct influence of the sun, and, in those regions, few coral-polypes carry on their ceaseless work at a greater depth than 30 fathoms, thence building upward to the lowest tide-mark. As we come towards more temperate regions, the species diminish both in size and number; simple forms become proportionately more numerous, and their bathymetrical range is greatly increased.

The waters of north-western Europe might be expected generally to be too much within the influence of Polar temperature to be fitted for coral-life, even in its simplest form; yet in our own seas, and extending far into the Arctic Ocean, are found some few species vying with the productions of the Tropics in brilliancy of colouring and delicacy of structure. Here, however, we have a peculiar and extraneous source of warmth in the Gulf Stream, whose waters, now becoming widely diffused, but still retaining some portion of their original excessive temperature and motion, exercise a sensible influence on the coast-productions of the western side of the British islands. The course of the current in the neighbourhood of our shores is marked sparingly, but distinctly, by the presence of eight or ten species of living coral.

The long list of *habitats* recorded by Mr. Gosse in his valuable 'Actinologia Britannica' has been of great use to me in tracing the range of our native species; and although many parts of the coast have been but little worked, enough has been done to furnish a tolerably clear outline of the distribution of the coralligenous polypes. From the writings of Maury and others, it appears that the Gulf Stream is divided by the British Islands; one portion going southward to the Bay of Biscay, the other and main body of the current sweeping away to the north by the Orkneys and Shetland. The entrance of the English Channel and the Irish Sea would thus be under the most direct influence of the warm current; and it is in these waters we find corals most abundant. Devonshire and Cornwall are extremely rich in these productions; and, including Weymouth Bay (the only recognized locality for *Hoplangia durotrix*), the south-

western promontory of England can boast of five out of the eight undoubted British species. They consist of two *Caryophylliæ*, one *Sphenotrochus*, *Balanophyllia*, and *Hoplangia*. Of these species, Guernsey produces two. *Caryophyllia smithii*, the commonest species in the West of England, where it is found close to low-tide mark, ranges along the eastern and northern coasts of Ireland and the West of Scotland as far as Shetland, gradually increasing its depth of water as it proceeds north. It has also been met with on the western coast of Ireland; but very little has been done as yet in exploring the Atlantic sea-board of that island. Among the Hebrides and Orkneys, the fine branching coral *Oculina prolifera* has on rare occasions been met with, but only in deep water. Two species of *Caryophyllia* and the large scarlet *Ulocyathus arcticus* have been obtained in 80 or 90 fathoms near Shetland; the last-mentioned coral has also been taken by Sars at a depth of nearly 200 fathoms near the North Cape. Three other little corals have been dredged in the Moray Frith, and placed by Mr. Gosse in the genus *Paracyathus* of Milne-Edwards. The specimens, however, are so young and imperfect that it is difficult to determine their specific characters.

If we now turn to the eastern side of Great Britain, and inquire whence come the waters of the German Ocean, we find them to be mainly of Polar origin, brought from the far north by the great surface-current which washes all the Norwegian and our own eastern coasts. To this must be added the comparatively fresh water which pours through the Sound, loaded with all the drainage of the Baltic. How does this cold and impure water affect the production of corals? Its influence is not less marked than that of the warmer western current. Through the entire length of the North Sea, from the north-eastern point of Scotland to near the Isle of Wight, I have been unable to ascertain that a single specimen of coral has ever been taken. That line of coast is also very deficient in *Actinia*; and of the few that are found there, most are of the commonest species. This cold water from the north, however, also skirts the western coast of Scotland and Ireland; but it is only as a narrow superficial current; and when corals are found in its neighbourhood, they are only in the deep water of the great Atlantic stream, which, still retaining some of its excess of saline matter, sinks deeper and deeper as it meets the fresher and lighter, although colder, water from the north. Thus, as has been observed, all the northern corals are found in deep water, even the same species which on the Devonshire coast is abundant at low-water mark. The late Edward Forbes, in his 'Natural History of the European Seas,' remarks that the characteristic fauna of the "Arctic province" is only to be observed in the littoral regions, and the animals from deep water are all of them southern forms.

What has been pointed out as to the causes of the particular distribution of the British corals, namely, the effect of warm and cold currents, equally applies to the formation of coral-reefs within the Tropics. A comparison of Maury's Chart of the "Sea-drift" with Darwin's Map of the Distribution of Coral-reefs would lead one

to suppose they had been prepared by the same hand. I will mention two remarkable cases as illustrations. A well-known barrier-reef extends some hundreds of miles along the north-east coast of Australia; its southern limit is near Moreton Bay; and a reference to Maury's Chart shows this to be the precise point at which a cold current from the South Pole meets the warm equatorial current from the east. Again, it appears somewhat remarkable that along the whole western coast of North and South America no vestige of coral has been found. Mr. H. Cuming informs me that he has dredged in vain for specimens of these characteristic tropical productions in the Bay of Panama and at the Galapagos; but the chart shows that cold currents from the north and south sweep the whole western coasts of America, meeting at the Equator, and then turning away into the Pacific, where, under a vertical sun, the water soon becomes warm enough for the growth of the various coral-reefs scattered about in that ocean. Fresh water and sediment of any kind being present act as fatal barriers to the growth of coral; and to these causes may generally be traced gaps in reefs, and waste places of limited extent in those seas which especially abound in corals. Dana has recognized the effect of warm and cold currents in the general distribution of corals throughout the warmer seas; and the fact of the same influences being at work, and easily recognized, in the waters surrounding the British Islands appears sufficiently interesting to justify me in bringing the subject before this Society.

6. NOTE ON THE SIZE OF A SEAL AT THE TIME OF BIRTH.

BY DR. J. E. GRAY.

We have received from the Zoological Gardens the body of a Ringed Seal (*Callocephalus fœtidus*), that had died soon after its birth. It was entirely covered with closely set, well-developed fur of a silver-grey colour, being rather browner on the upper surface. It is 2 feet 8 inches long, from the tip of the nose to the end of tail; the fore paws are 6, and the hinder 8 inches long, and the latter are 7 inches wide when expanded. The webs of the feet are covered with hair, and the claws are well developed and black. The whiskers are white, well developed, and slightly waved.

7. DESCRIPTIONS OF NEW SHELLS. BY DR. H. DOHRN.

1. CATAULUS BLANFORDI.

Testa subperforata, ovato-fusiformis, solida, confertim striata, parum nitens, rufa; spira convexo-turrita, apice obtusiusculo; anfr. 9, convexiusculi, ultimus attenuatus, antice subascendens; carina umbilicalis compressa, valida, antice vix dilatata; periomphalum angustum, costulato-striatum; apertura subcircularis; peristomium aurantiaco-fuscum, incrassatum, valde expansum, reflexum, ad anfractum penultimum angustatum, mar-

gine dextro protracto, basali recedente, canali angusto perforato. Operculum tenue, corneum.

Long. 20–21½, diam. 6–7; ap. intus diam. 3½, cum perist. long. 6½–7 mill.

Hab. Ad Bollegalle in vicinitate Kandy, insulæ Ceylon, ubi collegit A. H. F. Blanford.

I have much pleasure in dedicating this species to my excellent friend Mr. Henry Blanford, who is so well known for his remarkable contributions to our knowledge of Indian conchology.

2. MITRA CITHAROIDEA.

Testa ovato-oblonga, solidula, confertim spiraliter costulata, costulis incrementi striis interdum interruptis, alba; spira conica, apice acutiusculo; sutura subcanaliculata; anfr. 6, convexiusculi, lente accrescentes, ultimus $\frac{3}{4}$ longitudinis æquans, basi attenuatus; apertura angusta, labro simplici; columella 4-plicata, non recurva.

Hab. —? (*Mus. Cuming.*).

Nulla mihi nota est species descripta, quæ forma huic accedat. Adsunt in anfr. ultimo 35–40, in ceteris 8–10 costæ satis regulariter distantes.

3. MITRA LOWEI.

Testa ovato-turrita, solidula, lævis, nitida, aurantiaco-fulva, interdum maculis albis conspersa; spira conica, apice acuto; sutura simplex; anfr. 6–7, modice convexi, lente accrescentes, ultimus $\frac{1}{2}$ longitudinis æquans, paullo ventrosior, basi attenuatus; apertura rhombeo-ovata, labro simplici; columella 3-plicata, vix recurva.

Long 8½, diam. 3; ap. long. 4, lat. 2½ mill.

Hab. Ad insulas Canarias (*Mus. Hanley.*).

Differt a *Mitra savignyi* anfractibus lævibus, convexis, lentius accrescentibus, statura graciliore, colore etc.

4. MUREX MACGILLIVRAYI.

Testa clavata, solida, trifariam varicosa, confertim spiraliter lirata, alba, liris flavescensibus; spira globoso-turbinata, apice acuto, luteo; sutura impressa; anfr. 7–8, inflati, supra medium angulati, inter varices biplicati vel tuberculati; varices validi, compressi, in anfractibus superis spina unica curvata ascendente ornati, in anfractu ultimo 4-spinosi, spina supera ascendente, valida, mediis mediocribus, infima columellari recta transversa; apertura subcircularis, peristomii margine superiore breviter adnato, late calloso, columellari late patente, mutico, dextro lobato, inter spinas 2^{am} 3^{am} que protracto; cauda longa, recta.

Long. 60, medio lat. 20, ap. diam. 11–12, cauda 30 mill. longa.

Hab. Ad Lizard Islands Australiæ (*Macgillivray in Mus. Cuming.*).

Proxime accedit ad *M. occam*; differt spira depressa, anfractibus convexioribus, varicum forma, spinarum situ et numero etc.

8. DESCRIPTION OF NEW SOLARIA, CHIEFLY IN THE COLLECTION OF H. CUMING, ESQ. BY SYLVANUS HANLEY.

S. CUMINGII, Hanl. *Testa subdepresso-conica, albida seu pallide fulva, infra sulcum spiralem zona lata submaculosa picta: dimidium inferius anfractuum majorum seriebus 3 macularum linearium brunnearum ornatum. Anfractus sulcis (nisi labrum versus) subconfertis radiati, et sulco unico spirali infra cingulum album (marginē superiore brunneo submaculoso (?) passim ornatum) superne instructi; pars inferior areā mediæ costellis tenuibus obsolete cincta: cingulum marginale (seu inferius) nullum. Carina parva, angusta, brunneoque maculata. Basis albæ area media tantum umbilicum versus modicum et crenis rufis permultis munitum punctis picta: cingulum infraperiphemale procul a carina, angustum, tantum obscure maculatum.*

Lat. $1\frac{3}{8}$ poll.

Hab. —?

Mus. Cuming.

The suture is rather fine, yet deep.

S. DUNKERI, Hanl. *Testa conica, haud multum depressa, sæpe Trochiformis. Discus superior sicut in S. perdice, sed magis fulvus, et nonnunquam maculis linearibus parvis distantibus subbrunneis, in seriebus spiraliibus paucis, subobsolete ornatus; cingula etiam, latiora multoque confertius crenata, maculis brunneis interruptis interdum cincta; sulci radiantes conspicui. Crenæ umbilici magnæ, plerumque brunneæ.*

Lat. $1\frac{1}{2}$ poll.

Hab. Insulas Indiæ orientalis.

Mus. Cuming, Hanley.

The keel is peculiarly broad below. The exterior spiral sulci of the lower disk are almost cancellated in immature examples.

S. REEVEI, Hanl. *Testa fulvo-carnea vel livido-carnea, in utroque anfractu maculis parvis saturate fulvis in seriebus 5-6 ordinatis cincta, striis, denique obsolete, contiguis tenuibus transversim obliquis radiata; sutura haud canaliculata. Anfractus haud celeriter expansi, cingulo supra suturali (interdum duobus), quod sæpius est albidum et fulvo brunneo remote articulatam, infra sulcum spiralem latum minime profundum ornati, alibi inconspicue (sulco infra zonam primam excepto) spiralliter sculpti. Basis et periphæria fere ut in S. lævigato, sed cingulum proxumbilicale (cum crenis parvis permultisque umbilici coarctati) confertim maculosum.*

Lat. —.

Hab. —?

Mus. Reeve.

The upper disk of this shell, whose apex is of a dark liver-colour, reminds one a little of *Trochus ziziphinus*: upon the lower disk there is an obsolete spiral sulcus beyond that which bounds the proxum-

bilical belt. The only specimen known to me is an elevated abnormal form; and I think both the conoidal shape and the lower supra-sutural belt result from the coiling of the seven whorls upon the carinal belt instead of, as usual, upon the groove above it. The central rows of spots are somewhat linear. *S. lævigatum* and *S. purpuratum* are its nearest congeners.

S. REGIUM, Hanl. *Testa depresso-conica: sutura subcanaliculata. Anfractus in cingula 4 planulata subæqualia, in spira in rhombos satis latos sulcis radiantibus diffracta, sulcis 3 spiralis divisi. Cingulum superius albidum, maculis (nisi apicem versus brunneis) magnis ad cingulum secundum defluis subconfertim pictum; peripheria maculis similibus ad zonam proximam ascendentibus ornata; ita ut in anfractu ultimo pars tantum areæ mediæ macularum est expers. Filum tenue infra quartum cingulum inter peripheriæ cingula 2 subæqualia permagnum fit. Carinam albidam remote maculatam filum et deinde cingulum validum et simile sequitur. Basis area media vel mere pallida, vel marginem versus interiorem punctis linearibus remotis aspersa. Cingula 2 alba, utrumque sulco lato circumscriptum, umbilicum (cujus crencæ sunt latæ) satis amplum circumdant.*

Lat. $1\frac{1}{2}$ poll.

Hab. —?

Mus. Cuming.

Allied to *S. maximum* and *S. quadriceps*; but in the former the third zone is much wider than the second, and in the latter the threads, teeth, &c. differ greatly. The earlier turns are whitish near the suture, elsewhere livid rufous. The unique example is scarcely mature, but exhibits nearly seven volutions.

S. TAYLORI. *Testa depresso-conica, solida, fulva: sutura late canaliculata. Anfractus in cingula 4 fusco-rufescente articulatim picta (tertio, quod 2 præcedentia fere æquat, excepto) et sulcis radiantibus (nisi in anfractu ultimo rudibus subremotis) in rhombos multo latiores quam altos diffracta, sulcis latiusculis (tertio præsertim) eximie divisi. Peripheriæ cingula gemina subæqualia similiterque picta; intervallum haud insculptum, æque latum, sulci præcedentis latitudinem vix superans. Areæ basalæ pars media maculis brunneis perparvis tantum marginem juxta interiorem ornata, alibi magis minusve lævis. Sulcus carinæ obtusæ proximus, latiusculus, haud filosus. Cingulum inter sulcos latos umbilico vicinis conspicue angustum. Crencæ umbilici subangusti satis magnæ, carneo-rufescentes.*

Lat. $1\frac{5}{12}$ poll.

Hab. —?

Mus. Hanley.

In the only example known to me, the articulation is not developed upon the earlier turns; the first belt, however, is paler than the rest. It is allied to *S. maximum* and *S. quadriceps*, from both of which the

articulation of the second zone, and its coarser sculpture, sufficiently distinguish it.

I have named this species after T. Lombe Taylor, Esq., whose fortunate purchase of the types of the *Solaria* described by the late Mr. Hinds, from Sir E. Belcher's collection, has materially assisted me in my monograph of this genus.

S. SOVERBII, Hanl. *Testa subdiscoidea, fulva et albido-fulvo undatim nebulosa seu variegata: sutura anguste canaliculata. Anfractus (parci?) filis elevatis obliquis transversim clathrati, in cingula 4 crenogranosa, quorum 3 superiora, cum sulcis suis, æqualia sunt, et ultimum, cum sulco præcedente, aliquantum est latius, divisi: infra secundum oritur denique cingulum alium. Peripheria declivis, haud biangulata, sed cingulis nonnullis similibus, minus autem vicinis, sulcisque clathratis instructa, ita ut cingula circiter 13-14 ultimum anfractum ornant. Basis planæ vel retusæ cingula 4 intima (seu ultima) multo remotius clathrata, sulcis latioribus sejuncta; crenæ permultæ cinguli ultimi (omnium latissimi) ultra parietem humilem umbilici modici conspicue eminentes.*

Hab. Littora Tunetana.

Mus. Brit.

The sculpture is peculiar. Four whorls alone are developed in the described examples.

9. ON THE BREEDING OF THE NUTCRACKER (*NUCIFRAGA CARYOCATACTES*). BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

About six months ago (P. Z. S. 1861, pp. 396-7), I expressed a hope of being able before long to give the Society some more certain information with respect to the breeding of the Nutcracker (*Nucifraga caryocatactes*). In that I hope I have not been altogether disappointed.

The nest and young bird now exhibited (the latter still showing traces of its original downy clothing) have been received by me within the last few days from my excellent friend Herr Pastor P. W. Theobald of Copenhagen, to whom I think the Society will join with me in hearty congratulations on his success in obtaining these decisive facts in regard to the nidification of this mysterious bird, and whose zeal in the quest of zoological discovery fully deserves, in my opinion, all the praise that can be accorded to it.

Believing, however, that the Pastor will himself publish fuller details of this interesting capture, I will only briefly recount the information with which he has supplied me.

It appears that previously to the summer of 1860, a forester in the island of Bornholm had satisfied himself that the Nutcracker was in the habit of breeding there annually. He had seen it every month in the year, from May to November inclusive; and this intelligence being communicated to Herr Theobald, that gentleman made

an expedition to the island, but without finding the special object of his search—a nest of the bird. This present spring, however, the Pastor, accompanied by two of his friends, HH. Erichsen and Fischer, both keen oologists, visited Bornholm a second time; and one of their achievements I have now the pleasure of making known to you. Writing from that island, on the 30th of May last, Herr Theobald says:—

“Returning to the result of our ornithological expedition, I can tell you that, after many days’ inquiries, we succeeded in finding two nests of *Caryocatactes*, the young birds flying near them. As we presumed, we came too late for getting the eggs; but I think we have advanced a good deal, and after this discovery we dare be almost sure of receiving them next year. Our gentle and clever host, the forester Rosen, who now knows the time and manner of nidification of this bird, may be considered a guarantee for our hopes.

“We have thought it might be of interest to you to possess an undoubtedly genuine nest of *Caryocatactes*, and also a young bird in the first plumage; we therefore send you one nest and one skin. Both the nests are of the same size and construction. They were in fir-trees (*Pinus rubra*), not very private, but rather easy to find. It is likely that the young birds had left the nest perhaps eight days. None of them moved, except with difficulty, among the branches; and one of them fell on the ground. The old birds cried, but only sometimes, with an anxious voice that was not unlike a Magpie’s, and then all was silent again. In the neighbourhood of the nest, where the birds had been previously observed, we found on the rocky ground a good number of freshly cracked hazel-nuts; and as no nut-trees grow there, the birds must fetch them from a distance of an English mile at least. We are inclined to think that they collect them in autumn and secure them in a private spot; and perhaps it is on this account also that the bird, whose economy is very hidden, is seldom to be seen in the breeding-time.

“As I have already mentioned, the nest is not of the most difficult class to find. It is not built on the top [of the tree], but close to the stem, about 25 or 30 feet high. The bird is an early breeder, but can scarcely have eggs before the beginning of April.

“Now you have the nest wherein the young birds were lately hatched, and a young bird in its first plumage. Next year we hope to send you very well authenticated eggs.”

I have only to conclude by mentioning that the nest, as will be seen on examination, is of large size, some five or six inches in thickness, with an outside diameter of about a foot, and a shallow depression of six inches across; but the cup was probably a good deal deeper before its brim was subjected to the weight of the young birds. It is composed outwardly of sticks and twigs, among which I recognize those of the larch, spruce, and birch. These latter show the period at which it must have been built, as the buds, though enlarged, had not burst. It has a thick lining of grass, which appears to have been plucked while growing. The very small bits of moss and lichen do not seem to have been intentionally added, but to have adhered

to the other materials. The down with which the nestling has been covered, and of which traces may be observed on a few of the back-feathers, is of a dark-brownish grey, as is usual among the *Corvidæ*. The first plumage much resembles that of the adult, being, however, duller in colour and with the white tear-like spots less conspicuous; but the quill-feathers of the wings and tail are not so entirely destitute of metallic reflexions as some authors lead one to imagine.

Whether the Nutcracker builds the whole structure for itself, or only furnishes the forsaken nest of some other animal, I do not know. This and other particulars we shall probably soon learn from Pastor Theobald himself; and I need scarcely say I look forward with the greatest interest to the clearing up of our doubts as to what its eggs are really like.

10. NOTE ON NANNOPERCA AUSTRALIS. BY DR. A. GÜNTHER.

This fish has been described in the preceding volume of the 'Proceedings' of this Society, p. 116, where the *absence of the lateral line* has been mentioned as one of the generic characters. By some misunderstanding, the artist has added a strongly marked lateral line (1861, Pl. XIX. fig. 2), an error which has been discovered too late for correction. Therefore I take an early opportunity of confirming the statement made in the text.

11. ON SOME POINTS RELATING TO THE ANATOMY OF THE HUMMING-BIRD (*TROCHILUS COLUBRIS*). BY EDWARDS CRISP, M.D., F.Z.S., ETC.

The recent dissection of the above-named bird has induced me to place an account of some parts of its anatomy before the Society, believing that the communication will not be devoid of interest.

I am indebted to Mr. Gould for the Humming-bird, which he captured in America, and brought alive to this country; but it lived only a few days after its arrival.

It had been preserved in spirits for some time before I examined it, and therefore the weight may not have been exactly the same when first captured, but I believe that the difference would be very slight. I have, in the accompanying drawing, depicted the bird with and without its skin. I have also represented the skeleton and all the viscera by measurement.

The bird (a female) weighed 61 grains; its length from beak to tail 4 inches, the bill being three-fourths of an inch, the tail 1 inch; from the extremity of each wing, when extended, $4\frac{1}{4}$ inches. Tail-feathers ten; wing-feathers in all sixteen, the first the longest.

On removing the skin, the bird, as represented in the drawing, had a very plump, solid appearance, the pectoral muscles being of very large size: they weighed 12 grains, being nearly one-fifth the weight of the bird. The extremities of the os hyoides, as in the

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Secretary.

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OF THE
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FOR THE YEAR

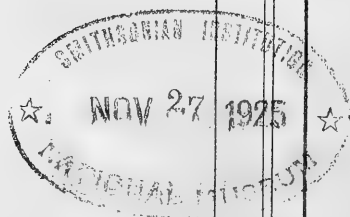
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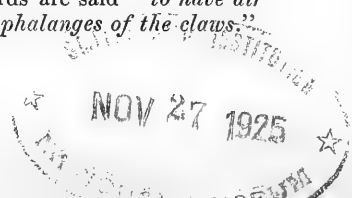
Woodpeckers, reached the anterior part of the head. The thoracic and abdominal viscera, when viewed *in situ*, presented nothing abnormal either in form or position. I failed to discover a gall-bladder. The brain weighed 3 grains, forming a large proportional amount to the body ($\frac{1}{20}$); the alimentary canal measured $3\frac{1}{2}$ inches.

The crop membranous and capacious; the gizzard moderately thick, with a soft cuticular lining. A small elevated spot was observed (under the microscope) on the surface of the rectum, which probably was the rudimentary appendix.

The trachea consisted of about sixty rings, and the left bronchus of forty—the latter being nearly the length of the trachea. The ovary very small. The os hyoides long and very muscular, extending, as before stated, to the space between the orbits. The tongue from the base of the os hyoides fourteen lines in length, the bifid portion being eight lines. This latter part appeared to be composed of two elastic cylinders having a membranous web on their inner sides; these webs towards their extremities, as seen in the drawing, present a shreddy, torn appearance, the torn portions being of a triangular shape, their bases towards the cylinders. These cylinders were not hollow, but composed of a solid cartilaginous material. The eyes measured two lines in diameter, and weighed about one grain.

Skeleton.—The enormous depth of the sternum in this little bird at once excites attention. The sternum is of a triangular shape, its anterior and deepest portion measuring four lines, its length $6\frac{1}{2}$ lines: the cervical vertebræ twelve, the coccygeal five, ribs seven; flat, broad, and thin. The depth of the sternum and the great proportional size of the pectoral muscles probably exceed those of any other bird, judging from the sterna of several hundred species of birds that I have inspected. The humerus very short, one line; carpus two lines; metacarpus two lines; phalanges $3\frac{1}{2}$ lines; femur two lines; tibia four lines; tarsus $1\frac{1}{2}$ line; longest toe three lines; the claws curved and sharp. *The bones of this bird did not contain air.*

Remarks.—I have been somewhat minute in the description of the measurements of the skeleton, because it is only by comparison with the skeletons of other birds that any practical and useful results can be arrived at. The shortness of the humerus is one remarkable feature; and in this respect there is a great resemblance to the same bone in the Swifts (*Cypselinæ*). It is curious that this bone in our common Swift (*Cypselus apus*), although of very small size, contains air. By some it will be thought singular that the very swift-flying bird the Humming-bird should have no air in its bones; but when we consider, as I have stated in my papers upon this subject in our 'Proceedings' (1857, pp. 9 and 215), that the bones of two of our swiftest-flying birds—the Swallow and Martin—contain no air, the absence of it in the bones of this bird will appear less remarkable. In the first paper alluded to (p. 12), I have stated that Professor Owen, in his 'Lectures on Comparative Anatomy,' vol. ii. p. 34, remarks that the Swifts and Humming-birds are said "*to have air in every bone of the skeleton, down to the phalanges of the claws.*"



I repeat this because several physiologists and lecturers on comparative anatomy still adhere to the old doctrine of the presence of air in the bones of all birds; and on asking a celebrated physiologist whether he believed that the bones of birds contained air; his reply was, "Has a bird a brain?"

Professor Owen, in the Lectures on Birds that he is now delivering at the Government School of Mines, as reported in 'The Medical Times and Gazette,' May 24, 1862, p. 537, says,—“In the swift Humming-birds and in other birds of flight, the air permeates the interior of every bone of the skeleton.”

Brisson and Lesson, as quoted by Sir W. Jardine, state that “the tongue of the Humming-bird is composed of two muscular tubes, joined together for the greater part of their length, towards the tip broadened or swelling, and, according to Lesson, terminated in a spoon-like point on the upper surface. They assist in retaining the different substances, which are immediately conveyed to the opening of the œsophagus by the contractility of the tubes.” Sir W. Jardine says “that he has confirmed this statement, as far as the examination of the moistened parts would allow.” He adds, “Our own examination of the tongue of the *Trochilus moschatus*, relaxed with warm water, gave the appearance of a fimbriated opening at the tip, having the exterior margin of each fork set with recurved, sharp-pointed, pliable spines, as if to assist its viscosity in securing any substance seized by them.”

It is possible that in the different species of *Trochilidæ* the tongue, like the beak and tail-feathers, may differ somewhat; but I believe it will be found that the cylinders are not hollow, and that the recurved spines spoken of by Sir W. Jardine are shreds of the membranous part of the tongue detached by maceration. The somewhat feather-like tongue of these birds is probably used chiefly for dipping into the nectar, and for detaching the small insects upon the flowers, the rapid motion of the organ enabling the bird to obtain a large supply of nourishment in a short time.

The examination of recent specimens will be necessary to decide the question as to the tubular character of the tongue; but there is one thing tolerably certain, viz. that the food of these birds is chiefly insects, and does not consist of the nectar of flowers only, as was formerly supposed.

12. ON THE CAPACITY OF THE ŒSOPHAGUS AND OTHER PARTS OF THE INTESTINAL CANAL OF PYTHON RETICULATUS. BY EDWARDS CRISP, M.D., F.Z.S., ETC.

The recent death of a specimen of *Python reticulatus* in the Society's Gardens enables me to speak of some parts of its structure, especially in relation to the question as to the habit of the Viper (*Vipera berus*) of swallowing its young.

This, as is well known, is denied by many: the late Professor Henslow believed that it was “physically impossible;” and a recent

writer on the subject, Dr. Bree of Colchester, the author of the 'Birds of Europe,' thinks "that the young Vipers would be killed by the gastric juice of the stomach."

In 1855 I read a communication to this Society (P. Z. S. 1855, p. 191) on the large size of the œsophagus of the Viper, as compared with that of the stomach; and I showed the alimentary tube of this reptile distended with air, and stated at that time that I had positive evidence that the Viper did swallow its young. The information I have received since that period enables me now to speak even with greater certainty upon this matter.

The physical obstacle spoken of I have been unable to discover; and the death and dissolution of the young by the gastric juice is an impossibility, because they do not enter the stomach. This will be shown by an account of the length and capacity of the alimentary tube of the Ophidian in question, the *Python reticulatus*,—the intestinal canal of the Viper, I may remark, being of about the same proportionate size.

This reptile, the exact cause of the death of which I was unable to determine, measured 15 feet in length; and I may add that I had an opportunity of examining, about the same time, a Python (*P. molurus*) that died on board a ship in the docks. The latter was nearly as long as the *Python reticulatus*. I could discover no important difference in their visceral anatomy: they were both females.

I will only allude briefly to a few points in the anatomy of the *Python reticulatus*. The ovaries were 6 feet 2 inches in length, and they each contained twenty-five ova, varying from the size of a pea to that of a nut. The trachea measured 2 feet 10 inches in length: the rings amounted to 437; they were nearly approximated at the upper part, but widely separated in the centre and lower portion.

The gall-bladder contained $2\frac{1}{2}$ ounces of bile; two cystic ducts proceeded from it, and these were united by cross ducts so as to form a network of ducts between the gall-bladder and the intestine. I know not whether this has been before described.

The œsophagus measured 6 feet in length, and contained 473 ounces of water; the stomach was 18 inches long, and held 74 ounces of water. The small intestines were 9 feet 6 inches in length, and contained 204 ounces of water. The large intestines measured 2 feet 11 inches, and contained 142 ounces. Total length 20 feet 4 inches; capacity of the whole alimentary tube 744 ounces.

I have measured the capacity of the alimentary tube of many of the serpents, and the length and size of the œsophagus are great in all; so that in the poisonous Ophidians which swallow their young there would be no possibility of the latter coming in contact with the gastric juice, as they could readily be received into the upper part of the œsophagus.

13. ON THE PROBABLE CAUSE OF DEATH OF A WART-HOG (*PHACOCHÆRUS ÆTHIOPICUS*). BY EDWARDS CRISP, M.D., F.Z.S., ETC.

A male Wart-Hog, which had been twelve years in the Gardens, appeared to be in tolerable health on Sunday, June 22nd, 1862, but it was found dead on the following morning; its death therefore must have been sudden. It was in excellent condition, and weighed about two hundredweight. The stomach was greatly distended with food, so that it had eaten a hearty meal a short time before its death. The blood was fluid, and all the thoracic and abdominal viscera were tolerably healthy. Upon the fundus of the bladder was a tumor the size of a large orange, the remains of an *Echinococcus* in a state of chalky degeneration. The parietes of the cyst were covered with chalky layers, and a white thick creamy cretaceous fluid occupied the interior of the cyst.

It is curious that in the sow of this species which I examined, in Ælian's Wart-Hog (*P. æliani*), and in the Red River-Hog (*Potamochoærus penicillatus*), these *Echinococci* (so called) were alike present; and I may add that in these and other Pigs in which I have found these parasites (and the same may be said of the Deer and Antelopes) I have never discovered tape-worms or any kind of entozoa in the intestines.

On examining the teeth of this animal, I found a large cavity in the place of the molar tooth of the lower jaw on the right side, into which the upper molar (much elongated from want of pressure) passed; this cavity was lined with false membrane, except in two places, where the bone was denuded and of a dark colour. The enlarged tooth pressed upon this part; and it is not unlikely that this irritation, combined with a very full stomach, produced cerebral congestion or extravasation, of which the animal probably died; but as the skeleton was required, I was not permitted to examine the brain; so that the exact cause of death must remain doubtful.

As the animal died suddenly and in good condition, I had a small outlet for my dinner. As might have been supposed from the age and sex of the animal, it was rather coarse and tough; it had a porky flavour; but I believe that the flesh of a young animal would be exceedingly good. Mr. Bartlett informs me that Sir G. Grey has eaten this hog in Africa, and has stated that "its flesh was of excellent flavour." One of the peculiarities of this hog is the enormous thickness of the muscles over the ribs. I found the same in the sow; and I think that if a cross between this animal and our English Pig could be effected, it might be of great value; but of this matter I hope to speak in another communication, when comparing the anatomy of the Wart Hog with that of the other Hogs.

I may mention one interesting fact respecting the renal veins of this animal: they are supplied with two pairs of valves, so as to prevent the blood from regurgitating from the renal capsules into the kidneys. This fact I first pointed out before the Physiological Society, in 1853, in the renal veins of other animals.

14. DESCRIPTION OF *CROCODILUS FRONTATUS*, A NEW CROCODILE FROM OLD CALABAR RIVER, WEST AFRICA. BY ANDREW MURRAY, ASSIST. SECRETARY, ROYAL HORTICULTURAL SOCIETY.

(Plate XXIX.)

CROCODILUS FRONTATUS, nov. sp.

Head broad and deep, much broader than in *C. vulgaris*, very flat on the vertex, and with the margins of the flat portion slightly raised; the lateral margins very slightly curved; the suture inside of the lateral margin placed at rather more than a fourth of the breadth of the vertex from its side. This suture is not throughout parallel to the lateral margin; it is nearly so for about two-thirds of its posterior length; towards the front it bends a little outwards. Fig. 1 shows the form of the sutures in this species, while fig. 2 shows their form in *C. vulgaris*, and fig. 3 in *C. leptorhynchus*. The ver-

Fig. 1.

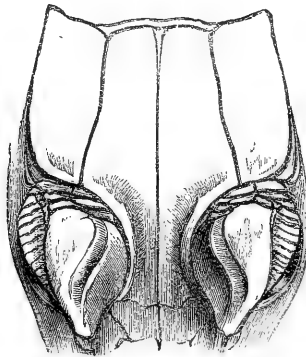


Fig. 2.

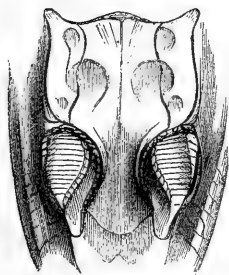
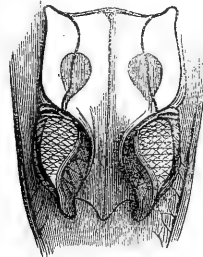


Fig. 3.



tex in the two last, although flattened, is not so depressed, but is slightly rounded, so as to be somewhat higher at the middle than at

the margin. The colour in *C. frontatus* is yellowish with blackish spots, instead of brown with blackish spots, as in *C. vulgaris* and *C. leptorhynchus*. The muzzle is shorter than in either of the others, deeper, and the front rises higher above it; the nostrils are more prominent and turned up. Both the head and the lower jaw are

Fig. 4.

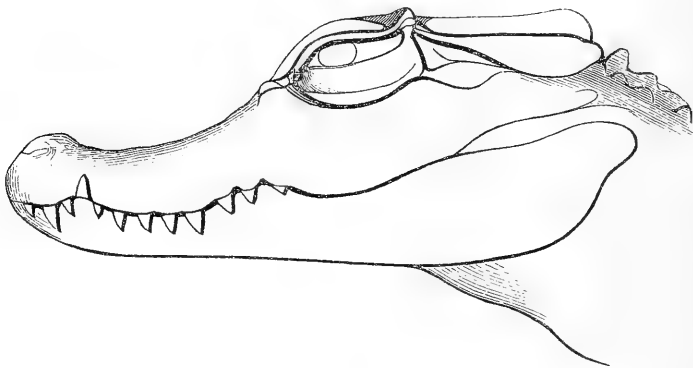


Fig. 5.

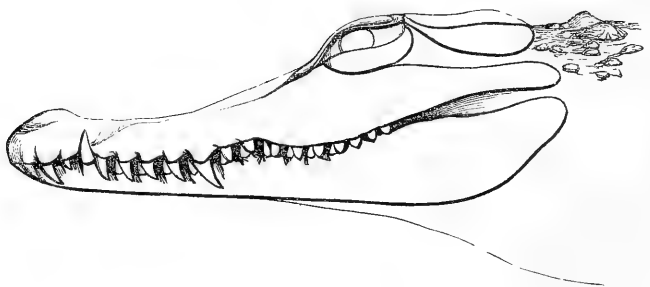
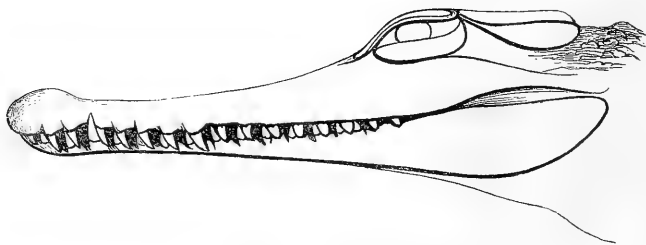


Fig. 6.



deeper than in *C. vulgaris* and *C. leptorhynchus*. (See fig. 4, which represents the head of *C. frontatus* seen in profile, and figs. 5 and 6,

which respectively represent the profiles of the head of *C. vulgaris* and *C. leptorhynchus*.) The disposition of the scuta or plates along

Fig. 7.

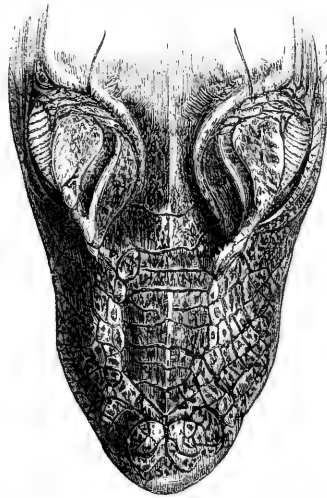


Fig. 8.

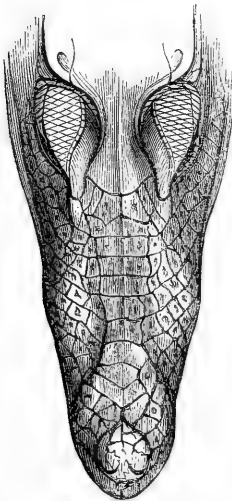
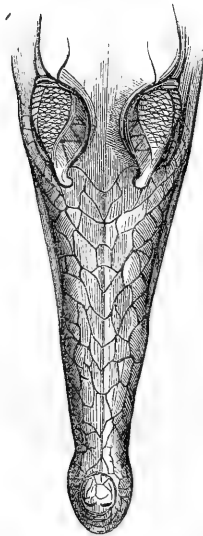


Fig. 9.



the nose or muzzle is different in each species. Fig. 7 shows them in *C. frontatus*; fig. 8, in *C. vulgaris*; and fig. 9, in *C. leptorhyn-*

chus. It will be seen that the arrangement in *C. frontatus* is much nearer that in *C. vulgaris* than that in *C. leptorhynchus*, which is upon a totally different plan, the middle space in it being free from scuta, soft, and smooth, with transverse wrinkles or lines, while in the other two the space is covered with scuta, those in the middle being transverse. The commencement of these transverse scuta between the eyes is also different.

The scuta on the nape of the neck are differently proportioned and placed in all three; and here the arrangement in *C. frontatus* bears most affinity to that of *C. leptorhynchus*, instead of to that of *C. vulgaris*. Fig. 10 shows this arrangement in *C. frontatus*; fig. 11,

Fig. 10.

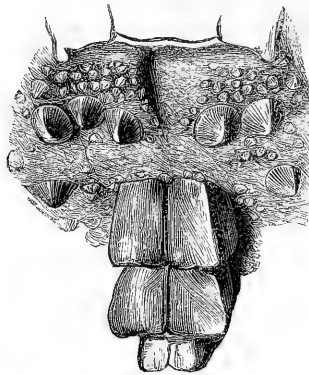


Fig. 11.

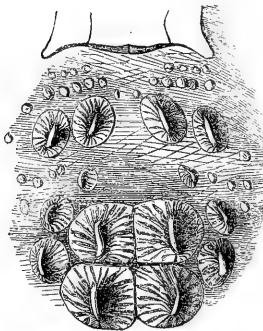
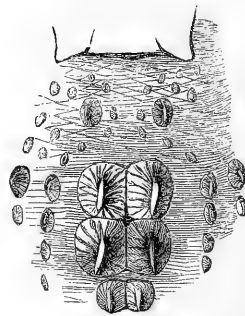


Fig. 12.



in *C. vulgaris*; and fig. 12, in *C. leptorhynchus*. In *C. frontatus* and *C. leptorhynchus* the four large scuta are of a subquadrate form; in *C. vulgaris* they are irregularly subhexagonal. In the latter, not only these but also the scuta generally are flat, with a longitudinal

raised line or carina. In *C. leptorhynchus*, those in the neighbourhood of the four larger scuta bear a projecting oblong umbo; and *C. frontatus* has this developed in a manner still more marked. The same character prevails in the rest of the scuta. In all three species there are six rows of large scuta down the back, varying in width, diminishing to four rows in the lumbar region. In *C. vulgaris* these scuta are flat, with only a slightly raised longitudinal line or carina. In *C. leptorhynchus* this carina is much more raised, so as to form regular crests. In *C. frontatus* some of them have an oblong umbo, others a crest, and others only a raised line: the affinity in this respect is greater with *C. leptorhynchus* than *C. vulgaris*. It is the same with regard to the crest down the tail. In all three the rows of dorsal scuta down the back become only four in number after passing the hind legs, forming four raised lines, two on each side of the spine; the inner crests or lines on each side then gradually approximate (in *C. vulgaris* forming a narrow channel) and thin off and become obliterated. The outer crest on each side, at about the seventh or eighth joint behind the hind legs, becomes broader and spreads out into a flat plate or leaf turned out horizontally on each side. There are about seven joints in which this flat table-shaped position of the scuta occurs, and about the same number prevails in all three. As this disposition, however, does not commence suddenly at any particular joint, but proceeds by gradations out of the crest on the back, the number may be modified according to the degree at which the observer reckons the horizontal leaf to commence. The size of these scuta is proportionally larger in *C. frontatus* and *C. leptorhynchus* than in *C. vulgaris*. These horizontal thin scuta extend one on each side for a certain distance; and then all at once the double row ceases, and is replaced by a series of single erect scuta running down the top of the tail. In my specimens the number of joints before this single crest commences, reckoning from immediately behind the hind legs, is as follows:—

<i>C. vulgaris</i>	18
<i>C. leptorhynchus</i>	17
<i>C. frontatus</i>	13

And the number of erect terminal joints is—

<i>C. vulgaris</i>	26
<i>C. leptorhynchus</i>	19
<i>C. frontatus</i>	19

The colouring of *C. frontatus* is much nearer that of *C. leptorhynchus* than *C. vulgaris*. The latter is coloured pale ashy brown, blotched irregularly with dark brown. The other two have the dark blotches distributed in transverse bands,—*C. frontatus* having every alternate two rows of transverse scuta pale and dark—a disposition followed in *C. leptorhynchus*, but not so regularly.

Total length of my specimen, 21 inches; total length of head, from tip of snout to back of under jaw, $3\frac{1}{2}$ inches; breadth of head, $1\frac{3}{4}$ inch; length of muzzle to front of eye, $1\frac{1}{4}$ inch; length of eye,

nearly 1 inch; height of head, 2 inches; length of body, from occiput to back of hind legs, 8 inches; total length of tail, 12 inches; length of tail to commencement of single crest, $5\frac{1}{2}$ inches; length of the part of it with single crest, $7\frac{1}{2}$ inches.

On the whole, this new species seems to combine many of the characters both of *C. vulgaris* and *C. leptorhynchus*. In its head it is nearest to *C. vulgaris*; in its colouring, scuta, and tail to *C. leptorhynchus*.

I owe this specimen to the kindness of the Rev. W. C. Thomson, the accomplished missionary at Old Calabar. He wrote me word long before I received it that there was another species of Crocodile in the Old Calabar besides the two generally known, that it was extremely scarce, but that he would endeavour to procure a specimen for me. He did so, and sent me the individual from which this description is taken, alive. It reached Liverpool in good health, but, most unfortunately, was drowned on the railway on its passage to Edinburgh. The gentleman who was kind enough to charge himself with it thought it would not live unless brought in water, and he put it in a foot-pail half full of water. The water was too deep to allow the poor animal to rest on the bottom of the pail and stretch up its head for breath; and when the jolting of the railway commenced, it was kept in a constant state of submersion. The consequence which might have been anticipated ensued, and my Crocodile arrived dead. There is no doubt that it is a good species, half-way between *C. vulgaris* and *C. leptorhynchus*.

15. NOTE ON THE HABITS AND AFFINITIES OF THE KAGU
(RHINOCHETUS JUBATUS). BY A. D. BARTLETT.

(Plate XXX.)

At the first sight of this bird, one is struck with its resemblance to several different genera, and at once calls to mind *Eurypyga*, *Ædinemus*, *Cariama*, *Psophia*, *Nycticorax*, and *Scopus*: one and all appear more or less represented in its singular combination of characters.

The actions and movements of the Kagu are generally quick and lively, so opposite to the slow and chameleon-like movements of the true Herons that one can hardly suspect it to be an Ardeine bird. This, however, it doubtless will prove to be, but so modified and adapted to a different kind of diet and mode of life, that its real affinities are difficult to recognize.

With its crest erect, and wings spread out, the Kagu runs or skips about, sometimes pursuing and driving before him all the birds that are confined with him in the same aviary [among these are several Blue Waterhens (*Porphyrio*)], evidently enjoying the fun of seeing them frightened; at other times he will seize the end of his wing or tail and run round, holding it in his bill: from a piece of paper or dry leaf he derives amusement by tossing it about and running after

it. During his frolic he will thrust his bill into the ground and spread out his wings, kick his legs in the air, and then tumble about as if in a fit. At other times he appears intent upon catching worms: he steps slowly, his neck close to his body, his crest flat on his back, all his feathers smooth and close; he raises one foot, and with two or three gentle strokes he paws the ground, swiftly he darts his bill into the earth and draws forth a worm, a sudden shake and it is swallowed; again he runs; stopping suddenly, he makes another dart; and thus he continues to capture this kind of food. With respect to feeding, this bird differs much from the Heron family, seeking out, in every hole and corner, worms, snails, and other living things, whenever they are not in motion: as soon as a snail is found, he breaks its shell by repeated knocks upon the ground, and after shaking the fragments of the broken shell off, the animal is swallowed. In no instance, however, that I have observed, does this bird eat bread, seed, or any kind of vegetable, but he strictly confines himself to insects and other animal substances.

The skeleton and internal anatomy of the Kagu being entirely unknown to me, I can only form an opinion of the affinities of this bird by its external characters, habits, &c.; and I find that the remarkable powder-down tufts, which are well developed in all the Ardeines, are carried to a greater extent in this bird; for above and around the wings, on the breast beneath the wings, and on the back and belly, this structure exists, and the enormous quantity of the white powder given off is surprising. I have seen the bird enter the small pond and attempt to wash; and upon dipping partly under water, the whole surface of the water was covered with a white film, like French chalk. The strong resemblance between this bird and *Eurypyga*, even in the markings upon the wing- and tail-feathers, the mode of spreading out the wings, and other resemblances, convince me that I am right in considering the Kagu to be more closely allied to *Eurypyga* than to any other bird that has come within my notice.

Dr. E. Crisp exhibited the enlarged tail-glands of two domestic hens that had been kept in a confined situation in London. The enlargement appeared to arise from closure and obstruction of the ducts and the increase of the oily secretion. These glands in each of the hens weighed about 350 grains, their normal weight being about 10 or 12 grains.

November 11, 1862.

Professor Huxley, F.R.S., V.P., in the Chair.

The Secretary read the following extracts from a letter addressed to him by Dr. Lamprey, dated Shanghai, July 31st, 1862:—

“I have forwarded by H.M. Steam Transport ‘Urgent,’ which sailed from Shanghai on the 14th inst., three couples of the *Phasianus superbus*; at least, I suppose this to be the proper designation of these birds from their fulfilling the description of that bird in the ‘Naturalist’s Library.’ I procured six males last winter at Tien Tsin, where they were sold in the market for the table, like other game-birds. The beauty of the birds, then in good plumage, and the remarkable length of their tail-feathers were very striking; and I hope their safe arrival in England will afford an opportunity of seeing them recover their plumage and tails, which have been sadly damaged by confinement. Subsequently I procured five females of the same species by sending a man to the interior, north of Pekin, where they are to be found—though I have strong suspicions that all my specimens came from the Tung Ling, or eastern burial-place of the Emperors, situated some distance north-east of Pekin, in a mountainous district. It is the custom to place all kinds of game in the extensively enclosed grounds of the Imperial burial-places, where they are carefully preserved; but no doubt the mandarins in charge make a good perquisite by disposing of the superfluous stock every winter.

“These birds are, however, to be found in the mountainous country north of Pekin, in Shantung, also in Shansi; in the latter province, I am informed, there is also a Pheasant of a beautiful scarlet colour, though of very small size. I have seen a drawing of this bird in a mandarin’s house in Tien Tsin, and would have supposed it to be a sketch from fancy, were it not that I was previously informed of the existence of a bird of which this might have been a good representation. With regard to the drawings of birds on Chinese fans, screens, &c., I was hitherto, like others, under the impression that they were altogether imaginary; the brilliant colouring, attitudes, almost grotesque, and strange outlines lead one to this conclusion; but from seeing a great variety of birds in the country, and having had the opportunity of comparing them with Chinese drawings, I find that they are all more or less good representations of birds which exist in reality. Unfortunately that which constitutes the chief merit of a Chinese artist is his skill in sketching from memory; otherwise, were they to pay more attention to minute detail, their drawings would give us a good idea of the ornithology of the country.

“It might be said that the foregoing remarks do not hold good with regard to the Fung or Phoenix of the Chinese, which is evidently one of the Pheasant tribe: it does not require any close examination of the Chinese drawing to see this, which corroborates in a great measure the notions of the early western philosophers, who held that the Phoenix was derived from a Pheasant, and not from an

Eagle, which is the form generally given to the representation of it in heraldry, &c., and current among westerns of the present day. It may yet be discovered, by some explorer of the extensive mountain-ranges adjacent on all sides to the north of China, that there is a bird in plumage and general character resembling the Fung; perhaps it may be a hybrid between two of the Pheasant tribe.

"I have seen, in all, four distinct kinds of Pheasants in the markets of Tien Tsin: the uninterrupted cold of winter allows of their being brought in large quantities from remote places, and preserves them fit for use till the spring. Of one of these Pheasants I sent a specimen last year to Mr. Swinhoe, Consul of Formosa, and one of your corresponding members, which he describes as being 'a kind of *Crossoptilon*, perhaps the female of the *C. tibetanum*.' The bird had all the appearance of a male, in having spurs, though it was impossible to ascertain its sex, as it had been previously gutted. No doubt this bird will be brought to your notice by this zealous naturalist on his arrival in England. During the last winter, I procured another fine specimen of this bird; but after preparing the skin, a young dog unfortunately got at it and tore it up. Its plumage was the same as that of the previous specimen. The meat of this kind of Pheasant is exceedingly delicate, and the body is nearly as bulky as that of a small-sized Turkey.

"Another kind of Pheasant found in the Tien Tsin market bears out the description of the *Euplocamus pucrasia* of the 'Naturalist's Library,' so common on the hills in India. Although the preserved skins of this bird are in too bad a condition for mounting, they may serve to identify the species. They remained too long in a frozen state to admit of their being preserved properly.

"In the event of the *P. superbus* not reaching home alive, I have by me good skins of the male and female, though the tail-feathers do not show their full length. The fact is that the longest feathers are removed before exposing the bird for sale, and appropriated for decorating the dress of warrior-chiefs in theatrical representations.

"The common Ring-necked Pheasant (*P. torquatus*) constitutes the fourth and most abundant kind found in the markets. The numbers of these birds that are sold every winter is wonderful. It was noticed that in birds apparently of the same age there was frequently a great disparity of size, almost giving one the idea of two species, though it is not improbable that this difference may be attributed to the different circumstances of food and locality.

"The Partridges found in the market at Tien Tsin are not unlike the English (*Perdix cinerea*), except that the marking on the breast of the Chinese bird is darker. They were abundant last winter. I am also assured that the Red-legged Partridge was shot in the hills north of Pekin, though this bird did not make its appearance in the market at Tien Tsin.

"Quails are very common; they are sold mostly alive, and trained for fighting, as in India. There is a second kind, which might be designated the Bush Quail,—a solitary bird smaller than the other, and speckled."

Mr. F. Buckland exhibited several specimens of the Smooth Snake (*Coronella austriaca*), and gave particulars of the various instances of its occurrence in several parts of England.

The Secretary called the attention of the Meeting to the living Aye-aye (*Chiromys madagascariensis*) which had been added to the Society's Menagerie in the preceding August. This valuable animal had been liberally presented to the Society by Edward Mellish, Esq., of the Mauritius (one of the members of the mission sent to Madagascar on the accession of Radama II. in 1861), and had reached England in safety by the overland mail on the 12th August.

The following papers were read :—

1. OBSERVATIONS ON THE LIVING AYE-AYE IN THE ZOOLOGICAL GARDENS. BY A. D. BARTLETT.

The subject of the following remarks is a fine adult female of the Aye-aye (*Chiromys madagascariensis*), which arrived in this country on the 12th of August last. On the voyage, this animal produced a young one, which lived about ten days. On arriving here she was in poor condition and very feeble; she soon, however, began to feed freely, and has now considerable strength, as is shown by the timber destroyed in the cage in which she is kept.

This animal is much blacker, and appears larger, than the male of this species now in the British Museum; the long hairs on the back of the neck, extending to the lower part of the body, have white points; these white points are thickest above, and become less numerous towards the limbs and tail, which appear quite black; the hairs of the tail, however, are white or grey at the roots (this can only be observed by separating them); the chin and throat are dirty white, which colour extends over the chest; the short hairs on the face are a mixture of dirty grey and white; the long hairs are black; the eyes light brown, surrounded by dark-coloured hairs; the nose and muzzle are of a dirty flesh-colour; the lips pink; the ears, shining black, and naked, but thickly studded with small protuberances; the feet and toes are sooty black, with the under surface and claws lighter, inclining to flesh-colour. The situation of the mammæ is remarkable: they are two in number, and placed at the lowest part of the abdomen (the animal differing in this respect entirely from the Lemurs and Bats, the teats of which are on the breast).

The Aye-aye sleeps during the day; and the body is then generally curved round and lying on its side, the tail is spread out and flattened over it, so that the head and body of the animal are almost entirely covered by the tail.

It is only at night that the Aye-aye exhibits any activity. I hear her crawling about and gnawing the timber when, to me, all is perfectly dark; and I have been surprised to find that upon the introduction of a light, directed to the face of the animal, she does not exhibit any signs of uneasiness, but stretches out her arm and tries to touch the lamp with her long fingers. She frequently hangs by

her hind legs, and in this position cleans and combs out her large tail, using the slender hook-like third finger with great rapidity, reminding one strongly of the movements of the large Bats (*Pteropus*). This skeleton-like finger is used with great address in cleaning her face and picking the corners of the eyes, nose, mouth, ears, and other parts of her body; during these operations the other fingers are frequently partially closed.

In feeding, the left hand only is used, although she has the full use of her right one. The mode of taking her food requires careful attention, in consequence of the very rapid movement of the hand during the process. The fourth finger (which is the longest and largest) is thrust forward into the food, the slender third finger is raised upwards and backwards above the rest, while the first finger or thumb is lowered so as to be seen below and behind the chin; in this position the hand is drawn backwards and forwards rapidly, the inner side of the fourth finger passing between the lips, the head of the animal being held sideways, thus depositing the food in the mouth at each movement; the tongue, jaws, and lips are kept in full motion all the time. Sometimes the animal will advance towards and lap from the dish like a cat, but this is unusual. I have never heard her utter any cry, or produce any vocal sound, during the many hours at night in which I have watched her habits, nor has she appeared shy or angry at my presence.

With reference to food, this creature exhibits no inclination to take any kind of insects, but feeds freely on a mixture of *milk, honey, eggs*, and any *thick, sweet, glutinous fluid*, rejecting meal-worms, grasshoppers, the larvæ of wasps, and all similar objects. Consequently I am inclined to think that this animal is not insectivorous. Its large and powerful teeth lead me to infer that it may possibly wound trees, and cause them to discharge their juices into the cavity made by its teeth; and that upon this fluid it probably feeds. This appears to me the more likely, as I observe that our specimen returns frequently to the same spot on the tree which she had previously injured. I am also strengthened in my opinion by noticing the little attention paid by the animal to its food. It does not watch or look after it; for I have on several occasions removed the vessel containing its food during the time the animal was feeding, and the creature continued to thrust its hand forward, as before, upon the same spot—though after a while, finding no more food, she discontinued, and moved off to search for more elsewhere. This apparently stupid act is so unlike the habits of an animal intended to capture or feed on living creatures that I am inclined to believe that the Aye-aye feeds upon inanimate substances. I have frequently seen it eat a portion of the bark and wood after taking a quantity of the fluid food.

The excrement of this animal much resembles the dung of small rabbits, being in separate nearly round balls.

2. ON A NEW BIRD FROM THE ISLAND OF MADAGASCAR.

BY DR. G. HARTLAUB, FOR. MEMB.

CUCULUS ROCHII, sp. nov. *Supra ardesiacus; gutture pallidius cinereo; pectore et abdomine in fundo albo-flavicanibus, fasciis rarioribus angustis nigricantibus; subalaribus flavescenti-albidis, tenuissime ardesiaco fasciolatis; subcaudalibus ochraceis, maculis nonnullis nigris; rectricibus nigris, maculis rarioribus minutis albis prope scapam notatis, omnium apicibus albis; ala extus unicolore, nigricante, remigum pogoniis internis albo fasciatis vel postice transversim maculatis; maxilla nigricante; mandibula flava, apice obscura; pedibus flavis.*

Long. 10–11''; rostr. a fr. 8''; al. 5'' 11''; caud. 5'' 7–8''.

Syn. "*Cuculus canorus*, L., common at Madagascar," Desjardins, P. Z. S. 1832, p. 111. *C. tenuirostris*, Jules Verreaux, MS. (*olim*).

Nearly allied to certain Indian species, but in all probability distinct. In an old MS. of my friend Jules Verreaux I find an accurate description of this species, under the often misused name of *Cuculus tenuirostris*.

Named after Dr. S. Roch, who accompanied the mission sent last year by the Government of Mauritius to that of Madagascar.

3. NOTES UPON AUSTRALIAN SNAKES, AND THEIR GEOGRAPHICAL DISTRIBUTION. BY GERARD KREFFT.

Acanthophis antarctica.—This species, very common in the neighbourhood of Sydney, ranges over the whole continent, the southern part of Victoria excepted. I have captured specimens on the banks of the Murray, on the Darling, and in South Australia; and there are specimens in the Museum collection from all parts of this colony, also from Queensland. Dr. J. E. Gray mentions, in the 'British Museum Catalogue,' that only the anterior dorsal scales are keeled; but a great number of specimens which I have examined had eight rows of the dorsal scales distinctly keeled to the root of the tail. The different specimens vary much in colour and markings.

Of *Hydridae* the Australian Museum is in possession of a good many different species, but without notes of the localities where they were captured. *Lapemis curtus* and *Pelamis bicolor* are frequently found on this part of the Australian coast. Of the last-mentioned species I captured a specimen some months ago in Botany Bay, containing five young ones.

Of *Boidea* we have only one species in this neighbourhood—*Morelia spilotes*, which is one of the most common Snakes found here. I think it is not generally known that the range of this species is very limited, and that it is only found within a radius of 200 or 300 miles from Sydney. On the Murray and Darling, in South and West Australia, and in the northern part of the continent, *Morelia variegata* represents the genus. I have never seen specimens of *Morelia spilotes* from the Clarence River, or from the country to

the north of it; and though inhabiting the Illawarra district, the range of this Snake does not extend beyond the Snowy Mountains.

Lialis childrenii.—The two specimens in the Museum collection were taken at Port Denison, Queensland. I do not know anything about the geographical distribution of this species.

Bolyeria multicarinata, of which mention is made in the 'British Museum Catalogue' as having been found at Port Jackson, does not exist in this neighbourhood.

Coronella australis is also rare in this part of the continent. The only specimen which ever came under my notice was found at King George's Sound.

Tropidonotus picturatus is not found in New South Wales. The only specimen in the Australian Museum collection was captured at Port Denison, Queensland.

Dendrophis punctulata.—Very common near Sydney; distributed over the whole continent, I believe.

Dipsas fusca has also a very extensive range, but is not so common as *Dendrophis punctulata*. No doubt it is on account of its nocturnal habits that it is not met with so often.

Glyphodon ornatus.—A very rare Snake in this neighbourhood; its geographical distribution is not known to me.

Diemansia psammophis.—An inhabitant of the north-east coast, where it represents

Diemansia reticulata, which is the most common Snake here. *D. reticulata* is also found in the northern part of Victoria, and on the banks of the Murray and Darling.

Diemansia milleri I consider to be a young individual of the above-mentioned species. I possess several specimens with rose-coloured streaks along the sides of neck and body, and I shall take an early opportunity of forwarding one to Dr. Günther.

Diemansia cucullata, Gthr.—An extremely rare species, of which I have never found more than three specimens in the immediate neighbourhood of Sydney.

Pseudo-elaps kudingii, Jan (Rev. Zool. 1859, p. 127), is merely a young individual of *Pseudonaja nuchalis*, from three to four years old.

Diemansia annulata is also an immature form of *P. nuchalis*, from one to two years old. I have captured four specimens this season.

Hoplocephalus variegatus.—A very common form in this neighbourhood, of the geographical distribution of which I do not know anything.

Hoplocephalus pallidiceps is no inhabitant of this neighbourhood. It is common on the Hunter and Clarence Rivers, and nocturnal in its habits.

Hoplocephalus coronatus.—The most common form of this genus in Western Australia; not found in New South Wales, nor on the Murray and Darling.

Hoplocephalus coronoides.—Frequently found near Sydney. I possess also specimens from Port Macquarie and the Clarence River.

Hoplocephalus curtus.—This species is very common, and inhabits the whole southern half of this continent. Specimens from Western

Australia are generally darker in colour, and have the bands more distinctly marked, than those found in Victoria and New South Wales.

Hoplocephalus superbis is not found in New South Wales. It is perhaps only a variety of *H. curtus*.

Hoplocephalus nigrescens.—A rare Snake. The few specimens I found of this species were all captured at Middle Harbour, an inlet of Port Jackson. I have never seen it from other parts of Australia.

Hoplocephalus temporalis I captured, more than two years ago, at Port Lincoln, South Australia. I have also seen specimens from Albany, King George's Sound. No doubt a great many more species of this extensive genus will be discovered; in fact, I know of three new ones already, which will be described shortly.

Pseudechis porphyriacus.—Inhabits the greater part of the continent in the north. The brown variety, with bright yellow or orange belly, is the most common. On the Lower Murray both varieties occur.

Pseudonaja nuchalis.—Common near Sydney, on the Hunter and Clarence Rivers.

Brachysoma diadema is also an inhabitant of this neighbourhood, and is frequently captured in the northern part of New South Wales and in Queensland.

Vermicella annulata.—Rarely obtained in this neighbourhood—I suspect, on account of its nocturnal habits. Found on the east coast, from Twofold Bay to Brisbane, and no doubt ranges still further north.

4. ON THE GENERA OF MOLLUSCA ESTABLISHED BY H. F. LINK IN THE CATALOGUE OF THE ROSTOCK MUSEUM. BY O. A. L. MÖRCH.

In the 'Proceedings of the Zoological Society' for the year 1851 there is an abstract of the Catalogue of the Rostock Museum, by the late Dr. Herrmannsen, the continuation of which was prevented by his early death. Of the work, which appeared as a University program, only a few copies comparatively were distributed, the greater number having been preserved in the stores of the University. Oken appears to be the only naturalist who had any acquaintance with the work until it was mentioned in the 'Index Malacozoorum.'

The second part, containing the Mollusca, appeared on the 29th March 1807.

Lituina, Link, p. 84, is established upon *Nautilus spirula*, L.; Martini, i. t. 20. figs. 184, 185.

Ammonia, Breyn, has the priority.

The GASTEROPODA are divided into three sections—

1. *Diphonobranchii*, with a notch in the fore part of the aperture, corresponding to Lamarck's *Zoophaga*.
2. *Adelobranchii*, corresponding to Lamarck's *Phytophaga*.
3. *Dermobranchii*, containing the non-spiral shells, as *Calyptraea*, *Patella*, *Fissurella*, *Chiton*.

Pyramea, Link, p. 107, is founded upon the young of *Strombus gigas*=*Pyramis*, Bolt.

Lambidium, Link, p. 112, *L. oniscus*, Linn.=*Morum*, Bolt.

Phalium, Link, p. 113. The genus *Cassis*, in the Lamarckian sense, is divided into two genera:—1. *Cassidea*, Link, containing *C. rufa*, L.; *C. tuberosa*, L.; *C. cornuta*, L.; *C. testiculus*, L.; *C. flammea*, L.; *C. pennata*, Gm.—2. *Phalium*, Link, which is divided into two sections—

1. Inner lip reflexed, plicate.

2. Inner lip pustulate.

To the first section belong *Ph. glaucum*, L.; *Ph. flammeolum*, Chemn. ii. figs. 367, 368, Chemn. x. figs. 1957, 1958; *Ph. areola*.

Galeodea, Link, p. 113, *G. echinophora*, L.=*Morio*, Montf.

Galeodes, Bolt., must be retained as a subgeneric section of *Cassidula*, Humph.

Cadium, Link, p. 113=*Dolium*, Hill; Lam.

Dolium pomum is the first species; and in the generic description, from the expression "Die aussere Lippe gesäumt," it seems that Link acknowledged this species to belong to a different genus from the other species of *Dolium*; it is therefore a matter of doubt whether the name *Cadium* has not priority over *Malea*, Valenciennes.

Harpalis, Link, p. 115=*Harpa*, Lam.

Herrmannsen quotes Rumphius as the author of *Harpa*; but by that author the name *Harpa* is used as a specific name of *Voluta*.

Cithara, Klein, is the oldest name. The name *Harpalis*, Link, must be retained as a subgeneric name for the larger species, *H. antiquata*, *conoidalis*, &c.; and *Harpa*, Lam., as a subgenus for *Harpa costata*, L. (*imperialis*, Lam.).

Mancinella, Link, p. 115, *M. aculeata*, Link (*Murex mancinella*, L.), Mart. iii. figs. 967, 968.

M. hystrix, L., Mart. iii. figs. 974, 975.

M. castanea, Link, Mart. iii. f. 956, 958.

M. armigera, Chemn. x. f. 1798, 1799.

M. mutabilis, Link, Mart. iii. f. 951, 953.

Nassaria, Link, p. 123. This genus corresponds to *Nassa* and *Buccinum*, Lam. The first species is *N. lyrata*, Gm. p. 3794, Mart. iv. figs. 1122, 1123. If the quotation of Gmelin is right, the type is a *Mangelia*; but if Martini's figures (1122, 1123) are correct, the type is *Buccinum niveum*, Gmel. The latter, however, is not probable; and therefore the name *Nassaria* must not be used for *Hindsia*, H. & A. Adams.

Canrena, Link, p. 126=*Drupa*, Bolt.

Murex neritoideus, Mart. f. 972, 973, 976, 979.

Arcularia, Link, is adopted from Martini.

A. coronata, Link, Mart. ii. f. 409, 412, is the type.

Vertagus, Link (not Klein), is *Terebra*, Brug.

Aluco, Link, is *Tympanotonos* and *Cerithium*.

A. fuscus, Link, Chemn. iv. f. 1475.

A. auritus, L.

A. aculeatus, L.

A. nodula, L.

Tivela, Link, p. 152; *T. vulgaris*, Link (*Venus corbicula*, Born. Gm.), and *T. tripla*, L. This name, therefore, has priority over *Trigona*, Megerle.

Musculium, Link, p. 152. "Sumpferschale. Die Schalen gleich, rund, schliessen überall. Das Schloss mit zwei kleinen Zähnen, ohne Seitenzähne; Vorder- und Hinterspalte ziemlich gleich; das Band auswendig."

M. lacustre (*Tellina*), Gm. p. 3242; Ch. vi. f. 13. f. 135. Herrmannsen erroneously refers this genus to *Pisidium*, Pfr. From the figure of Chemnitz quoted, there cannot be any doubt that *Cyclas calyculata* is the type. The expression, "nearly equilateral," excludes the genus *Pisidium*. "No lateral teeth" does not agree with any European freshwater shell, and is very likely a misprint.

Musculium must be retained as a subgenus of *Sphaerium*, Scopoli.

Nuculana, Link, p. 155. "Meernuss. Die Schalen gleich, schliessen überall. Eine Reihe von kleinen spitzigen Zähnen an der Vorderseite der Schalen neben den Spitzen. *Nucula*, Lam."

Nuculana rostrata, Gm. p. 3308; Ch. vii. f. 550, 551. The author only seems to have noticed the teeth on one side of the umbones. Notwithstanding this, the genus must be regarded as established, and take priority over *Leda*, Schum.

Unionium, Link, p. 155, is *Avicula*, as Deshayes has restored it.

Anodonta, Link, p. 156, is *Loripes*, Poli, founded on *Venus edentula*, Gm. p. 3286; Ch. vii. f. 410, 411 = *A. alba*, Link.

Pectinium, Link, p. 156, corresponds to *Pecten* of authors.

Limaria, Link, p. 157, is *Radula*, Klein.

L. vulgaris, Link = *Ostrea lima*, Chemn. vii. f. 651.

Sellana, Link, p. 158, is the bent form of *Placuna*, and is synonymous with *Ephippium*, Bolt.

Atractilites, Link, p. 9. "Eine spindelförmige inwendigstrahlig krystallinische Schale, ohne Alveole."

A. belemniticus appears to be *Belemnites listeri*.

Siphonium, Link. "Eine gerade Schale mit Scheidewänden welche ausserhalb Ringe bilden. Hierher gehören die geraden Nautili."

S. fascia. Very similar to *Nautilus fascia*, but larger.

5. DESCRIPTIONS OF SOME NEW SPECIES OF LIMOPSIS FROM THE CUMINGIAN COLLECTION. BY ARTHUR ADAMS, F.L.S.

There have been six recent species of *Limopsis* already described, namely, *L. multistriata*, Forsk.; *L. belcheri*, Adams & Reeve; *L. cancellata*, Reeve; *L. borealis*, Woodward; *L. pygmaea*, Phil.; and *L. oblonga*, A. Adams. To these I now add five more recent species from the seas of Japan, one from the Cape, and two from Lizard Island in Torres Straits. Those from Japan and the Cape were obtained by myself; and for the Australian examples we are indebted to Mr. Macgillivray. Nearly all the known species are in the magnificent collection of Mr. Cuming.

1. LIMOPSIS JAPONICA, A. Adams.

L. testa orbiculari vix æquilaterali, albida aut rufescente, costellis radiantibus striisque elevatis concentricis concinne cancellata, epidermide fusca dense pilosa, pilis in fimbriis concentricis dispositis, obtecta, intus rufo-fusca, radiatim strigosa, albo marginata; margine ventrali explanato, intus integro.

Hab. Kuro-Sima, 57 fathoms; Kiusu, 26 fathoms.

This species in form and sculpture most nearly resembles *Pectunculus cancellatus* of Reeve, which is a true *Limopsis*. It is, however, much larger, the radiating ribs are equal, and the hinge-margin is not straight, and is extended in the form of auricles.

2. LIMOPSIS OBLIQUA, A. Adams.

L. testa valde obliqua, oblonga, inæquilaterali, tumidula, albida, longiore quam lata, latere antico brevi, postico longiore, radiatim striata, liris crenulatis concentricis decussata, epidermide dense pilosa fusca obtecta; linea cardinis arcuata, fossa magna triangulari; intus alba radiatim strigosa, margine ventrali intus lævi.

Hab. Uruga, 21 fathoms.

This species is even more oblique than *L. oblonga*, A. Ad. (Ann. and Mag. Nat. Hist. 1860), from which it differs in being oval, and not trigonal, in the broad triangular cartilage-pit, and in the ventral margin not being internally crenate.

3. LIMOPSIS CUMINGI, A. Adams.

L. testa ovata, valde obliqua, inæquilaterali, latiore quam longa, compressa, albida, concentricè lirata, interstitiis longitudinaliter radiatim striatis, latere antico brevi, postico multo longiore dilatato, epidermide pilosa pallide fusca, pilis in fimbriis concentricis dispositis, obtecta, intus alba, margine ventrali intus lævi.

Hab. Gotto, 48 fathoms; Santanomosaki, 55 fathoms.

This species somewhat resembles *L. belcheri* in form, but the posterior side is regularly arcuate, and the hinge-margin is bent in the middle; the teeth, moreover, are much less numerous, and the ventral margin of the valves is not crenate within.

4. LIMOPSIS CRENATA, A. Adams.

L. testa oblique ovata, longiore quam lata, convexa, oblonga, latere antico rotundato, postico declivi, longitudinaliter radiatim substriata, concentricè sulcata, liris concentricis subdistantibus crenatis, epidermide dense pilosa, pilis in fimbriis concentricis dispositis, oblecta, intus alba strigosa, margine ventrali intus crenulato.

Hab. Uruga, 21 fathoms; Satanomosaki, 55 fathoms.

Most like *L. obliqua* in form, but less prolonged from the beaks to the ventral margin; it is also more gibbous, and the surface of the valves is furnished with prominent concentric crenate liræ.

5. LIMOPSIS FORSKALII, A. Adams.

L. testa subtrigonalis, solida, orbiculata, subæquilaterali, tumida, latere postico declivi, rufescente, costellis radiantibus strisq̄ue concentricis elevatis cancellata, costellis minoribus et majoribus alternantibus, intus pallide rufa, linea cardinis castaneo tincta, margine ventrali intus lævi.

Hab. O-Sima; Takano-Sima; on the sands, dead.

This is a strong, subtrigonal, cancellated species, most nearly resembling *L. japonica*; but it is more triangular in outline, the sculpture is much coarser, and the hinge-margin is narrower and more arcuated.

6. LIMOPSIS PHILIPPII, A. Adams.

L. testa vix orbiculari, subobliqua, gibba, subæquilaterali, pallide fusca, costellis radiantibus æqualibus confertis lirisq̄ue crenulatis concentricis reticulata, latere postico rotundato, epidermide fusco-pilosa partim oblecta.

Hab. — ?

This is a gibbous, somewhat oblique species, neatly reticulated with radiating riblets and elevated concentric lines. It is more gibbous than any of the other species, and the surface of the valves is partly covered with a pale brown epidermis.

7. LIMOPSIS ABYSSICOLA, A. Adams.

L. testa valde obliqua, inæquilaterali, gibba, lineis elevatis radiantibus et liris concentricis crenulatis decussata, latere antico brevi, rotundato, postico longiore declivi non dilatato, epidermide fusca pilosa, pilis in fimbriis dispositis, oblecta.

Hab. Cape of Good Hope, 136 fathoms.

This is the species actually dredged from 136 fathoms, off the Cape, during the voyage of H. M. S. 'Samarang.' The shell figured as *Pectunculus belcheri* (Moll. Voy. Sam. pl. 22. f. 5), a much larger and more compressed species, was, I believe, obtained from the Korean Islands, and most nearly resembles *L. cumingi*, which, however, has not the ventral margin internally crenate.

8. LIMOPSIS MACGILLIVRAYI, A. Adams.

L. testa oblique ovata, inæquilaterali, gibbosula, albida, costellis

tenuibus nodulosis radiantibus et striis vix elevatis concentricis crenulatis concinne decussata, latere postico longiore et dilatato, umbonibus subacutis, epidermide fusco-pilosa partim oblecta.

Hab. Lizard Island, Torres Straits.

An oblique species, most nearly resembling *L. multistriata*, with the surface of the valves very neatly sculptured with numerous fine radiating ribs, crossed by slightly elevated concentric lines.

9. LIMOPSIS WOODWARDI, A. Adams.

L. testa orbiculari, subæquilaterali, convexa, marginibus crenulatis, candida, costellis acutis tenuibus radiantibus et lirulis concentricis crenulatis decussata, costellis breviculis circa marginem ventralem interpositis ad medium valvarum evanidis, linea cardinis regulariter arcuata, dentibus acutis lamellatis prominentibus, fossa trigonali conspicua, margine ventrali intus lævi.

Hab. Lizard Island, Torres Straits.

This is a pure-white species, with the surface of the valves very delicately sculptured; the hinge-teeth are sharp and prominent, and the concentric liræ cause the radiating ribs to assume a nodulous character.

6. ON THE SPECIES OF OBELISCINÆ FOUND IN JAPAN.

BY ARTHUR ADAMS, F.L.S., ETC.

In this subfamily of *Pyramidellidæ*, the members of which are nearly all of small size, and which appear to be tolerably numerous in the seas of Japan, the form of the shell is subulate, the texture vitreous, and the surface usually polished. Nearly all the species of *Obeliscus* and *Syrnola* are prettily adorned with a spiral red-brown zone, which usually marks a line at the sutures, and crosses the last whorl at the periphery. The *Syrnolæ* are usually of small dimensions, and the inner lip is always furnished with a single parietal plait: the *Styloptygmæ* have the peritreme entire, as in *Chrysalida*, but the whorls are not plicate. In most of the specimens of *Syrnola* found, the apex of the spire is seen to be decollated. This is owing to the extreme fragility of the nucleolar whorls, which in some species form a cylindrical transparent mucro, terminating in a little globose, decumbent, sinistral whorl. In *S. cincitella*, the mucro of which is very elongated, the number of similar pellucid nucleolar whorls is about eight.

I have not hitherto been able to trace any connexion between the form or character of the shell and the internal transverse grooves seen in the whorls of so many species. Similar grooves are met with in several other genera of *Pyramidellidæ*, and also of *Helicidæ* and *Ellibiidæ*. That they serve some good purpose in the economy of the animal is no doubt true, although at present it has not been detected by our observation.

The species of *Syrnola* usually inhabit deep water, and live on a

floor of sand or sandy mud; they are very difficult to obtain alive, the shells forming the subject of this paper having been obtained, for the most part, from an examination of shell-sand. The animal of *Syrnola cincitella* crawls rapidly. It is of a semipellucid white, with the upper surface of the mentum flecked with opaque white; the tentacles are broad and triangular, with the eyes between them very close together; the mentum is greatly elongate, and bilobed at the end; and the foot is narrow. This species lives in two fathoms' sandy mud at Takano-Sima, a small island on the east coast of Japan.

Genus OBELISCUS, Montf.

1. OBELISCUS PULCHELLUS, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 20.

Hab. O-Sima; Yobuko; Mososeki.

2. OBELISCUS TERES, A. Ad., Sow. Thes. Mon. Obel. pl. 171. figs. 31, 32.

Hab. Mino-Sima.

3. OBELISCUS BALTEATUS, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 25.

Hab. Yobuko; Uraga.

4. OBELISCUS PUSILLUS, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 7.

Hab. O-Sima; Takano-Sima.

5. OBELISCUS NITIDULUS, A. Ad.

Syrnola nitidula, A. Ad., Ann. Nat. Hist. 1860, vi. 335.

Hab. Mino-Sima, 63 fathoms; O-Sima, 25 fathoms.

6. OBELISCUS VITREUS, A. Ad.

Syrnola vitrea, A. Ad., Annals, 1860, vi. 335.

Hab. Uraga; Tsu-Sima.

7. OBELISCUS TRIFASCIATUS, A. Ad.

O. testa acuminato-conoidea, cornea, tenui, semipellucida, vitrea; anfractibus normalibus 7, planiusculis, fasciis tribus rufis transversis ornatis, suturis cæaratis, apertura ovata; plica suprema valida transversa, plica inferiore parva inconspicua; labro intus lirato.

Hab. Uraga; Mososeki.

This species resembles *O. nitidulus* in form; but the whorls, in all my specimens, are adorned with three transverse bands.

8. OBELISCUS EBURNEUS, A. Ad.

O. testa subulato-aciculata, elurnea, solida, opaca, lævi; anfractibus normalibus circa 10, planulatis, sulcis longitudinalibus hic

et illuc instructis, suturis valde exaratis; anfractu ultimo ad peripheriam obtusim angulato; apertura subquadrata; labio buplicato; plica superiore valida, transversa, tortuosa; labro margine rectiusculo, intus tirato.

Hab. O-Sima.

This is a slender, white, solid species, with the whorls here and there longitudinally sulcate.

Genus SYRNOLA, A. Adams.

Testa subulata, recta, vitrea, polita; anfractibus planis, simplicibus, suturis impressis. Apertura oblonga; labio in medio plica obliqua instructo; labro interdum intus sulcato, margine acuto.

1. SYRNOLA GRACILLIMA, A. Ad., Annals, 1860, v. 405.

Hab. Mino-Sima; Uraga.

2. SYRNOLA CINCTELLA, A. Ad., Annals, 1860, vi. 333.

Hab. O-Sima; Seto-Uchi.

3. SYRNOLA MERA, A. Ad., Annals, 1860, vi. 334.

Hab. Mino-Sima; O-Sima.

4. SYRNOLA TERETIUSCULA, A. Ad., Annals, 1860, vi. 334.

Hab. Tsu-Sima, 15 fathoms.

5. SYRNOLA PUPINA, A. Ad., Annals, 1860, vi. 334.

Hab. Mososeki; Mino-Sima.

6. SYRNOLA PYRAMIDALIS, A. Ad., Annals, 1860, vi. 334.

Hab. Tsu-Sima.

7. SYRNOLA BIZONALIS, A. Ad., Annals, 1860, vi. 334.

Hab. Mino-Sima.

8. SYRNOLA ELEGANS, A. Ad.

Obeliscus elegans, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 19.

Hab. O-Sima; Seto-Uchi.

9. SYRNOLA BRUNNEA, A. Ad.

Obeliscus brunnea, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 35.

Hab. O-Sima.

10. SYRNOLA ACICULATA, A. Ad.

Obeliscus aciculata, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 21.

Hab. Tanabe.

11. SYRNOLA STRIATULA, A. Ad.

Obeliscus striatula, A. Ad., Sow. Thes. Mon. Obel. pl. 171. fig. 29.

Hab. Seto-Uchi.

12. SYRNOLA BUXEA, Gould.

Obeliscus buxus, Gld. Otia Conch. p. 147.

Hab. Takano-Sima.

13. SYRNOLA LACTEA, A. Ad.

S. testa pyramidato-subulata, lactea, solida, nitida, lævi; anfractibus normalibus 8, planis, suturis exaratis, anfractu ultimo ad peripheriam subangulato; apertura subquadrata; labio brevi; plica parietali valida, transversa; labro margine in medio obtuse angulato.

Hab. O-Sima.

A solid, milk-white, shining species, with the sutures exarate, and the last whorl angulate at the periphery.

14. SYRNOLA SEROTINA, A. Ad.

S. testa subulata, vertice subattenuato, serotina, lævi, nitida; anfractibus normalibus 7, planis, linea rufa ad suturas ornatis, ultimo in medio linea rufa transversa circumcincto; apertura ovata; labio tenui, rectiusculo, albido, plica parietali postica obliqua; labro margine albido.

Hab. Takano-Sima.

A small, light orange-coloured species, with the columella and the margin of the outer lip whitish.

15. SYRNOLA SUBULINA, A. Ad.

S. testa aciculato-subulina, alba, linea rufo-fusca transversa ad suturas ornata; anfractibus normalibus 9, planatis, ultimo ad peripheriam angulato et linea rufo-fusca succincto; apertura subquadrata, antice subeffusa; plica parietali spirali, postica; labro margine in medio obtuse angulato.

Hab. Takano-Sima.

Somewhat resembling *S. cinctella*, but more subulate and slender, and angulate at the base.

16. SYRNOLA PISTILLUM, A. Ad.

S. testa subulata, solida, opaca, lactea, nitida, vertice obtusiusculo; anfractibus normalibus 9, planatis, sublente transversim tenuissime striatis; apertura elongato-ovata; labio arcuato, plica parietali obliqua.

Hab. Yobuko.

A small, pestle-shaped, solid, milk-white species, with the whorls very finely transversely striated.

17. SYRNOLA CYLINDRELLA, A. Ad.

S. testa cylindræa, in medio tumidula, cerina, linea angusta transversa rufa ad suturas ornata; anfractibus normalibus 9, convexis, ultimo in medio linea rufa circumcincto; apertura subquadrata; labio brevi, plica parietali spirali valida; labro margine rectiusculo.

Hab. Takano-Siam.

A nearly cylindrical species, with the whorls but very slightly enlarged in the middle.

18. SYRNOLA COLUMNELLA, A. Ad.

S. testa subcylindraceo-subulata, cerina, linea rufa spirali ad suturas ornata; anfractibus normalibus 11, convexis, ultimo linea rufa transversa succincto; apertura subquadrata, antice vix effusa; plica parietali valida, postica.

Hab. Seto-Uchi; Mososeki.

This is an elongated subcylindrical columellar species, with numerous convex whorls, and is of much larger dimensions than *S. cylindrella*.

19. SYRNOLA DÆDALA, A. Ad.

S. testa subulata, in medio tumidula, lactea, nitida, linea pallida fulva transversa ornata; anfractibus normalibus 7, planis, longitudinaliter substriatis, intus liris, anfractu ultimo elongato ad basin rotundato; apertura oblonga; plica parietali postica, obliqua; labro margine arcuato.

Hab. Uraga.

A somewhat pupiform milk-white species, obscurely banded with pale fulvous.

Genus STYLOPTYGMA, A. Ad.

Testa utrinque constricta, pupiformis, elongata, anfractibus varie sculptis, plerumque lævibus.

In this division I have grouped together all the Japanese species of *Syrnola* which assume a pupoid form or *Clausilia*-like aspect. I originally founded the group on *Monoptygma stylinum*, A. Ad. (Proc. Zool. Soc. 1851, p. 224); but a more extensive knowledge has enabled me to modify somewhat the original diagnosis so as to include a wider range of species.

1. STYLOPTYGMA PUPIFORME, A. Ad.

Rissoa (Goniostoma) pupiformis, A. Ad., Annals, 1860, v. 411.

Hab. Mino-Sima.

2. STYLOPTYGMA TÆNIATUM, A. Ad.

S. testa elongata, clausiliiformi, in medio tumida, tenui aut epidermide subfusca fugacea obtecta, zonulis rufis transversis ornata; anfractibus normalibus 7, planatis, longitudinaliter strigulatis, suturis profundis; apertura ovata, antice dilatata; labio incrassato, antice subplanato, plica parietali obliqua; labro intus simplici.

Hab. Takano-Sima.

A very delicate and prettily banded species, of *Clausilia* shape, and with the whorls longitudinally strigose or strigulate.

3. STYLOPTYGMA LENDIX, A. Ad.

S. testa elongata, pupiformi, in medio tumida, tenui, semioպaca, lactea, polita, nitida; anfractibus normalibus 7, planis, intus transversim liratis, obsolete longitudinaliter striatis; apertura ovata, antice dilatata et eversa; plica parietali obliqua, valida.

Hab. Yobuko.

A polished white larviform species, with the transverse internal grooves visible through the semioպaque substance of the whorls.

4. STYLOPTYGMA GIBBUM, A. Ad.

S. testa elongato-ovata, brevicula, pupiformi, utrinque constricta, solidiuscula, vitrea, lævi, semipellucida, alba; anfractibus normalibus 5, subconvexis, penultimo gibboso; apertura obliqua, semioպata; plica parietali parva, obliqua.

Hab. O-Sima; Tanabe.

This is a very peculiar smooth vitreous species, with the penultimate whorl gibbous: it is pellucid only when in a fresh condition; dead or worn specimens are opaque and dull.

5. STYLOPTYGMA CEREUM, A. Ad.

S. testa elongata, pupiformi, in medio tumida, solidiuscula, cerea; anfractibus normalibus 6, planatis, suturis obliquis impressis; apertura elongato-ovalis, antice dilatata; labio calloso, incrassato; plica parietali obliqua, inconspicua.

Hab. Takano-Sima.

A wax-like pupoid species, with the inner lip thickened and callosous, and the parietal plica obsolete.

6. STYLOPTYGMA LARVULA, A. Ad.

S. testa gracili, teretiuscula, in medio tumidula, solida, opaca, lactea, polita; anfractibus normalibus 8, planis, suturis impressis; apertura parva, ovata; plica parietali valida, transversa; labro intus lirato.

Hab. O-Sima.

A solid, milk-white, polished species, with transverse internal liræ showing through the substance of the whorls. Its specific name is derived from its somewhat resembling a meal-worm.

7. STYLOPTYGMA SUBULIFORME, A. Ad.

S. testa aciculato-subulata, alba, tenui, longitudinaliter substriata; anfractibus normalibus 11, planis, ad suturas concinne crenulatis; suturis obliquis, valde impressis; apertura subquadrata; labio plica parva, obliqua; labro dilatato, margine flexuoso.

Hab. Tsu-Sima, 30 fathoms.

A subulate slender species, more nearly approaching the type-species than any other; the whorls are crenulated at the sutures, and the outer lip is dilated and flexuous at the margin.

Genus ELUSA, A. Ad.

Testa subulata, turrita; anfractibus longitudinaliter plicatis. Apertura ovata, labio plica unica instructo, labro sæpe intus lirato.

1. ELUSA TERES, A. Ad. Annals, 1861, vii. 297.

Hab. Hulu-Shan Bay; Gulf of Lian-Tung.

2. ELUSA GRACILIS, A. Ad.

Pyramidella gracilis, A. Ad., Sow. Thes. Mon. Pyram. pl. 172. f. 14, 15.

Hab. Yobuko.

3. ELUSA SUBULATA, A. Ad.

Pyramidella subulata, A. Ad., Sow. Thes. Mon. Pyram. pl. 172. f. 13.

Hab. O-Sima, 26 fathoms.

4. ELUSA CASTANEA, A. Ad.

E. testa tenui, subulato-turrita, castanea, nitida; anfractibus normalibus 10, planatis, intus transversim liratis, supremis longitudinaliter plicatis, inferioribus lævibus; apertura subquadrata; labio rectiusculo, plica parietali postica subcelata; labro intus lirato, margine tenui.

Hab. O-Sima.

This is a deep-chestnut-coloured, semiplicate species, with the internal grooves showing through the substance of the shell.

5. ELUSA BADIA, A. Ad.

E. testa subulata, solida, rufo-fusca aut badia, nitida; anfractibus normalibus 12, planis, intus transversim sulcatis, anfractibus supremis longitudinaliter plicatis, inferioribus lævibus; apertura subquadrata; labio plica parietali tortuosa, mediana; labro intus sulcato.

Hab. Takano-Sima.

A solid, subulate, brown or reddish-brown species, with a strong transverse spiral plica.

6. ELUSA STRIGULATA, A. Ad.

E. testa subulata, solida, sordide alba, zonula rufa transversa ad suturas ornata; anfractibus normalibus 9, planatis, longitudinaliter strigulatis, anfractu ultimo linea rufa in medio cincto, apertura quadrato-ovata; labio brevi, plica parietali valida transversa; labro intus sulcato.

Hab. Yobuko.

This species is well marked by its peculiar strigulate whorls, and the rufous zone which encircles them.

7. ELUSA CINNAMOMEA, A. Ad.

E. testa subulata, cinnamomea; anfractibus normalibus 8, plana-

tis, longitudinaliter obsolete strigosis; apertura elongato-ovata, antice dilatata; labio subincrassato, plica parietali vix obsoleta; labro margine rectiusculo.

Hab. O-Sima.

A subulate, cinnamon-coloured species, with the whorls somewhat indistinctly strigose or strigulate, and with the columellar fold nearly obsolete.

7. SPECIES NONNULLÆ BURSARUM VEL RANELLARUM COLLEC-
TIONIS CUMINGIANÆ. DESCRIPTÆ A GULIELMO DUNKER.

1. BURSA ASPERRIMA, Dkr.

Testa ovata, crassa, vix depressa, alba, maculis punctisque fuscis conspersa, anfractibus septenis convexis, angulatis, granosis et nodiferis instructa; anfractus ultimus spira vix duplo major, costis transversis majoribus nodiferis et rugoso-granosis necnon pluribus minoribus quasi margaritifervis cinctus; varices recti crassi, distantes; columella fortiter rugoso-plicata, valde sinuata; canalis curvus, paullo adscendens; labrum dentatum et plicatum, expansum; apertura parva subrotunda, superne canali brevi profundo terminata.

Altit. 40, *latit.* 30 mm.

Hab. China.

Hæc species magnitudine ad *Bursam cruentatam* Sow. prope accedens, superficie sua rugosissima excellit. Anfractus ultimus costis duabus crassis nodosis ac rugiferis, inferiore paullo angustiore, instructus est; costæ quæ sequuntur minores, ex parte moniliformes.

2. BURSA GRAYANA, Dkr.

Testa ovata, solida, alba vel gilva, maculis fuscis irregularibus parvis variegata, anfractibus senis, convexis, angulatis, prope suturam corrugatis, undique granosis, rugiferis transversimque costatis instructa; anfractus ultimus interdum gibbosus, $\frac{3}{5}$ totius longitudinis adæquans, costis majoribus tribus nodiferis subcompressis et nonnullis minoribus cinctus; varices crassi, vix obliqui; columella valde sinuata, rugoso-plicata; canalis brevis, curvus; labrum incrassatum, dentatum; apertura ovata, superne canali profundo, quasi fistulato, terminata.

Altit. 29, *latit.* 22 mm.

Hab. Mare Erythræum.

Hæc cochleola undique rugosa, granosa, et tuberosa, plerumque costis tribus crassioribus cincta, ad eas *Bursarum* species pertinet, quæ in superiore peristomatis parte canali fistulato gaudent, qui et in anfractibus superioribus observatur.

3. BURSA CUMINGIANA, Dkr.

Testa ovata, subdepressa, solidiuscula, pallide fusca, albida lividogue variegata, apicem versus rubida, anfractibus septenis con-

vevis instructa; anfractus ultimus spira duplo fere longior, nodorum grandium seriebus duabus necnon granorum minorum seriebus senis cinctus; nodi majores verrucosi, minores irregulares; varices crassi, undique graniferi; columella rugosoplicata, alba; apertura ovata, superne sinuata et canaliculata; labrum album, incrassatum, dentatum; canalis brevis, profundus, subobliquus.

Altit. 47, latit. 32 mm.

Hab. Nova Caledonia.

Species nostra *Bursæ affini* Brod. similis, nodorum grandium verrucosorum seriebus duabus cingulisque senis granorum minorum insignis est. Varices crassi ut solent laterales.

4. BURSA TUMIDA, Dkr.

Testa ovata, subconica, tumida, vix depressa; anfractus 7, valde convexi, ultimus costulis lineisque elevatis densissimis acutis, sub vitro undulatis, undique cinctus, fasciis angustis castaneis æquidistantibus lineisque flavidis elegantissime pictus; fasciæ anfractuum superiorum undulato-nodiferæ; varices superiores appressi, haud regulares, penultimus paullo distans; apertura ovata; columella media lævigata, superne tuberculo crasso plicato, inferne rugis nonnullis signata; labrum paullo incrassatum, intus plicato-dentatum; fauces lævissimæ, lacteæ.

Altit. 93, latit. 56 mm.

Hab. Nova Seelandia.

Hæc species insignis *Bursæ zelebori* Dkr. (ex Novara exp.) respectu habito sculpturæ tam affinis est, quæ pro varietate tantum haberi possit. Cum vero specimen quod exstat unicum collectionis Cumingianæ testa tenuiore, levio, valde inflata necnon spira multo breviori mirum in modum differat, adhuc secernendum esse putavimus, donec formæ intermediæ inveniantur.

5. BURSA FUSCO-COSTATA, Dkr.

Testa parva, ovata, subdepressa, flavida, transversim denseque striata, costis longitudinalibus tuberosis fuscis ornata; anfractus ultimus spira pæne duplo major; canalis angustus, fere rectus; columella plicata; labrum incrassatum, intus sulcatum; fauces albæ.

Altit. 22, latit. 14 mm.

Hab. California.

Species elegans *Bursæ bituberculari* Lam. haud dissimilis, habitu minore, costis tuberosis longitudinalibus fuscis, varicibus vix obliquis aliisque notis bene differt.

6. BURSA CONCINNA, Dkr.

Testa ovato-conica, colore pallide fusco vel livido subroseo tincta; anfractus 8-9, modice convexi, sutura distincta sejuncti, serialim granosi et striati, ultimus seriebus granorum 7 cinctus, quarta serie alba; varices subobliqui, albi, luteo maculati;

canalis brevis, recurvus; apertura parva; labrum album, incrassatum, denticulis septenis munitum; columella subrugosa.

Altit. 22, latit. 14 mm.

Hab. Mare Erythræum.

Hæc species parva concinna *Ranellam roseam* ex Philippinis insulis in mentem vocat, quæ vero colore coccineo in ruborem roseum transeunte, anfractibus superne angulatis necnon sculptura crassiore satis superque differt.

7. BURSA LAMELLOSA, Dkr.

Testa parvula, angusta, sublanceolata, alba, nitida, anfractibus septenis modice accrescentibus, transversim granoso-striatis, sutura profunda divisim lamellis que erectis instructa; columella lævigata; canalis brevis, recurvus; apertura parva, ovalis.

Altit. 15, latit. vix 6 mm.

Hab. Japonia.

Hæc species parvula et singularis varicibus quinque erectis lamelliformibus in suturis conjunctis insignis est. Spira ultimo anfractu duplo longior est.

8. DESCRIPTION OF A NEW GENUS OF MARINE SHELLS FROM THE SANDWICH ISLANDS. BY W. HARPER PEASE.

Fam. PEDICULARIIDÆ.

Genus DENTIORA, Pease.

T. ovata, labro subinflexo, plano, lirato, posteriore, vix expanso; columella plana vel excavata, intus compressa, dentata.

DENTIORA RUBIDA, Pease.

T. ovata, subpyriformis, omnino rubida, transversim elevatim striata, longitudinaliter irregulariter striata; labro lirato, liris parvis, paucis; columella vix excavata, externe lirata, intus compressa, dentibus acutis armata; spira vix exserta.

Shell ovate or subpyriform, transversely elevately striated; striæ obsolete granulose by irregular fine longitudinal striæ; ridges on outer lip few and small; columella slightly excavated, ridged above, compressed below, and sharply dentate. Colour wholly light red.

Length $3\frac{1}{2}$, breadth 2 mill.

9. DESCRIPTION OF NEW SPECIES OF MARINE SHELLS FROM THE PACIFIC ISLANDS. BY W. HARPER PEASE.

LATIRUS SQUAMOSUS.

T. fusiformis, turrata, longitudinaliter costata; costis 7-8, transversim lirata, liris subdistantibus, costis supra nodosis, interstitiis transversim, et longitudinaliter subtilissime striatis,

minute et irregulariter squamatis: anfr. convexis, ad suturas squamis prominentibus erectis ordinatim ornatis: anfractu ultimo parte inferiore basin versus contracto: rufescenti-fusca, liris transversis super costas lutescenti-fuscis, squamis albis: apertura alba.

Shell fusiform, turreted; body-whorl somewhat ventricose, longitudinally ribbed; ribs seven or eight, transversely ridged; ridges somewhat distant, becoming nodulous on the longitudinal ribs; interspaces finely ribbed, transversely and very finely striated longitudinally, squamate, more particularly at the base of the body-whorl. Whorls ornamented at the sutures with a row of prominent, erect, squamate scales or spines; lower part of last whorl contracted towards the base. Colour reddish brown; nodulous portion of the transverse ridges yellowish white; scales and spines white; aperture white.

Length 45, breadth 20 mill.

PISANIA STRIGATA.

T. elongata, transversim costata; costis planiusculis, superne subangulatis, transversim interdum striatis; striis irregularibus, elevatis: anfr. 7-8, convexis, anfractu ultimo prope labrum incrassato: labro crenato, canali brevi: apertura longitudinis dimidium testæ haud æquans: castaneo-fusco et albo maculata et fasciata, apertura alba.

Shell elongate, transversely ribbed; ribs depressed, regular, plane and somewhat angulated at their upper edge, and sometimes marked transversely with a few elevated striæ or fine ribs. Whorls seven or eight, convex; the last with a prominent varix near the edge of the outer lip; edge of lip crenate; canal short, slightly twisted; aperture less than one-half the length of the shell. Mottled and banded with dark chestnut-brown and white; grooves between the ribs dark brown; aperture white.

Length 37, breadth 15 mill.

AMPHIPERAS SEMISTRIATA.

T. ovata, subgibbosa, extus intusque candida, nitida, transversim striata; striis undulatis, ad dorso evanidis; labro lirato, liris parvis; columella rotundato-convexa: apertura flexuosa, canali brevi.

Shell ovate, somewhat gibbous, white, shining, transversely striated; striæ undulated and obsolete on the back, somewhat roughened longitudinally by fine irregular striæ; ridges on outer lip small; inner lip roundly convex on base; right margin slightly thickened; aperture flexuous, canal very short.

Length $12\frac{1}{2}$, breadth $7\frac{1}{2}$ mill.

EMARGINULA CLATHRATA.

T. ovata, alba, costis concentricis et radiantibus clathrata, interstitiis profundis; apice antico; labro crenato.

Shell ovate, white, depressedly convex, clathrated by concentric and radiating ribs; interstices deeply pitted; apex anterior, lip crenated and lirate within on its edge.

Length $8\frac{1}{2}$, breadth 6 mill.

CYTHARA STRIGATA.

T. oblongo-ovata, alba, nitida, longitudinaliter costata; costis 8, subdistantibus, transversim elevatim striatis, interstitiis transversim subtilissimè striatis: apertura longitudinis testæ dimidium haud æquans.

Shell oblong-ovate, white, shining, longitudinally ribbed; ribs about eight, rather remote, transversely elevately striated or ridged; interstices very finely striated transversely; aperture rather less than half the length of the shell.

Length 7, breadth $2\frac{1}{2}$ mill.

CLATHURELLA MACULOSA.

T. oblongo-ovata, alba, nitida, castaneo-fusco sparsim maculata, longitudinaliter costata, transversim elevatim striata; anfr. convexis: apertura longitudinis testæ dimidium haud æquans.

Shell oblong-ovate, white, shining, sparsely blotched with dark chestnut-brown, longitudinally ribbed, transversely elevately striated. Whorls convex; aperture less than one-half the length of the shell.

Length $6\frac{1}{2}$, breadth $2\frac{1}{2}$ mill.

LAIMODONTA CONICA.

T. ovato-conica, spira acuta, transversim striata, obsolete granulosa, plicis prominentibus; anfr. 5, plano-convexis: castaneo-fusca, fasciis pallidis cingulata.

Shell ovato-conical, spire acute, striated transversely, obsoletely granulose by irregular longitudinal lines; plaits on inner lip and columella-fold at base prominent; whorls five, plano-convex. Colour dark chestnut-brown, encircled with one or two bands of a lighter colour.

Length $4\frac{1}{2}$, breadth $2\frac{1}{2}$ mill.

RISSOINA SEMPLICATA.

T. subulata, polita, nitida, subpellucida, alba; anfr. 6, plano-convexis; spira obsolete longitudinaliter plicata: apertura ovata, antice obsolete canaliculata.

Shell subulate, white, shining, subpellucid, polished; whorls six, plano-convex; spire longitudinally and somewhat obsoletely plicated; aperture ovate, basal canal very slight.

Length $3\frac{1}{2}$, breadth $1\frac{1}{2}$ mill.

EULIMA EXILIS.

T. exiliter subulata, elongata, alba, polita, recta; anfr. numerosis, planis, sutura vix impressa: apertura parva, acuto-ovata, columella subcallosa.

Shell slenderly subulate, elongate, white, polished, straight; whorls numerous, plane, suture very faintly impressed; aperture small, acutely ovate; columella slightly callous.

Length 11, width $2\frac{1}{2}$ mill.

ENGINA TUBERCULOSA.

T. fusiformis, utrinque attenuata; spira subacuminata, acuta, longitudinaliter tuberculato-costata; transversim lirata, iris superne nodosis, interstitiis subtilissime striatis, nigra; anfractu ultimo albo fasciato; apice albido; columella postice corrugata, denticulis parvis: apertura alba, longitudinis testæ dimidium haud æquans.

Shell fusiform, attenuated at both ends, spire somewhat acuminate, acute; longitudinally tuberculately ribbed, transversely ridged, ridges forming tubercles or nodules on the longitudinal ribs. Interstices very finely striated; aperture less than one-half the length of the shell; columella-lip corrugate or plicate posteriorly; teeth small. Colour black, last whorl encircled with a white band; aperture and apex white.

Length 9, width 4 mill.

The smallest species of the genus with which we are acquainted. We give the size of a large specimen. We have received it from several localities, and find it constant in shape and sculpture. The painting varies, the lower part of the last whorl and the spire being more or less spotted with white in some specimens.

EUCHELUS MACULOSUS.

T. parva, conico-globosa, umbilicata, nitida, tenui, concentricè irregulariter costata, longitudinaliter subtilissime striata: alba, costellis maculis rubris subdistantibus maculatis.

Shell small, umbilicate, somewhat conically globose, rather thin, shining, concentrically irregularly ribbed, longitudinally very finely striated. Colour white; transverse ribs spotted somewhat remotely with red.

Breadth 2, height $1\frac{1}{2}$ mill.

10. DESCRIPTIONS OF NEW SPECIES OF SHELLS FROM THE PACIFIC ISLANDS. BY W. HARPER PEASE.

CLATHURELLA BICARINATA.

Shell turreted, white, decussated throughout with longitudinal and transverse raised striæ. Whorls six, the last ornamented by two very prominent keels; the interstices plane; angulated at the suture; Upper whorls carinate at their centre and angulated at the suture, furnished with a single prominent keel; sutures deep, sinus in the form of a narrow slit, terminating in a round aperture. Aperture less than one-half the length of the shell; canal short, broad, slightly recurved.

Hab. Kingsmill Islands.

The only species with which this can be compared is the *P. tricarinata*, Val. They agree in the peculiar form of the sinus, and differ in that respect from all other species of the family. Our species is, however, more slender, and bears a less number of keels.

MARGINELLA CYLINDRICA.

Shell cylindrical, smooth, polished, white; last whorl ornamented on the back with broad yellowish bands, a spot of darker colour at the base. Aperture linear; outer lip simple, slightly expanded at the base, and spreading a short distance over the spire, at its junction posteriorly, by a callosity; inner lip four-plaited at the base.

Hab. Kingsmill Islands.

COLUMBELLA PUSILLA.

Shell small, fusiform, smooth, transversely striated at the base. Whorls seven, slightly convex; aperture oblong; canal rather wide, and slightly recurved; outer lip thin, thickened externally, denticulate within, and sinuated near its junction posteriorly; inner lip plicately thickened. Colour light fulvous or white, with irregular longitudinal, somewhat reticulated, chestnut-brown lines. At the upper part of the whorls, lines much less distinct and smaller; last whorl encircled by a narrow white band.

Hab. Kingsmill Islands.

SISTRUM AFFINE.

Shell ovate, thick, stout, longitudinally and transversely ribbed, interstices deeply excavated; longitudinal ribs rather broad, obtusely noded, nodules oblong; transverse ribs smaller, and striated transversely, interstices filled by two or three irregular-sized ribs or ridges. Aperture oblongo-ovate; folds on the inner lip faint. Colour black; transverse ribs white between the nodules; edge of lip and base black; columella purplish brown.

Hab. Kingsmill Islands.

The above species belongs to a group of which the *S. tuberculatum*, Blainv., may be considered the type. Our species, however, differs from that in being much more deeply engraved throughout, in the longitudinal ribs being more distinct, and the transverse striæ forming ribs or ridges.

AVICULA RADIATA.

Shell obliquely oblong, rather narrow, and somewhat curved, acuminately ridged, upper side angulate; posterior wing slender and elongate, of nearly the same length as the shell. Colour black, finely rayed with dark chestnut-brown, and covered with a brown, serrated, festooned epidermis.

Hab. Kingsmill Islands.

AVICULA BRUNNEA.

Shell oblique, rather oblong; posterior wing slender and elongate, finely striated concentrically, and somewhat obsoletely radiately

ribbed. Colour chestnut-brown, finely and irregularly rayed with lighter brown.

Hab. Sandwich Islands.

The above species was fished up from twenty fathoms, attached to coral. The only species of this form known to live at our islands.

11. DESCRIPTIONS OF TWO CORALS FROM MADEIRA, BELONGING TO THE GENERA PRIMNOA AND MOPSEA. BY JAMES YATE JOHNSON, COR. MEM. Z.S.

(Plate XXXI.)

Fam. GORGONIIDÆ, M.-Edw.

Subfam. GORGONIINÆ, M.-Edw.

Sect. PRIMNOACEÆ, M.-Edw.

PRIMNOA IMBRICATA, sp. n.

White, having a tendency to branch dichotomously in one plane; the branches slender, flexible, not plume-like, and not anastomosing. Axis pale brownish yellow, spineless, obscurely striated, effervescing in hydrochloric acid, coated with small white scales composed of carbonate of lime. Over the lower coating of scales there is another coating of larger scales, with a wide space between the two. The outer coat, which is easily removed, appears to be attached to the peduncles of the cells. These peduncles are in closely-set whorls of three or four, each of which expands into a cup-like cell, having its mouth closed in the dead coral with eight scales that have their apices in contact. The peduncles project at right angles from the stem, and are also clothed with scales.

This is a much more delicate form than *Primnoa lepadifera*, in which species the pedunculated cells appear to be arranged spirally on the branch.

Two specimens of this elegant *Primnoa* have been obtained, the larger of which has a height of $8\frac{1}{2}$ inches, with a width of 11 inches. It was attached to a piece of *Lophohelia (Oculina) prolifera*. The whorls of the pedunculated cells are about three-twentieths of an inch apart, and the peduncles about the same in height. The principal branch, near the base, has a diameter of one-fifth of an inch. The smaller example has been deposited in the British Museum.

Subfam. ISIDINÆ, M.-Edw.

MOPSEA ARBUSCULUM, sp. n.

The whole coral is coated with a thin brown skin. When this skin has been removed from the lower calcareous joints, they are found to be stony, white, subcylindrical, but rather narrower at the middle than at either end. They are finely striate longitudinally, and the striæ are parallel and straight. The interjoints do not

nearly equal the joints in length, being little more than discs, and are somewhat less in diameter. They are striate, and from them spring the branches. These branches are very numerous, diverging in all directions subdichotomously, and making a tolerably thick bush. They are much thinner than the main stem, and they become gradually more slender upwards, the calcareous joints at the same time becoming longer. Occasionally two of the ultimate branchlets come into contact and are soldered together. Each branchlet bears at its apex a cell of a shape between campanulate and infundibuliform, the margin of which bears eight pairs of long, upright, spine-like spicula. There are also sessile cells at the sides of the ultimate branchlets, one at each interjoint. All the cells are of a pale brown colour. The pellicle covering the branchlets contains long spicula, which are for the most part large and fusiform, whilst the smaller ones are cylindrical, and all are brown and minutely tuberculated.

A single example of this Coral was obtained from a fisherman at Cama de Lobos, Madeira, and it is now in the British Museum. Its length, without the base, which is wanting, is 13 inches, and it is 7 inches across. The lower part of the main stem has a diameter of three-tenths of an inch, and its calcareous joints are about three-eighths of an inch in length. The branches are broken away from this part of the stem; but there are remains to show that some of the interjoints bore four branches, others only one. A cell, with its marginal spines, measures the fifth of an inch.

This coral seems to be nearly related to *Mopsea dichotoma*; but M. Milne-Edwards gives the Indian Ocean (with a mark of doubt) as the habitat of that species. Strange to say, that writer, in his work on Corals ('Histoire Naturelle des Coralliaires,' forming one of the 'Nouvelles Suites à Buffon'), is altogether silent as to the cells of *Mopsea*. Lamouroux says that the polypi (? cells) of *M. dichotoma* are mammiform on the higher, tuberculous on the middle, and superficial on the lower branches. This would ill accord with the Madeiran specimen. Little agreement can be made out between that specimen and the figures of Esper, "Pflanzenhiere," Isis, pl. 5, figs. 1-5.

November 25, 1862.

E. W. H. Holdsworth, Esq., F.Z.S., in the Chair.

The following extracts were read from a letter addressed to the Secretary by Dr. G. Bennett, F.Z.S., dated Sydney.

"For the last six months I have been making every effort to procure specimens of the *Didunculus*, alive or dead. It has been reported (which I cannot credit) that they are nearly extinct; but if, as has been mentioned, the Samoan Islanders keep them as pets, as

is the case with the Mooruk among the natives of New Britain, I do not consider they can have become so scarce. We have not a single skin of this bird in the Australian Museum. The first time I sent for them the captain expected to call at the Navigators' Islands, but did not do so. Just previous to receiving your letter I was attending a young man in the office of a merchant who owns vessels trading to the islands; and as he is going for change of air as supercargo of a brig to visit the Samoan group about the end of August, I have furnished him with the description of the bird, and I will now give him your drawing. He will also procure me some Samoan Pigeons; and I hope that the brig will return, and, if successful, in sufficient time to send all the birds to you by the next voyage of the 'La Hogue.'

"I am happy to inform you that Mr. Hill has a pair of Brush-Turkeys (*Talegalla*), male and female, for Mr. A. Denison, for your Society. We have also a female; and as the Acclimatization Society have made arrangements with a collector (who proceeds next month to the northern districts) to procure for us several pairs of these birds to keep and breed, I will at the same time secure another pair in case of your requiring another male bird. I propose sending them to London in pairs, as most birds like society and are more likely to survive the voyage when in pairs.

"I will now give you some notes on birds which may be of interest to you. I have just received by Capt. McLeod a rough-dried specimen of a *Megapodius*, found abundantly over the New Hebrides and other groups of islands of the Southern Pacific. My specimen was procured from the island of Nua Fou, where it is named 'Mallow' by the natives. It accords with the description of *M. freycineti*. The bird measures 14 inches from the tip of the beak to the end of the tail; the plumage is of an uniform blackish-brown colour, the mandibles, feet, and legs yellow. At Tanna they gave it the English name of 'Bush Fowl;' at Sandwich Island it was named Tarboosh. At the island of Nua Fou, Capt. McLeod says the bird lives in the scrubs in the centre of the island, about a large lagoon of brackish water, which has the appearance of an extinct crater; the birds lay their eggs on one side only of this lagoon, where the soil is composed of a sulphur-looking sand; the eggs are deposited from 1 to 2 feet beneath the surface. The locality frequented by these birds is, at this island, under the protection of the king or chief, and by his permission only can the birds or eggs be procured. The number of eggs deposited in the mounds varies, as the eggs are laid by different birds in succession; but as many as forty eggs are said to have been procured from one mound. At the other islands the birds visit the sandy beaches in retired localities near the sea about the months of September and October, and deposit their eggs in mounds of sand a short distance one from the other. Thus this bird has the habits of the Freshwater Tortoises, which scoop a pit in the sand near a river, deposit their eggs, and cover them up; when hatched, the young force their way out of the sand, and, guided by their instinct, make for the river. Mr. Dawson, who procured living birds from the Island of

Sava or Russell Island, which unfortunately died on the passage to Sydney, informs me that the female lays daily from two to four eggs, and that the female on board laid two eggs daily until the time of her death. The natives of the various islands inhabited by these birds collect these eggs for sale (for they are richer and more delicious than those of the fowl), in baskets of two dozen each. The eggs are sometimes found fresh and good when opened, whilst others contain partially-formed young in different stages, even to the full-fledged bird just ready to emerge from the shell into active life. This might be expected, considering the irregular intervals of time the eggs are laid. The eggs I have vary slightly in size, but are usually of a pale brownish-red colour, and measure, for the most part, 3 inches in length and $1\frac{3}{4}$ inch in breadth.

“Our pair of Mooruks are thriving well in the Botanic Gardens : we have placed them in a large grassed enclosure, 117 feet in length and 45 feet broad, interspersed with a few trees and a small circular pond of water about 2 feet deep, where they are very fond of bathing. There is a thatched shed in the centre for further shelter, if required ; and the whole is surrounded by a wire fence, 5 feet high. In this enclosure with the Mooruks are two native companions, an Emu and a sedate Jabiru. The latter is a very solitary, timid bird, always seen by himself. He moves with stately strides, and, if pursued, runs with great rapidity. When the Mooruks first arrived, they were placed with the Water-fowl, in an enclosure where there was a deep tank of water ; they are very fond of bathing (which, I also observe, obtains with the Emu), and one of them leaped, as usual, into the water ; but the sides being perpendicular and made of cut stone, it could not get readily out of it. Finding itself getting exhausted, it struggled against the edge of the tank, cut its face and severely injured the throat, laying open the pharynx, through the gaping wound of which the food passed ; this was stitched, and the bird soon got quite well. From the birds being nearly drowned several times, they were removed to the enclosure before mentioned, with a more shallow pond of water. Mr. Dawson (who has just returned from New Britain) brought another young bird, but, from some cause or other, it died a few days after its arrival. It is now in the Australian Museum. He says the natives pronounce the name of this bird as if written ‘Moorup.’ Fifteen eggs, brought by Mr. Dawson, that I have examined (of which he gave me two, and also a pair for the Australian Museum) differ considerably in size and colour. They have all been exposed more or less to the influence of heat and various atmospheric influences ; so that none are seen of the beautiful grass-green colour of the recently-laid eggs in the Zoological Gardens in the Regent’s Park. One was a small abortive egg, barely one-half of the natural size, but with similar markings. The birds are brought off for sale by the natives in every stage of growth, from the young chick to the full-grown bird, with its dark plumage, purple neck, and trilobed crest. The medium of purchase is pipes and tobacco.”

The following letter, addressed by Dr. Bennett to the 'Sydney Herald' of September 3rd, 1862, was also read to the meeting:—

“ Since the publication of my observations on the Toothed-billed Pigeon (*Didunculus strigirostris*) in the 'Sydney Herald' of August 19th, 1862, I have received a communication from the secretary of the Acclimatization Society of Victoria, enclosing some valuable notes given to them, respecting this rare and extraordinary bird, by the Rev. John B. Stair, of Broadmeadows, Victoria, who was formerly resident for some time at the Samoan or Navigator group of islands, considered the exclusive habitat of this singular bird. I have now selected those portions relating to the bird which are either new to science or will more fully add to its history, and complete, as far as possible, our knowledge of this nearly extinct bird. Mr. Stair says he has seen the *Didunculus*, and that it is named by the natives Manu Mea, or red bird, from the most predominant colour of its plumage being chocolate-red. It was formerly found in great numbers; and this assertion may excite some surprise that this remarkable form of bird should not have been seen and procured by the early navigators. Now, Mr. Stair observes, as I have for some time suspected, the bird is nearly, if not entirely, extinct. It feeds on plantains, and is partial to the fruit of the 'soi,' a species of *Dioscorea* or yam, a twining plant found abundant among the islands, and producing a fruit resembling a small potatoe. The habits of this bird, Mr. Stair observes, are exceedingly shy and timid. Like the Ground-Pigeons, it roosts on bushes or stumps of trees, and feeds on the ground. It also builds its nest in such situations. During the breeding-season both parents aid in the duty of incubation, and relieve each other with great regularity; and so intent are they when sitting on the eggs as to be easily captured. It was in this way two living specimens were obtained for Mr. Stair. They are also captured by the natives with bird-lime or springs, and shot with arrows—the sportsman concealing himself near an open space in which some quantity of the 'soi,' their favourite food, has been placed.

“ The first living bird obtained was accidentally killed; the second, when placed in confinement, at first became sullen and refused food, but soon became reconciled to captivity, and thrived well. The natives fed it upon boiled taro (the root of the *Caladium esculentum*) rolled into oblong pellets, in the same manner as they feed their pet Wood-Pigeons and Doves. On the departure of a friend for Sydney in 1843, Mr. Stair availed himself of the opportunity of sending the bird here, for the purpose of ascertaining if it was known, and, if so, with what genus it was to be classed, and whether it was a new species. Some natives on board the vessel paid great attention to it, and fed it carefully during the voyage, and it reached Sydney alive. His friend informed him that he could obtain no information respecting the bird, whether it was a new species or otherwise, but left it with some bird-stuffer; and Mr. Stair heard nothing more respecting it until his return to England in 1847 or 1848, when he mentioned the subject to Mr. G. R. Gray of the British Museum, who showed him a

drawing of the bird, and told him the subsequent history of the specimen he sent to Sydney.

“The power of wing of most of the pigeon tribe is very great, and it also obtains in this bird. It flies through the air with a loud noise, like our Top-knot Pigeon (*Lopholamius antarcticus*), found in the Illawarra district, and many other of our Australian Pigeons; and Mr. Stair describes it when rising as making so great a noise with its wings, that, when heard at a distance, it resembles a rumbling of distant thunder, for which it may be mistaken. Mr. Stair concludes his remarks by observing that, when on the eve of departing for England in 1845, although he made every effort to procure more specimens of the bird, and offered what was then considered large rewards, he could not succeed in obtaining any more specimens. He considers they may perhaps yet be found at Savaii, the largest and most mountainous island of the group; but he does not think they at present exist on the island of Upolu.”

A communication was also read from Sir Robert Schomburgk, H.M. Consul-General for Siam, dated Bangkok, August 15th, stating that a male of the splendid Pheasant *Diardigallus crawfurdi* was still alive in his possession, and in excellent health; and giving the following description of the female bird, of which he also sent a Chinese drawing and some feathers:—

“Cere oblong, of a bright-red colour, such as it is in the male, set with short hair-like feathers of a blackish colour, disposed in rows following the cere in its outline; eye black, with a golden-coloured iris; bill horn-coloured. The crown of the head, and the short feathers under the chin, of a slate-colour, but otherwise a reddish brown is the prevailing colour; of such a tint is likewise the mantle, only somewhat darker, and the feathers are speckled with black; those of the throat and breast are lighter in tint, and frequently margined at their ends with white to the extent of 2 lines.

“Primaries and scapulars of a dark slate-colour, almost black, barred transversely at intervals with bands of white speckled with black. These bars do not possess regular outlines. The large or middle tail-feathers are marked in a similar manner; the lower or side tail-feathers are of a reddish brown.

“The thighs are clothed with dark-brown feathers; below the knee the feet are naked and of a bright red colour, similar to the cere. There is no trace of spurs upon the leg.

“I give the measurements taken from what I believe to be the oldest of the two hens in my possession:—

	ft.	in.	tenths.
Length from tip of bill to end of middle tail-feather	1	6	0
Height	0	10	5
Length of tail	0	9	0
— of legs	0	7	4
— from the foot or tarsus to thigh	0	4	0

	ft.	in.	tenths.
Length of foot from the tip of the middle claw to that of the hind toe	0	3	5
— of the large or middle toe	0	2	0
— of wing from shoulder to end of largest primary quill	0	10	0
Depth of wing	0	4	2
Circumference over the crown of the head and round the region of the eyes	0	5	0
Length of cere	0	2	0
Depth	0	1	0
Length of bill	0	1	2"

Sir Robert Schomburgk added that Crawford's drawing of the male bird alluded to by Mr. Gould in his account of this bird in the 'Birds of Asia,' "although stiff, was otherwise good," and that the habitat of this Pheasant was now fully ascertained to be the Shan States to the east of Kieng-mai, at Muang Nan, Muang Phi, &c.

The following letter, addressed to the Secretary by Dr. J. Shortt, F.Z.S., dated Chingleput, 9th August, 1862, was read to the meeting:—

"SIR,—I have much pleasure in sending you a short account of the Viper *Daboia elegans* (*Vipera russellii*)—the Tamil name being 'Kunuadi Vyrien,' or 'Kuturee Pamhoo.'

"Since sending you the skin, with skull entire, I have succeeded in procuring several specimens, alive and dead, both here and on the Shervaroy Hills, during a recent stay there of two months. The largest specimen in my collection at present measures 5 feet in length, and 7 inches in circumference at the thickest part of its body. Its head is large, elongate, depressed, rounded on the sides, and covered with acutely and regularly-keeled scales; nostrils large, subsuperior, anterior, and in the centre of a ring-like shield, edged with a large scale above; eyes convex, pupil round; nasal shield smooth in front; superciliary shield narrow, elongate, and distinct in front; jaws weak, upper toothless, with large, slightly curved, double fangs; lower jaw toothed; tongue long and forked: colour brown, with three rows of oblong (in the young, circular or oval) white-edged brown spots; two brown spots on each side of the occiput, separated by a narrow, oblique, yellow temporal streak. Scuta 168, subcaudals 52.

"From the three rows of white-edged spots being linked to each other, it is commonly called the Chain Viper. The Tamil name of 'Kunuadi Vyrien' literally means Glass Viper; that of 'Kuturee Pamhoo,' Scissors Snake. This name it receives from having double fangs, which are invariably present, of equal length, if not on both, on one side at least: these the natives of Southern India fancy resemble a pair of scissors.

"It is very common in these parts, and also at an elevation of 4800 feet above the sea (Shervaroy Hills): at the latter place I procured two specimens; the largest measured $4\frac{1}{2}$, and the other,

which was young, was 1 foot in length. These reptiles are generally found under stones and in rocky places; frequently in the low country it is found in prickly-pear bushes (*Opuntia vulgaris*).

“In their habits they are extremely active for their size, and live on frogs, mice, birds, &c. On opening the Viper I procured on the Shervaroy Hills, I removed from its inside a *Mynah* (Indian Grackle), from a second in this place a field-rat, and from a third an immense toad was taken. These Vipers are readily killed by the slightest blow; on one occasion I had one caught alive by fixing a noose round its body, but raising it from the ground and suspending it by the noose for a few seconds killed it.

“The natives dread these snakes greatly, as their bite is said to prove rapidly fatal. Although they are common in this district, I have not heard of an instance of this occurring during a residence of five years at this place. Dr. A. Hunter, of our service, tells me that when he was Zillah Surgeon here, some years ago, a sepoy was bitten by one, and that the man's life was saved by his sucking out the wound. During my stay on the Shervaroy, the first specimen that was brought to me was immediately recognized by my friend B. A. Daly, Esq., a coffee-planter, who related the following circumstance that occurred to him a few years ago. Mr. Daly was out shooting with a few dogs (mongrel spaniels), when he came upon one of these Vipers, and the dogs having attacked the snake before he could kill it, three were bitten, one after the other; the first died almost instantly, the second in about two hours after, whilst it was being carried home, and the third lingered for nearly three months from emaciation, general debility, loss of appetite, &c., and eventually made a good recovery. This we can readily understand: the first dog bitten received the largest quantity of poison, whilst the second received less, and when it came to the third the supply was no doubt all but exhausted, and the rapidity with which the wounds must have been inflicted left no time for fresh poison to be secreted. This accounts for the ultimate recovery of the dog.

“In January last a lady at this place was returning from a walk with her child, followed by a bull-terrier puppy about six months old; her house was situated some distance from the gate, and the road on either side was covered with spear-grass. It was just dusk. The puppy suddenly darted in front and began to bark vociferously. Although the lady had seen nothing, she took alarm at the movements of the puppy, and called out to me as I happened to be passing by the gate at that moment. On going to see what was the matter, I found a large Viper coiled up in the centre of the road, and the puppy making a great noise from a respectful distance. The snake was closely coiled up, with the neck bent abruptly backwards, and the head fixed almost horizontally; it began to puff itself out something after the manner of the Puff-Adder, and hissed loudly, intently watching the movements of the dog, no doubt awaiting an opportunity to strike it, when I called the puppy away. The instant the puppy turned its head, the snake glided with the rapidity of lightning into the surrounding grass and disappeared. The next day it was killed

in the same garden, and brought to me; it measured 4 feet 6 inches in length.

“These Snakes were formerly designated ‘Cobra Manil’ by the Portuguese, in consequence of their bite proving as rapidly fatal as that of the Cobra. The word Manil is a corruption of the Tamil word Mannunippāmhoo, which literally means Earth-eating Snake, and is the name given by the natives to the *Uropeltis grandis*, commonly termed ‘Double-headed’ Snake, and which they believe lives entirely on earth, from its being frequently found underground.”

Mr. W. K. Parker read the following abstract of a Memoir on the Osteology of the genera *Pterocles*, *Syrrhaptes*, *Hemipodius*, and *Tinamus*, intended for publication in the Society’s ‘Transactions’:—

“The classification of the gallinaceous birds would be easy enough if it were not for certain outliers, which refuse to conform to that particular plan of structure with which we are all so familiar in that very convenient and natural type of the group—the Common Fowl.

“Agreeing with this bird in all essential respects are the genera *Phasianus*, *Polyplectron*, *Lophophorus*, *Tragopan*, *Pavo*, *Meleagris*, *Numida*, and many others, the species of which are in many instances creatures of unsurpassed beauty. This properly typical group has, amongst other characteristics, its species provided with a robust body, short rounded wings, and very strong legs; whilst the tarsi are naked, provided with one or two spurs, and having the generally small heel elevated above the anterior toes.

“Notwithstanding the more subdued style of colouring, and the rudimentary condition of the spur, the Red Partridge (*Perdix rubra*) ought to be placed with the Francolins in the typical group.

“Still further, if we are to be guided by the structure of the skeleton, and especially by that of the skull, the dwarfs of the family, the Quails (*Coturnix*), ought to stand in the same inner circle as the gigantic species, the Turkey and the Peacock.

“In a subtypical group all those forms ought to be placed, in which, besides the quiet style of colouring, we find feebler legs, often with the tarsi feathered, a more depressed pigeon-like form of the body, and a skull with thinner and more fibrous walls, combined with a much enlarged tympanic cavity. The spur is also obsolete.

“The Grey Partridge (*Perdix cinerea*) should be classed with this subfamily—the *Tetraonidæ*.

“This beautiful and valuable bird is, as is especially shown in the structure of its skull, much more nearly related to the Ptarmigans (*Lagopus*) than to *Perdix rubra*, with its very thick-walled cellular skull, small tympanic cavities, and rudimentary spur.

“There is a group of very majestic birds inhabiting the warmer parts of the New World, which differs so much from the *Gallinæ* proper and from the *Tetraonidæ*, that it must be considered to belong to an outer or aberrant place in the great gallinaceous family. I allude to the *Cracidæ*.

“These birds, less ornate indeed than their normal relations, are

nevertheless creatures of great interest, and of no little beauty, whether we consider their form or their mode of colouring.

“In this outer circle we place the Guans (*Penelope*), the Curasows (*Crax*), the genera *Ortalia*, *Opisthocomus*, and others.

“The mode in which the *Cracidae* differ from their terrestrial typical congeners is highly interesting; but as the present paper is only intended to be an introductory outline, I shall not ‘bestow all my tediousness’ upon the Society by going into details now: suffice it to say that they appear to me to connect the *Gallinaceæ* quite as much with the Plantain-eaters (*Musophagidæ*) as with the Pigeons.

“The habit, which has given the family-name *Rasores* to the Fowl tribe, curiously enough, does not attain its highest degree in the typical species, but is developed in certain subtypical genera which are found ranging from the Philippines through the islands of the Indian Archipelago to Australia: these birds are the Megapodes*.

“In the ‘Mound-maker’ we have a bird which, whilst marvelously like the Common Hen in gentleness of expression and neatness of contour, has also a most striking isomorphic resemblance to certain members of a very distantly related family, viz. the Gallinules.

“My acquaintance with the structure of *Talegalla* was made sixteen or seventeen years ago; for at that time I met with and made drawings of a precious skeleton of this bird in one of the drawers of the Museum of the Royal College of Surgeons; it has not, however, been noticed in the Catalogue.

“Being therefore well and safely possessed of the fact that the Brush Turkey (*Talegalla*) does not, in any *essential point of structure*, differ from the Common and Ocellated Turkeys (*Meleagris gallopavo* and *M. ocellata*), I was indeed surprised to find that, as late as last spring, Professor Owen had classed them with Cuvier’s *Macrodactyli*.

“In the report in the ‘Medical Times and Gazette’ of the fourth of Professor Owen’s Jermyn Street Lectures for this year, delivered on the 23rd of May, I find the classification which he has adopted, and in which the mound-making birds are placed between the Rail and the Screamer.

“As there are in the same system of classification several other instances of what appear to me, to say the least, very odd and confusing misplacements, I shall crave the liberty to point them out, and to make my own remarks upon them, especially as the position in nature of these birds is exactly what I have set myself to try and find out. It is in Professor Owen’s Second, Third, and Fourth Orders, viz. the ‘Grallatores,’ ‘Cursores,’ and ‘Rasores,’ that I find most to surprise and confuse me.

“The family *Macrodactyli*, of the Second Order, ‘Grallatores,’ according to this eminent author contains the ‘Coot, Crane, Rail, Megapode, Screamer,’ and ‘Jacana.’

“The next family, or the ‘Cultriostres,’ contains, we are told, the ‘Boat-bill, Adjutant, Heron, Ibis, Stork, Tantalus,’ and ‘Spoon-bill.’

* Gould (see Penny Cyclop., art. “Talegalla”).

"The third family, or 'Longirostres,' is said to be composed of such forms as the 'Gambet, Avocet, Snipe, Ruff, Turnstone, Curlew, Sandpiper,' and 'Godwit.'

"And the fourth, or the 'Pressirostres,' the 'Oyster-catcher, Thicknee, Plover, Lapwing, Bustard,' and 'Courser.'

"Then in his Third Order, the Cursores, Professor Owen places these genera, and in this succession, viz. :—

'*Apteryx*.

Didus, Pezophaps.

Ostrich, Emeu, Nandú.

Cassowary.

Notornis.

Dinornis, Palapteryx.'

"In the Order 4, 'Rasores,' he gives us two families, viz. the *Gallinacei* or *Clamatores*, and the *Columbacei* or *Gemitores*.

"The first of these is exemplified by the 'Pea-fowl, Partridge, Quail, Pheasant, Ganga, Grouse, Pintado, Tinamú, Turkey, Curassow,' and 'Guan.'

"The second is made to contain the 'Dove, Goura,' and 'Vinago.'

"First, as to the Macroductylous *Grallæ*, the Porphyriine *Notornis* is wanting; and, besides the Megapode, the Crane certainly has no business there, being (as its embryology reveals) a gigantic specialized aberrant of the Pressirostral family.

"As to the *Cultrirostres*, I feel pretty certain that the Spoonbill and the Ibis will have to be placed in the next family, the *Longirostres*, a group less specialized from the Plover type than the Cranes. If this should turn out to be the truth, the 'Pressirostres' and the 'Longirostres' must receive accessions at the expense of the 'Cultrirostres,' which family, however, possesses the *Balæniceps*, the Umbre, and the *Eurypyga*.

"With regard to the 'Cursores,' it seems to me much better to use the simple term *Struthionidæ*, and to let *Didus* and *Pezophaps* abide where Messrs. Strickland and Melville most appropriately placed them, viz. amongst the Ground-Pigeons; the *Notornis* being marched back again to its proper place, between *Tribonyx* and *Porphyrio**.

"I hope to console the lover of the struthious tribe by compensating him for the loss of the Dodo and the *Notornis* with the gain of what has hitherto been considered as a true gallinaceous genus: I refer to the Tinamou.

"The examples given of the gallinaceous genera in Professor Owen's classification are principally remarkable for want of order, as the Ganga is not intermediate between the Pheasant and the Grouse, but between the Grouse and the Pigeon, and the Tinamou certainly has no place between the Pintado and the Turkey.

* Dr. Mantell (Petrifactions and their Teachings, page 125) says that "the general form of the skull" of *Notornis mantelli* "approaches nearest that of *Brachypteryx*;" whereas that of *Tribonyx mortieri* (Osteol. Catal. Mus. Coll. Chir. vol. i. p. 239, No. 1281) comes nearer. In the sternum, however, *Notornis* is most like *Brachypteryx*.

“The Gemitores might stand as they are, as to the examples given; but they are not *Rasores*.

“In the same lecture in which the ‘classification’ is given, the *Notornis* is said to be ‘allied to the Coots,’ and the Cassowaries ‘still more modified Coots.’

“This seems to me to be an inversion of the natural order of things; for the Cassowary, every one knows, is in all respects typically struthious in its whole skeleton, but is most decisively seen to be so in its cranium and facial bones; and all the *Struthiones* are low, embryonic, unspecialized forms.

“That there is a near relationship between the Rail-tribe and the Ostriches I feel certain; but the former seem to me to stand on the same level typically (or in relation to the highest style of bird) as the Rasorial group, and in some respects on a higher one; but I would not press this too far, as the skulking habits of these birds seem to point to a lower brain-development than even the Fowl possesses, and to place them in near contiguity to the Ostriches: moreover *Brachypteryx* is, in respect of its wings and sternum, but little in advance of the great ‘*Brevipennes*.’ Cranially, however, it is in advance; and it seems to be a more philosophical way of putting the matter to say that a Coot is a modified Cassowary, than that a Cassowary is a modified Coot. Whether Mr. Darwin is right in all respects or not, yet we all believe with him that nature does not retrograde, but ascends from the simpler to the more highly specialized forms.

“I shall not take up either the Society’s time or my own in merely arguing about these puzzling affinities, but hope soon to be able to bring forward some simple drawings and descriptions, such as shall enable any one to judge for himself as to what type these birds really do belong.

“I intend moreover in my larger paper to consider the relationships of *Oreophasis derbiamus*.

“But the birds hitherto mentioned are all easily referred to their proper zoological position; those, however, of which it is my principal business to speak stand just above the *Struthionidæ*, in such a doubtful position that it is at first hard to say whether they have declared for any one of the families by which they are surrounded.

“The Sand-Grouse, the Hemipodes, and the Tinamous have in their composition such a mixture of characters, that they seem to be the very birds which might in the lapse of ages, through climatal change, a different diet, ‘the struggle for existence,’ and ‘natural selection’ give rise to such divaricating and dissimilar types as the Pigeons, the Gallinaceous birds, and the Plovers.

“These last-mentioned families are those the characters of which the osculant forms under consideration most affect, with, let it be remembered, a more or less broad struthious basis.

“There are other genera, however, the osteology of which I long to know, viz. *Thinocorus*, *Attagis*, and *Chionis*.[‡]

“Speaking of these birds, Mr. Darwin, in his most pleasant ‘Journal’ (ch. 5, p. 94), makes the following remarks:—

“This small family of birds is one of those which, from its varied relations to other families, although at present offering only difficulties to the systematic naturalist, ultimately may assist in revealing the grand scheme, common to the present and past ages, on which organized beings have been created.”

“*Thinocorus rumicivorus* partakes, according to this excellent author, ‘of the characters, different as they are, of the Quail and the Snipe’ (ibid. p. 94).

“As to the *Attagis*, Mr. Darwin says (p. 94), ‘The two species of this genus are in almost every respect Ptarmigans in their habits;’ and of *Chionis alba*, that it ‘is an inhabitant of the Antarctic regions,’ that ‘it feeds on sea-weed and shells on the tidal rocks,’ and that, ‘although not web-footed, from some unaccountable habit, it is frequently met with far out at sea’ (ibid. p. 94).

“Will some lover of ornithology be on the look-out to procure something more than the *skins* of the birds of these three genera?*

“It would tend towards our knowledge of the meaning of these birds of mixed character and osculant relationship, if we knew how long each type has been on the planet; for if our Fowls and Peacocks, Doves and Gouras, are really comparatively new importations to the ‘green earth,’ then there would be some colour and life in ‘Darwinism,’ and the Ostriches, Tinamous, and Sand-Grouse might be looked upon as a remnant of the ‘flint-folk’ of the bird-class.

“It is, however, almost impossible for the most devout believer in separate creations to keep this idea of ‘ancestral relationship’ altogether out of his mind when considering such birds as those we are speaking of: at any rate, dogmatism on either side, on a subject so far beyond the reach of our feeble faculties and limited knowledge, has in it something of profanity. I have, up to this time, only been able to get a sight of the skeletons of *Pterocles arenarius* (see Osteol. Cat. Mus. Coll. Chir. vol. i. p. 273, No. 1421), of *Hemipodius varius* (ibid. p. 274, No. 1423), of a specimen of an undetermined species of *Hemipodius* (which died soon after its arrival at the Gardens, and was lent to me by Mr. Gerrard), and of a *Syrrhaptus paradoxus* and a *Tinamus robustus*, for which I am indebted to the Council of this Society.

“I shall now merely indicate the curious composition, so to speak, of these birds, and begin with that of the Sand-Grouse.

“These beautiful and gentle birds are seen at once to have in them something both of the Ptarmigan and the Pigeon; but there is in their physiognomy a marked inferiority of expression, quite in contrast with the sharp, intelligent look of the typical Fowls, and very much below what we see in the Pigeon-tribe.

“This is exactly in harmony with what the skeleton reveals; for whilst the characters of both these types are almost inextricably interwoven, yet there is in many points a marked inferiority of character—a less degree of elevation above the Struthious style of structure. What there is of the Bustard (*Otis*) in them (which Pro-

* There is a skeleton of *Chionis*, I find, in the British Museum.

fessor Owen, 'Osteol. Catal.' p. 274, points out) is only part of their general relationship to the Pluvialine type.

"It is in those parts of the skull and face which are first mapped out in thickened blastema, and then differentiated into clear cartilage, at some considerable period of the early embryonic life anterior to the deposit of bone, that we find the most instructive modifications of structure.

"I allude especially to the basis cranii and to the upper part of the first facial arch, that is, to the occipital and sphenoidal regions, and to the pterygoids, palatine bones, and vomer. Not only do these bones (with the exception of the vomer, which is absent as in the Pigeons) show a marked 'struthious' inferiority in the *Syrnhaptēs* (the culmination of the Pterocline type of structure), but the sternum, which literally unites that of the Ptarmigan with its counterpart in the Pigeon, is inferior in one important point, not only to this, but also to that of the whole Pluvialine group.

"The heel, which is a mere rudiment in *Pterocles* proper, is absent in the *Syrnhaptēs*; and the whole pelvic extremity is almost the counterpart of that of the Swifts (*Cypselus*) in deficient growth. I believe that it would take a very clever anatomist to detect any difference between the wing-bones of the '*Pteroclinæ*' and those of a typical Pigeon.

"The elongated feathers of the tail and wings of *Syrnhaptēs* give it one of its peculiarities of character: the two middle tail-feathers have already become elongated in *Pterocles setarius* (the Pin-tailed Sand-Grouse of Temminck), its nearest ally.

"I cannot conclude this rough outline of what I wish to say about the Sand-Grouse, without referring to what Dr. Andrew Smith tells us of *Pterocles gutturalis*, Sm., in his 'Illustrations of the Zoology of South Africa.'

"First, what must be considered a 'Pluvialine' character, the eggs are of a 'dirty-white or cream-colour, marked with irregular streaks and blotches of a pale-rusty and pale-grey or ash-colour;' and the second point is the careless habit of laying them upon the bare ground*. This habit, so untypical ornithically, so unlike the almost human family tenderness of their relatives, the Pigeons, is, however, much like the conduct of the unthinking 'giants' that come next below them in the zoological scale.

"So that not only the Ostrich, but also the Sand-Grouse 'leaveth her eggs in the earth, and warmeth them in the dust, and forgetteth that the foot may crush them, or that the wild beast may break them.'

"If birds were intelligent in the human sense of the word, their relationship to the reptiles would be as humiliating as our affinity to the *Simiæ*; but the fact is certain that these low types not merely have in themselves obscure anatomical resemblances, but their instincts and habits are plain, out-spoken evidences of their nearness in nature to 'the creeping things after their kind.'

"I now leave *Syrnhaptēs* (which, at first sight, seems to run in

* Penny Cyclop., art. *Tetraonidæ*.

some mysterious way without the help of feet) to speak of the stilted *Hemipodius*, an aberrant gallinaceous bird, which has escaped from its more steady *walking* allies to join the true coursing birds. Without heel, with not only naked tarsi, but with the lower half of the tibiae bare; what can these birds be but true essential '*Grallæ*.'

"They may be in a sense grallatorial, but are not really so, as we shall see, if we work out their mixed affinities.

"The *Hemipodii* (some of which are very small, and, like some other small creatures, very pugnacious) stand pretty exactly between the Tinamous and the Quails; but not quite so, for the Pigeon comes in again, even here, with a touch of kinship, the connecting links being the *Didunculus* and the dwarf Ground-Pigeons (*Chamæpelia*).

"The characters of head are almost equally divided between those of the Ground-Pigeon and the Quail; the sternum, between the Quail and Tinamou; yet the legs are those of a little Sand-Plover, although they are hinged upon a pelvis which would require but little altering to suit a Quail.

"I must ask for more time and space, if not to settle this difficulty, yet to put it into a proper form for some fuller mind to explain; for it seems to me that my position of 'interpreter' is in this case more perplexing than that of the purblind patriarch, who found the hands of his hairy son Esau combined with the vocal organs of the smooth-limbed Jacob.

"I have now merely to speak of the Tinamous; and in their case also I must merely indicate the kind of task they present to him who would fairly work them out.

"In the first place, let me at once say that they have no right to the dignity of the gallinaceous title; they are little struthious birds, looking upwards from that simple rudimentary beginning of the beautiful ornithic type.

"Nearly all the specialization of this bird, by which it rises above the *Struthionidæ*, is in the direction of the true or typical gallinaceous bird, and not towards the Ptarmigans, as is the case of the Sand-Grouse.

"The *Hemipodius* runs upwards towards the little flat-bodied typical Quails; but there is no bird better for comparison with the Tinamou than the common Hen. Nine-tenths of the characters of the bony structures of the head in this bird are truly struthious: the residuum belonging half to the Plover and half to the Fowl.

"It is not a little curious, however, that it outdoes the Plover in one thing, viz. the structure of the supraorbital region; for whilst the nasal or supraorbital glands in the *Pluvialinæ* are protected by a continuous beam of bone, the Tinamou has the unique character of a series of those bones. In the young Ring-Dottrel I find a series of square denticles growing out from the margin of the frontal below, and external to the large gland; these exogenous processes fuse together in the adult.

"I had racked my memory to find an instance of multiplied supra-orbitals in a vertebrate skull, but in vain, when one turned up to me on examining the Reptilian skeletons in the Museum of the Col-

lege of Surgeons, a few months ago: this example is the skull of the Trigonal Cayman.

“There are three on each side in this latter creature, united by a triradiate suture; in the Tinamou, however, there are six or seven larger and several smaller ossicles on each side. At first sight it seems as though half the sclerotic ring had been attached there by accident; these supraorbitals are, however, much stronger than the sclerotals.

“The sternum of the Tinamou is greatly differentiated when compared with that of a Rhea or Emeu; but all the improvement is gallinaceous. It is absolutely the most unique and wonderful of all the sternums I have seen, the variations of which in the bird-class, as is well known, are very great and very exquisite.

“The presence of a somewhat deep keel, so seemingly fatal to the struthious theory of this bird's relationship, strange to say, turns out a good proof of its validity and truth. Every one who has watched the larger-winged Ostriches must have noticed their habit of lifting their wings—a motion performed by the middle pectoral muscles or *levator*es of the humerus: to these muscles nearly all the keel of the Tinamou's sternum is devoted, a most narrow, small corner being left for the thin abortive *depressor*es—muscles which, not only in typical birds, but also in the heavy Gallinacæ, are of very large size. The small ‘furculum’ is Pluvialine; but the coracoids and scapulæ come very near to those of the common Fowl.

“The blending of the last cervical with three out of four of the dorsal vertebræ is gallinaceous; but the absence of costal appendages, except a small one on the second true rib and a trace on the third, is struthious enough. The pelvis looks, at first sight, but a few removes from that of the Hen; and in so much as it differs from the pelvis of the Emeu or the Apteryx (which have very compressed pelvises, whilst this is broad and gently arched), in the same degree does it approach that of the Fowl. The preacetabular spur of the ilium is there; but the postfemoral part of that bone looks as if it had been pared away, leaving an enormous ischiadic *notch*, which is a *foramen* in typical birds. The tail is a mere pretence (as Wagler's term *Nothura* well expresses); the caudal vertebræ are therefore but little better than those of an Ostrich. The strong legs leave us the choice, at first sight, of referring them to either the Fowl or the Ostrich; and the heel, small and high up, is gallinaceous. But the tarso-metatarsus, covered with transverse plates in front, has the posterior two-thirds invested by an intensely strong imbrication of horny scales; thus adapting the leg of the bird to that odd sitting position (about as elegant as that of the Ass in the first stage of the erect posture) in which the *Struthionidæ* delight.”

The following papers were read:—

1. NOTE ON THE JAPANESE BEAR. BY P. L. SCLATER, M.A.,
PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XXXII.)

At the meeting of this Society on the 24th of June last, I called the attention of the members present to two Bears from Japan, deposited in the Menagerie by Capt. Ward*. I remarked that the Bear of Japan was stated in Temminck and Siebold's 'Fauna Japonica' to be referable to the well-known Indian *Ursus torquatus* (sive *tibetanus*), but that these animals were evidently of a different species; and I therefore suggested that they should be called *Ursus japonicus*, and promised further particulars concerning them at a subsequent meeting.

I have, however, been informed by Dr. Schlegel of Leyden that, since the publication of the portion of the 'Fauna Japonica' relating to the Mammals, he has discovered the error of referring the Japanese Bear to *Ursus torquatus*, and has in his 'Manual of Zoology'†, published in 1857, proposed to bestow upon it the very appellation (*Ursus japonicus*) that I had selected as most appropriate for the species.

The Japanese Bear, in fact, seems almost intermediate between *Ursus torquatus* and *Ursus americanus*. Our specimens, the largest of which must be nearly full-grown (for the dentition, except the last pair of molars, is perfect), are barely two-thirds of the size of *Ursus torquatus*. The very distinct white gular band of *Ursus torquatus* is only represented in *Ursus japonicus* by a slight undefined whitish line, which seems likely to wholly disappear. The muzzle is also much blacker in *U. japonicus* than in *U. torquatus*; and, instead of the prominent bushy cheeks of *U. torquatus*, the Japanese species appears to have the face clothed only with short hair, as in *Ursus americanus*.

Mr. Wolf's figure (Plate XXXII.) will further assist in the identification of this species, it being obviously impossible to draw up very accurate characters from living specimens.

2. DESCRIPTION OF SOME NEW SPECIES OF MAMMALIA.
BY DR. JOHN EDWARD GRAY, F.R.S., F.L.S., ETC.

(Plates XXXIII., XXXIV., XXXV.)

Among some Mammalia which Mr. A. R. Wallace has lately sent to the British Museum, which he collected in Morty Island in 1861, are two species of a frugivorous Bat, which does not appear to have been hitherto registered in the Catalogue. This Bat may be easily known from all the other *Cynopteri* by the extraordinary length of

* Vide *suprà*, p. 186.

† Handleiding tot de Beoefning der Dierkunde, pt. 1, p. 42.

its tail, which induces me to form for it a section or subgenus, which I propose to call *Uronycteris*.

CYNOPTERUS (URONYCTERIS) ALBIVENTER.

Tail elongate, free, produced beyond the narrow, short, interfemoral membrane. Nostrils much produced, tubular, far apart at the base, and diverging outwardly. Fur brown-olive, with greyer base to the hairs. Face and throat only slightly hairy, grey. Sides of the neck and breast yellow-brown. Side of the body brown. Chest and middle of the belly white. Wings brown.

Hab. Morty Island (*A. R. Wallace*).

The length of the forearm-bone 2 inches; length of the tail (dry) nearly $\frac{3}{4}$ of an inch.

The wing-bone, on the upper surface of the wing, of both specimens is marked with some irregular white spots. These may be only accidental, or even artificially produced in the process of preservation or by carriage, as the spots on the two sides of the same wings are more or less unlike, and those of the two specimens are dissimilar.

Mr. Keilish, the furrier, has kindly sent to the British Museum for examination the skin of a Leopard which he has received from Japan. It is well tanned, and marked on the inner side with the red impressions of two Japanese seals. The skin at first sight seemed much like that of a fine-coloured Hunting Leopard, but it is at once distinguished from that animal by the comparatively shorter legs, by the larger size and brown centre of the black spots, and from all the varieties of the Leopard by the linear spots on the nape and the spots on the back not being formed of roses or groups of smaller spots. I propose to call it

LEOPARDUS JAPONENSIS. (Pl. XXXIII.)

Fur fulvous, paler beneath. Back and limbs ornamented with ovate or roundish unequal-sized black spots. The spots on the shoulders, back, and sides converted into a ring by a single central spot of the same colour as the fur. Spots on the back and legs large, oblong, and transverse. Head with small, regularly disposed, black spots. Nape with four series of narrow elongated black spots (the outer ones sometimes confluent into lines), and with a series of large black spots on each side of the back of the neck. Chest with a series of larger spots, forming a kind of necklace. Tail elongate, very hairy, spotted, paler, and with four black rings at the tip.

Hab. Japan.

The skin in its tanned state is 4 feet 6 inches, and the tail 2 feet 10 inches long.

Mr. W. Fosbrooke has kindly presented to the British Museum a small and beautiful species of Boshbock, which was captured by John Dunn, Esq., in the Ungo-zy Forest, between the Umbrelans

and Umblatore, in the country of the Amazula. Mr. Dunn could not learn that the natives had any special name for this animal.

It is a most peculiarly-marked species, and of a very small size. The hunter mistook it for a young animal, and fed it with milk, on which it died; but when it was examined, the mammæ were found dilated with milk, showing that it was approaching full age, and probably had lately produced a fawn. It is the smallest species of the genus, standing only 10 inches high to the top of its head, and weighing not more than three pounds. It is most like *Cephalophus whitfieldii*, figured in the Knowsley Menagerie, from a specimen in the British Museum which was brought from the Gambia by Mr. Whitfield. It differs from that species in the general shade of the brown colour; and there is no white about that animal, which is so prominent in the Natal specimens.

CEPHALOPHUS BICOLOR. (Pl. XXXIV.)

Fur soft, brown, with the rump, the whole of the hind legs, the chin, throat, chest, belly, the inner side of the fore legs, a broad ring over the fore hoofs, and a large spot occupying the front of the face and forehead pure white. The ears blackish, white within. The side of the forehead darker brown. The crumen on the side of the face linear, well marked. Horns not present in the female sex.

Hab. Natal.

Mr. R. Swinhoe, having shown me a part of the collection of mammals which he formed while residing in the island of Formosa, has kindly allowed me to describe a new specimen of Wild Goat or Goat-Antelope.

This species agrees in all its characters with the Cambing-outang (*Capricornis sumatrana*) of Sumatra, and the *Capricornis crista* of Japan, but is very distinct from either of them. In colour it more nearly resembles the Japanese species, *C. crista*, which has a white face; but it is easily distinguished from that species, which I only know from a figure and very general description in Schegel's 'Fauna Japonica.' I propose to call it, after its discoverer,

CAPRICORNIS SWINHOII. (Pl. XXXV.)

The fur harsh and crisp, brown, with a narrow streak down the back of the neck; a spot on the knee and the front of the fore legs below the knee black. The hind legs are bay. The sides of the chin pale yellowish. The underside of the neck yellow-bay—this colour being separated from the darker colour of the upper part of the neck by a ridge of longer, more rigid hairs. The ears are long, brown, paler internally. The horns are short and conical. The skull has a deep and wide concavity in front of the orbits, and a keeled ridge on the cheek.

3. NOTICE OF TWO NEW SPECIES OF BATAGUR IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. J. E. GRAY.

Dr. Günther, who is re-examining the Indian Tortoises in the British Museum, has drawn my attention to two young specimens of the genus *Batagur*, which he believes to be different from those that I have hitherto described; and as there appears every reason to believe that they indicate species that has not hitherto been recorded in the Catalogue, I shall proceed to describe them provisionally until we receive more adult representatives of them. They both belong to the subgenus called *Kachuga*, as defined in my 'Catalogue of Shield Reptiles in the British Museum' (p. 35).

BATAGUR PICTA.

Pale grey-brown, with three interrupted dark brown streaks on the back, and a more or less triangular dark brown spot on the front margin of the marginal shields; beneath uniform pale yellow. Nuchal shield none. The first vertebral plate oblong, four-sided, rather longer than broad; the second, third, and fourth six-sided, second and third as long as broad, the fourth rather longer than broad. The margin entire, bent up behind. The pectoral and anal plate as long as broad. Head (when dry) pale olive, blackish on each side.

Hab. Borneo, Sarawak (*Wallace*).

Length 11, width $8\frac{1}{2}$ inches. Not full-grown, and with large intercostal spaces on the sides, showing that this species grows to a much larger size.

BATAGUR ELLIOTTI.

Young state. Pale grey-brown, one-coloured when dry; the hinder margin strongly and acutely serrated. Nuchal shield broad, short. Second, third, and fourth vertebral shields strongly keeled, and ending in an acute prominence; the first square, rather broader than long; second and third six-sided, broader than long; fourth six-sided, longer than broad. Underside uniform pale yellow. The gular plate triangular; the pectoral and anal shorter than broad. The head dusky brown; temple and beak yellow, with a blackish streak from the nostril to the orbit, and continued behind from the orbit over the tympanum.

Hab. Southern India, River Kistna (*Walter Elliot*).

The specimen is very young, with very large narrow intercostal spaces, showing that it grows to a considerable size. It is known from all the other species by its sharp dentated margin. This character may be obliterated in the adult specimens; but I am not aware that it occurs in any other young *Batagur*, and we have most of the described species in a young state. The specimen here described was procured from Mr. Warwick, the dealer, without any habitat. But Dr. Günther has shown me a drawing, which has been sent to him by my excellent friend Mr. Walter Elliot, of Wolfelee, with the above habitat attached to it, which is so like the specimen described as

almost to lead to the supposition that it was made from the same individual. From the drawing we not only learn the habitat, but also that the colour of the living animal is very like that of the dry specimen.

4. NOTICE OF A NEW SPECIES OF DOGANIA FROM ASIA.

By DR. J. E. GRAY, F.R.S., ETC.

We received for the Museum a dried and varnished specimen of the genus *Dogania*, unfortunately without any special habitat, which appears to be distinct from *Dogania subplana*. It is scarcely two-thirds the size of the specimen which we received from General Hardwicke, which agrees with the type specimen of Geoffroy, on which the species was originally described; yet the dorsal shield is more ossified, the ribs more expanded, and the surface of the bone of the back and chest more granulated. This leads me to believe that it must be of a distinct species; I shall therefore give the diagnosis of the two kinds.

DOGANIA SUBPLANA.

The first odd transverse bone of the dorsal shield smooth, with a narrow band of granules on the middle of the hinder edge. The first, fifth, sixth, and seventh ribs narrow, the last being the narrowest and shortest; the second, third, and fourth ribs broader, dilated at the outer end, the width being about one-third of the length. The sternum smooth, with a small, narrow, oblong, longitudinal granular patch on the hinder edge of the transverse bone.

Hab. India, Singapore?

The dorsal disk of this species is well figured by Cuvier, *Oss. Fos.* iii. t. 13. f. 5.

Mr. Swinhoe informs me that this animal is common in the rivers of China and Formosa; that it is known to the Europeans there by the name of "Terapan," most likely a corruption of the American word "Terrapin," and is esteemed a great delicacy by the Chinese, and fetches a good price in the market to make soup.

The head of the older specimen is not so large compared with the body. The animal has the power of drawing its head within the skin of the neck.

DOGANIA GUENTHERI.

The odd transverse bone in front of the dorsal shield entirely covered with granulations, like the ribs. The ribs all nearly similar in width (nearly four times as long as wide), and very slightly and gradually dilated at the outer end; the last rib the smallest, narrow and short compared with the others. The hinder sternal bones broad, with a large oblong patch of granulations at the inner hinder end. The labral bones with a large indeterminate group of tubercles near the suture that divides them.

Hab. India, —?

I have named this species after my friend Dr. Albert Günther, one of my colleagues in the Museum, who has prepared such admirable catalogues of the Snakes and Fishes in the Museum Collection. He first drew my attention to the specimen, and considers it as indicating a very distinct and interesting species. It is to be regretted that the head is so dried and covered with varnish that it is impossible to see the distribution of the colours with any certainty; for I have found that the distribution of the colours on the head and exposed parts of the body affords one of the best and most prominent characters for the distinction of the species of this family, and one, unlike the form of the bones, that is not at all, or but slightly, altered by the age of the specimens.

5. ON THE BREEDING OF A WEST-INDIAN TORTOISE IN THIS COUNTRY. BY WILLIAM WILLIAMS (OF TREGULLOW).

A female Land-Tortoise, brought from the West Indies and given to Mrs. Williams's mother upwards of fifty years ago, was then about the size of a watch. It has now been in the garden at Tregullow about thirty-two years. Four years ago another Tortoise was obtained, which turned out to be a male; they were allowed to roam in the garden at their will. In 1860 some eggs were found, but, from insufficient heat, they were not hatched.

About the 25th of July last, the gardener, on passing a south border, observed the female Tortoise making a pit with her hind legs in a very peculiar manner. On watching her, he found she had made a hole some four inches deep, quite flat at the bottom. On returning, in about five minutes, he found she had deposited six eggs, and was in the act of covering them with earth. He immediately removed them, in a flowerpot-stand about two inches deep, filled with white sand, to a pine-pit, and placed them on a tan-bed. On the 19th of October last he observed two of the eggs had been hatched; and on looking around he found, much to his astonishment, two young live Tortoises. The eggs were about the size of those of a pigeon, and much the same in appearance.

The young ones are kept in a wooden box (in a pine-pit) with some earth and moss, under which they nestle. They are fond of lettuces and strawberries, but do not eat much. They appear quite well and lively, moving about briskly; they are now a little larger than half-crowns.

The eggs were not disturbed while in the pine-pit, the temperature of which during the time they were there was from 85° to 90° by day, and from 65° to 70° by night.

The female measures 12 inches long, by 12 $\frac{1}{4}$ inches wide over the back; the male 8 inches long, by 8 $\frac{1}{2}$ inches wide over the back.

6. NOTES ON THE BEAVER IN THE ZOOLOGICAL GARDENS.

BY A. D. BARTLETT.

During one of the heavy storms of wind and rain that prevailed during the last month a large willow-tree was partly blown down. The limbs and branches of this fallen tree were given to many of the animals, and to them proved to be a very acceptable windfall. To the Beaver, however, I wish to direct especial attention, as this animal has exhibited in a remarkable manner some of his natural habits and intelligence. One of the largest limbs of the tree, upwards of 12 feet long, was firmly fixed in the ground, in the Beaver's enclosure, in a nearly upright position, at about twelve o'clock on Saturday last. The Beaver visited the spot soon afterwards, and walking round this large limb, which measured 30 inches circumference, commenced to bite off the bark about 12 inches above the ground, and afterwards to gnaw into the wood itself. The rapid progress was (to all who witnessed it) most astonishing. The animal laboured hard, and appeared to exert his whole strength, leaving off for a few minutes apparently to rest and look upwards, as if to consider which way the tree was to fall. Now and then he left off and went into his pond, which was about 3 feet from the base of the tree, as if to take a refreshing bath. Again he came out with renewed energy, and with his powerful teeth gouged away all round the trunk. This process continued till about four o'clock, when suddenly he left off and came hastily towards the iron fence, to the surprise of those who were watching his movements. The cause of this interruption was soon explained; he had heard in the distance the sound of the wheelbarrow, which, as usual, is brought daily to his paddock, and from which he was anxiously waiting to receive his supper. Not wishing to disappoint the animal, but at the same time regretting that he was thus unexpectedly stopped in his determination to bring down this massive piece of timber, his usual allowance of carrots and bread were given to him; and from this time until half-past five he was engaged in taking his meal and swimming about in his pond. At half-past five, however, he returned to his tree, which by this time was reduced in the centre to about 2 inches in diameter. To this portion he applied his teeth with great earnestness, and in ten minutes afterwards it fell suddenly with great force upon the ground.

It was an interesting sight to witness the adroit and skilful manner in which the last bite or two were given on the side on which the tree fell, and the nimble movement of the animal to the opposite side at the moment, evidently to avoid being crushed beneath it. Upon examining the end of the separated tree, it was found that only one inch in diameter was uncut; and it was of course due to the nearly erect position in which the tree was put into the ground that it stood balanced, as it were, upon this slender stem. After carefully walking along its entire length as it lay on the ground, and examining every part, he commenced to cut off about two feet of its length, and by seven o'clock the next morning he had divided it into three pieces: two of these he had removed into the pond, and one was used in the under part of his house.

The Beaver, the subject of the foregoing remarks, was presented to the Society by the Hudson's Bay Company, in the autumn of 1861, and was probably then about six months old. It is, no doubt, less vigorous than the large wild animals of this species, who would, in all probability, bring down trees of much larger dimensions in a shorter time. In fact, it was evident that our Beaver was a novice in the undertaking, as he more than once slipped and rolled over on his back in his eagerness to accomplish the task. It was impossible to witness the actions of this animal without being struck by the amount of skill and intelligence exhibited. When the space cut through towards the centre was too narrow to admit its head, its teeth were applied above and below so as to increase the width from the outside towards the centre, until the remaining parts above and below formed two cones, the apices of which joined in the middle. Again and again the animal left off gnawing, and, standing upright on its hind legs, rested its front feet on the upper part of the tree, as if to feel whether it was on the move. This showed clearly that the creature knew exactly what it was about.

7. DESCRIPTIONS OF THIRTY-SIX NEW LAND SHELLS, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

(Plate XXXVI.)

1. *HELIX DANÆ*, Pfr. (172 b). *T. angustissime umbilicata, subturbinata, solida, superne arcuata, plicatula, striis spiralibus obsolete decussatula, cinnamomea; spira convexiusculo-turbinata, vertice minuto; anfr. 6½, convexiusculi, regulariter accrescentes, ultimus non descendens, medio subcarinatus, basi subtiliter striatus, pallidus; apertura obliqua, lunaris, intus submargaritacea; perist. simplex, rectum, margine columellari subarcuato-declivi, sensim ad insertionem subdilato.*

Diam. maj. 32, min. 29, alt. 19 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

2. *HELIX MITIS*, Pfr. (447 a). *T. umbilicata, convexo-depressa, tenuiuscula, lævigata, diaphana, alabastrina; spira parum elevata, conoideo-convexa; sutura submarginata; anfr. 5, convexiusculi, sensim accrescentes, ultimus subdepresso-rotundatus; umbilicus angustissimus, via pervius; apertura parum obliqua, lunaris, intus nitida; perist. simplex, rectum, marginibus via convergentibus, columellari arcuato, superne subdilato.*

Diam. maj. $16\frac{2}{3}$, min. $15\frac{1}{3}$, alt. $8\frac{1}{2}$ mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

3. *HELIX PLUTO*, Pfr. (595 b). *T. umbilicata, depressa, solidula, superne striis spiralibus et aliis antrorsum descendentes minute sculpta, nitidula, fusco-nigricans, fasciis nonnullis pallidioribus notata; spira breviter conoideo-elevata, vertice obtusulo; anfr. 5½, convexiusculi, ultimus magnus, supra medium*

distincte angulatus, subtus convexus, lutescens, circa umbilicum angustum striis spiralibus subundulatis sculptus; apertura obliqua, rotundato-lunaris, intus concolor, margaritacea; perist. simplex, rectum, marginibus convergentibus, columellari ad insertionem breviter fornicato-reflexo.

Diam. maj. 61, min. 49, alt. 30 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

4. *HELIX BENIGNA*, Pfr. (701 a). (Pl. XXXVI. figs. 11, 12.)

T. late umbilicata, lenticularis, pertenuis, rugoso-striata et striis spiralibus minutis confertissimis decussata, pellucida, pallide cinnamomea; spira parum elevata, vertice subtili; sutura marginata; anfr. 6, vix convexiusculi, lente accrescentes, summi liris nonnullis elevatis sculpti, ultimus acute carinatus, supra carinam leviter canaliculatus, basi convexior; apertura parum obliqua, subrhombea; perist. simplex, rectum, margine columellari ad insertionem vix dilatato.

Diam. maj. 32½, min. 29, alt. 11 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

5. *HELIX LIZARDENSIS*, Pfr. (729 a). *T. umbilicata, conoideo-*

lenticularis, solida, carinata, conferte costulato-striata et lira filiformi juxta carinam posita instructa, cerea; spira conoideo-convexa; sutura carinato-exserta; anfr. 8, planiusculi, lentissime accrescentes, ultimus basi convexiusculus, ruditer striatus; umbilicus mediocris, profundus, ¼ diametri vix æquans; apertura subverticalis, anguste angulato-lunaris; perist. simplex, rectum, margine basali leviter et regulariter arcuato.

Diam. maj. 7½, min. 7¼, alt. 3 mill.

Hab. Lizard Islands (*Macgillivray*).

Nearly allied to the Ceylonese *Helix clathratula*, Pfr. (*Puteolus clathratulus*, Bens.), but larger, more flattened; the umbilicus much smaller, the striæ less elevated, the peripheral keel sharper, and the second keel running closely approximate to it.

6. *HELIX ILLUSTRIS*, Pfr. (1313 b). (Pl. XXXVI. fig. 8.) *T.*

imperforata, globoso-turbinata, solida, oblique et transverse irregulariter malleato-rugosa, nitidula, castanea; spira convexo-turbinata, vertice obtuso; anfr. 5, convexiusculi, regulariter accrescentes, ultimus utrinque convexior, medio obtuse angulatus, antice vix descendens; columella subverticalis, brevis, fornicato-dilatata, lilaceo-carnea; apertura obliqua, subtriangulari-lunaris, intus margaritacea; perist. expansum et reflexiusculum, lilaceo-carneum, marginibus callo nitido lilacino junctis.

Diam. maj. 62, min. 52, alt. 35 mill.

β. *Fulvo-lutescens, fascia una mediana castanea ornata, perist. carneo-albido.*

Diam. maj. 63, min. 51, alt. 37 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

7. *HELIX NOVOGUINEENSIS*, Pfr. (1322 a). *T. imperforata, globoso-turbinata, solida, sublævigata, nitida, pallide fulvida, fascia suturali alba, fasciis pluribus latis nigro-castaneis et area lata castanea ornata; spira fornicato-conoidea, vertice acuto; anfr. 5½, convexiusculi, ultimus antice vix descendens, substriatus, basi subangustatus; columella arcuata, dentiformi-truncata; apertura perobliqua, truncato-ovalis; perist. album, marginibus callo pellucido junctis, expansis et reflexis, supero subsinuoso, columellari supra regionem umbilicalem valde dilatato, adnato.*
Diam. maj. 41, min. 34, alt. 26 mill.

β. *Paulo minor, unicolor alabastrina, fascia unica suturali cretacea.*

γ. *Minor (diam. maj. 34, min. 29, alt. 25 mill.), alba, fasciis nonnullis latis pluribusque angustis castaneis ornata.*

Hab. North of New Guinea (*Wallace*).

8. *HELIX BANNERI*, Macgill. (1335 a). *T. clause umbilicata, turbinato-globosa, tenuiuscula, oblique irregulariter striata et confertim pustulosa, fulva, fascia 1 lutescente prope suturam ornata; spira breviter turbinata, vertice acutiusculo; anfr. 4½, convexi, ultimus ventrosus, antice profunde descendens; columella leviter arcuata, sinuosa; apertura fere diagonalis, lunari-rotundata, intus submargaritacea; perist. tenue, breviter expansum, vix reflexum, marginibus convergentibus, callo tenui junctis, columellari per dilatato, fornicatim reflexo, adnato.*

Diam. maj. 41, min. 33, alt. 31 mill.

Hab. Cape Direction, N.E. Australia.

"*Helix*, n. sp., may be called *H. banneri*, after Capt. Banner of the brig 'Julia Percy,' who picked up the only specimen met with during an inland expedition a few miles to the southward of Cape Direction. I was with him at the time, but we could find no more specimens."—*Macgillivray*.

9. *HELIX ROSTRELLA*, Pfr. (1633 a). *T. umbilicata, globoso-trochiformis, tenuiuscula, irregulariter striatula, sericea, fulvo-cornea; spira conoidea, vertice acutiusculo; anfr. 5½, convexiusculi, ultimus antice leviter descendens, supra medium carinatus, basi convexior; umbilicus angustus, pervius; apertura fere diagonalis, intus submargaritacea; perist. album vel carneum, marginibus convergentibus, dextro expanso, supra carinam subsinuato, tum breviter rostrato, basali reflexiusculo, ad insertionem subdilatato.*

Diam. maj. 17, min. 15, alt. 10 mill.

β. *Corneo albida, fascia 1 castanea ad carinam notata.*

Hab. Lao Mountains, Camboja (*Mouhot*).

10. *HELIX MYSOLENSIS*, Pfr. (1651 a). *T. subobtectae umbilicata, trochiformis, solidula, leviter striatula, nitida, alabastrina, ad suturam fascia 1 cretacea et præterea 1-2 fuscis*

notata; spira convexo-conoidea, vertice acute mammillato; anfr. $5\frac{1}{2}$, convexiusculi, ultimus periphæria obsolete subangulatus, basi planiusculus, fuscus; columella obliqua, compressa, basi truncata; apertura perobliqua, subtrapezoidea; perist. album, margine supero expanso, ad dextram effuso, basali reflexo, columellari dilatato, supra rimam umbilicalem adnato.

Diam. maj. $28\frac{1}{2}$, min. 22, alt. 22 mill.

Hab. Island of Mysol (Wallace).

11. **HELIX AURORA**, Pfr. (1675 a). *T. umbilicata, turbinato-depressa, solidula, irregulariter striatula, parum nitens, unicolor fusca*; spira breviter conoidea, vertice minuto, acutiusculo; anfr. $4\frac{1}{2}$, convexiusculi, regulariter accrescentes, ultimus periphæria carinatus, antice vix descendens, subtus parum convexus; apertura obliqua, lata, depresso lunaris, intus roseo-margaritacea; perist. pallide roseum vel lilaceo-carneum, marginibus convergentibus, supero horizontaliter abeunte, expanso, ad dextram subeffuso, basali vix arcuato, reflexo, columellari lamina fornicata dilatata umbilicum angustum fere occultante.

Diam. maj. 30, min. 24, alt. 17 mill.

Hab. Isle of Waigiou (Wallace).

12. **HELIX DELICIOSA**, Pfr. (1676 a). (Pl. XXXVI. fig. 3.)

T. umbilicata, depresso turbinato-globosa, tenuiuscula, subdistanter plicatulo-striata, parum nitens, isabellina, lineis rufis eleganter circumdata; spira conoidea, acutiuscula; anfr. fere 6, convexiusculi, ultimus non descendens, supra medium filoso-angulatus et fascia latiore rufa cinctus, basi convexus; umbilicus angustus, pervius; apertura fere verticalis, rotundato-lunaris; perist. pallide roseum, expansum, marginibus vix convergentibus, dextro medio subangulatim producto, columellari dilatato, fornicato.

Diam. maj. 26, min. 23, alt. $15\frac{1}{2}$ mill.

Hab. Lao Mountains, Camboja (Mouhot).

13. **HELIX EXACTA**, Pfr. (1879 b). *T. umbilicata, depressa, solida, subrugoso-striata, fulva*; spira plana, medio subimmersa; anfr. $5\frac{1}{2}$, vix convexiusculi, lente accrescentes, ultimus antice descendens, periphæria rotundatus, basi circa umbilicum angustum pervium subinflatus; apertura parum obliqua, anguste lunaris; perist. breviter expansum et incrassatum, marginibus remotis, dextro ab insertione breviter ascendente, columellari vix dilatato.

Diam. maj. 30, min. $26\frac{1}{3}$, alt. 14 mill.

Hab. North of New Guinea (Wallace).

14. **HELIX MOLLISSETA**, Pfr. (1885 a). *T. umbilicata, depressa, planorboidea, tenuiuscula, alba, lineis rufis variis cincta et epidermide fulva setis brevibus erectis mollibus dense obsita vestita*; spira plana, medio immersa; anfr. $5\frac{1}{2}$, convexiusculi, ultimus permagnus, depresso-rotundatus, antice deflexus, subtus

circa umbilicum angustum infundibuli instar excavatus; apertura obliqua, lunaris, intus alba, subfasciata; perist. simplex, marginibus convergentibus, callo junctis, dextro ab insertione ascendente, regulariter arcuato, expanso, columellari flexuoso, anguste reflexo.

Diam. maj. 30, min. 25, alt. 12 mill.

Hab. Island of Mysol (Wallace).

Nearly allied to *H. circumdata*, Fér., from which it differs in its size and epidermis, in its last whorl being less deflected, the umbilicus narrower, and the aperture more rounded.

15. *HELIX BIOMPHALA*, Pfr. (1888 a). *T. mediocriter umbilicata, depressa, solidula, striatula et lanugine brevi oblecta, fusca; spira profunde immersa; anfr. fere 5, turgidi, ultimi rapide accrescentes, ultimus inflatus, altus, antice sensim descendens, circa umbilicum non angulatus; apertura fere diagonalis, lunari-rotundata, intus margaritacea; perist. tenue, carneum, marginibus convergentibus, dextro ab insertione ascendente, subregulariter arcuato, anguste expanso, columellari subarcuato-declivi, anguste reflexo.*

Diam. maj. 20, min. 17, alt. 10-11 mill.

Hab. Island of Ceram (Wallace).

16. *HELIX LAOMONTANA*, Pfr. (1911 a). (Pl. XXXVI. figs. 9, 10.) *T. umbilicata, discoidea, solida, conferte capillaceo-striata, fusca; spira plana; anfr. 6½, vix convexiusculi, lente accrescentes, ultimus peripheria rotundatus, antice subdilatus, deflexus, subtus antice fortius striatus; umbilicus latissimus, pateriformis; apertura perobliqua, transverse truncato-oblonga, in imo fundo lamellis pluribus, per testam pellucens, munita; perist. albidum, incrassatum et reflexiusculum, marginibus callo crassiusculo rectilineari junctis.*

Diam. maj. 32, min. 27, alt. 8½ mill.

β. *Minor, anfr. 6, lamellis in anfr. ultimo nullis conspicuis. An spec. propria?*

Diam. maj. 21½, min. 18, alt. 6½ mill.

Hab. Lao Mountains, Camboja (Mouhot).

17. *HELIX HORRIDA*, Pfr. (1912 a). (Pl. XXXVI. fig. 15.) *T. umbilicata, depressa, tenuiuscula, granulata setisque rigidis erectis obsita, corneo-fusca; spira immersa; sutura profunda; anfr. 4½, convexi, ultimus rotundatus, antice profunde descendens, fossa profunda ab apertura remotiuscula et 2 juxta peristoma notatus; umbilicus latiusculus, infundibuliformis; apertura subhorizontalis, bisinuato-pyriformis, intus dente profundo et ad marginem duobus validis (omnibus fossis externis respondentibus) instructa; perist. continuum, undique reflexum, marginibus dextro et basali flexuosis, parietali subelevato.*

Diam. maj. 18½, min. 14, alt. 7½ mill.

Hab. Lao Mountains, Camboja (Mouhot).

18. *HELIX EMMA*, Pfr. (1952 c). *T. umbilicata, depressa, tenuiuscula, conferte et irregulariter rugoso-striata, superne liris nonnullis obsoletis cincta, haud nitens, carneo et albido variegata; spira breviter conoidea, vertice acutiusculo; sutura linearis; anfr. 4, planiusculi, ultimus acute carinatus, antice vix descendens, basi convexus; umbilicus angustus, pervius; apertura perobliqua, rotundato-rhombea; perist. tenue, marginibus convergentibus, supero expanso, antrorsum arcuato, ad carinam subsinuato et leviter rostrato, basali reflexo, ad insertionem dilatato.*

Diam. maj. 18, min. $14\frac{1}{2}$, alt. $7\frac{1}{2}$ mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

18*. *STREPTAXIS MOUHOTI*, Pfr. (22 a). *T. pervie umbilicata, oblongo-ovata, tenuiuscula, confertim et oblique costulato-striata, alabastrina; spira elevata, apice obtuse conoideo; sutura impressa, submarginata; anfr. $6\frac{1}{2}$, convexiusculi, primi 4 regulares, ultimi deorsum deviantes, ultimus juxta aperturam planulatus, laevigatus; apertura obliqua, truncato-oblonga, lamina parietali mediocri, linguiformi coarctata; perist. callosum, reflexum, margine dextro superne leviter antrorsum arcuato, intus obsolete denticulato.*

Diam. maj. 13, min. 9, alt. 8 mill.

Hab. Siam.

19. *STREPTAXIS PELLUCENS*, Pfr. (Pl. XXXVI. fig. 6.) *T. umbilicata, oblongo-ovata, tenuis, superne arcuatim costulato-striata, nitida, hyalina; spira elevata, apice subacute conoideo; sutura impressa, submarginata; anfr. $6\frac{1}{2}$, convexiusculi, 4 primi regulares, ultimi deorsum leviter deviantes, ultimus omnino laevigatus, juxta aperturam subplanatus, antice leviter ascendens; umbilicus punctiformis, extus parum dilatatus; apertura parum obliqua, truncato-oblonga, lamella parietali libera, compressa, intrante coarctata; perist. subincrassatum, reflexiusculum, marginibus subparallelis, dextro ad insertionem tenui, tum leviter antrorsum dilatato.*

Diam. maj. 13, min. 8, alt. $7\frac{1}{2}$ mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

20. *STREPTAXIS PORRECTA*, Pfr. (22 c). *T. umbilicata, oblique ovato-oblonga, tenuis, superne arcuato-plicatula, cereo-hyalina; spira excentrica, breviter conoidea; sutura impressa; anfr. $6\frac{1}{2}$, convexiusculi, primi 4 regulares, reliqui late deviantes, ultimus subascendens, ad suturam modo plicatulus; umbilicus mediocris, non pervius; apertura obliqua, truncato-oblonga, lamella parietali compressa, prope marginem dextrum intrante coarctata; perist. callosum, expansum et reflexum, margine dextro ad insertionem tenui, sinuato, tum subangulatim porrecto.*

Diam. maj. 10, min. $7\frac{1}{3}$, alt. 6 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

21. *BULIMUS PHŒBUS*, Pfr. (78 a). *T. imperforata, ovato-fusiformis, tenuis, leviter striatula, parum nitens, pallide lutescens, strigis et maculis fuscis irregulariter picta; spira conica, acutiuscula; anfr. 5½, convexiusculi, ultimus non descendens, spiram paulo superans, ventrosior, medio obsolete subangulatus; columella compressa, leviter arcuata; apertura parum obliqua, angulato-elliptica; perist. roseum, marginibus callo fusculo junctis, dextro expanso, basali deorsum subproducto, columellari angusto.*

Long. 31, diam. 15 mill.

Hab. Ecuador.

22. *BULIMUS RÖMERI*, Pfr. (Pl. XXXVI. fig. 4.) *T. sinistrorsa, perforata, ovato-conica, solidula, leviter striata strisque confertissimis spiralibus sub lente decussatula, carnea, ad suturam pallide fasciata; spira conica, vertice acutiusculo; anfr. 6, viz convexiusculi, ultimus spiram subæquans, infra medium subangulatus et spadiceo bifasciatus, basi rotundatus; apertura obliqua, auriformis; perist. simplex, margine externo breviter expanso, columellari subverticali, sursum dilatato, fornicatim reflexo.*

Long. 23½, diam. 13½ mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

This shell is very like *B. sinensis*, Bens., but differs from that by its more flattened whorls, the spiral striæ, the peristome not thickened, &c.

23. *BULIMUS PHRYNE*, Pfr. (839 b). *T. perforata, oblongo-fusiformis, tenuiuscula, plicato-striata, lutescens, strigis spadiceis albido conspersis picta; spira elongato-conica, vertice minuto; anfr. 6, convexiusculi, ultimus spira viz brevior, basi prope perforationem compressus; columella subangulatim arcuata; apertura parum obliqua, subrhombea, intus rosea, strigis perlucetibus; perist. simplex, rectum, margine columellari fornicatim reflexo.*

Long. 31, diam. 12 mill.

Hab. Andes of Peru.

24. *BULIMUS LURIDUS*, Pfr. (1014 a). *T. umbilicata, conico-ovata, solida, striatula, lurido-carnea; spira conica, apice acuto, submammillata; anfr. 6, convexiusculi, ultimus spiram paulo superans, basi rotundatus; apertura subverticalis, oblongo-ovalis; perist. rectum, margine dextro intus albide labiato, columellari dilatato, fornicato-patente.*

Long. 22, diam. 11 mill.

Hab. New Caledonia.

25. *BULIMUS SUBANGULATUS*, Pfr. (1043 a). *T. subperforata, ovato-conica, tenuissima, striatula, pellucida, fulvo-carnea; spira conica, vertice acutiusculo; anfr. 6, modice convexi, ultimus spiram paulo superans, medio subangulatus, basi rotun-*

datum; apertura obliqua, ovalis; perist. simplex, rectum, margine columellari sursum triangulatim dilatato, reflexo, subappresso.

Long. $14\frac{1}{2}$, diam. 8 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

26. *CLAUSILIA MOUHOTI*, Pfr. (Pl. XXXVI. fig. 5). *T. subrimata, fusiformis, solidula, plicis filaribus confertis et striis spiralibus arcte reticulata, sericina, pallide fulvida, maculis et strigis albis irregulariter picta; spira a medio regulariter attenuata, apice obtuso; sutura rufo obsolete marginata, fasciculis plicarum albarum subcrenata; anfr. 12, convexiusculi, summi unicolores pallidi, interdum truncati, ultimus angustior, rotundatus, breviter solutus, vix descendens; apertura fere verticalis, subangulato-piriformis; lamellæ triangulares, fere contiguæ; lunella filaris, elongata, parum arcuata; plica palatalis 1 supera, subcolumellaris juxta lamellam inferam emergens; perist. continuum, expansum et reflexiusculum, margine externo superne subsinuato.*

Long. (integr.) 42, diam. 9 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

27. *CYCLOTUS GRANULATUS*, Pfr. (14 a). *T. umbilicata, conoideo-depressa, solida, undique dense et subruditer granulata, opaca, albida, epidermide ad peripheriam latissime castaneo-fusciata vestita; spira parum elevata, vertice subtili; anfr. $4\frac{1}{2}$, convexi, celeriter accrescentes, ultimus rotundatus, circa umbilicum mediocrem non cristatus; apertura fere verticalis, subcircularis; perist. simplex, rectum, obtusum, continuum, anfractui contiguo breviter adnatum. Operc. planum, marginibus anfractuum haud prominulis.*

Diam. maj. 25, min. 20, alt. 14 mill.

Hab. Ecuador.

28. *ALYCÆUS MOUHOTI*, Pfr. (Pl. XXXVI. figs. 1, 2.) *T. anguste umbilicata, subpyramidalis, solidula, opaca, densissime capillaceo-striata, carneo-albida; spiraturbinata, apice obtusulo, lutescens; sutura profunda; anfr. $1\frac{1}{2}$, convexi, ultimus irregulariter inflatus, saccatus, 3 mill. pone aperturam subito contractus, a strictura canalem longum, in sutura retrocedentem emittens, tum sensim dilatatus et costulis nonnullis distantibus munitus; apertura obliqua, subcircularis; perist. duplicatum, internum continuum, breviter adnatum, externum fornicato-reflexum, latere sinistro subangulatim dilatatum.*

Diam. maj. $7\frac{2}{3}$, min. $6\frac{1}{3}$, alt. $5\frac{1}{4}$ mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

29. *ALYCÆUS* (sect. *DIORYX*, Bens.) *BACCA*, Pfr. (4 a). *T. breviter rimata, globoso-turbinata, sublævigata, parum nitida, cereo-albida; spira regulariter turbinata, apice acutiusculo,*

cornea; sutura profunda; anfr. vix ultra 4, convexi, ultimus levissime capillaceo-striatus, perinflatus, ad aperturam valde contractus, e strictura canale mediocrem, in sutura retrocedentem emittens; apertura verticalis, spira brevior, circularis; perist. album, continuum, breviter adnatum, anguste expansum, margine dextro subduplicatum. Operc. planum, multispirum, fulvum, nucleo rubro.

Diam. maj. 7, min. $6\frac{1}{4}$, alt. $7\frac{1}{2}$ mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

30. *HYBOCYSTIS MOUHOTI*, Pfr. (Pl. XXXVI. fig. 13.) *T. subumbilicata, compresse pupæformis, solida, striatula, saturate fusco-violacea; spira irregulariter oblonga; anfr. 6, primi 4 convexiusculi, conun subregularem formantes, penultimus multo longior, ultimus latere apertura complanatus, tum profunde descendens, foveolato-malleatus, antice arcuatim ascendens; apertura obliqua (basi axin excedens), angulato-ovalis, intus purpurascenti-fusca; perist. rufo-aurantiacum, incrassatum, duplicatum et reflexum, margine parietali subhorizontali, dextro ad angulum insertionis sursum producto. Operc. testaceum, pagina interiore castaneo callosa.*

Long. 35, diam. 17 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

31. *CYCLOPHORUS LAOMONTANUS*, Pfr. (16 a). *T. mediocriter umbilicata, depresso-turbinata, solidula, subtiliter striata, nitidula, fulva, strigis fulguratis pallide rufis ornata, vel in fundo pallido maculis et tæniis castaneis dense variegata; spira turbinata, vertice acuto, nigricante; anfr. 5, convexi, ultimus teres; apertura parum obliqua, subcircularis, superne obsolete subangulata; perist. continuum, breviter adnatum, cæterum æqualiter et anguste expansiusculum. Operc.?*

Diam. maj. 13, min. 11, alt. 9 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

This shell resembles *C. caeloconus*, Bens., but differs from it by its more elevated spire, narrower umbilicus, and slightly expanded peristome.

32. *CYCLOPHORUS HÆMATOMMA*, Pfr. (1076). *T. umbilicata, conoideo-depressa, solida, confertissime striata et superne liris elevatis inæqualibus crebris cincta, alabastrina; spira parum elevata, sursum fulvo-sanguinea, vertice subtili; anfr. 5, modice convexi, ultimus subteres, subtus lævigatus, crista funiformi, umbilicum latiusculum limitante, munitus; apertura obliqua, irregulariter rotundato-ovalis; perist. simplex, rectum, marginibus approximatis, callo brevi junctis, sinistro levius curvato, ad cristam umbilicalem sinuato.*

Diam. maj. 23, min. 19, alt. 12 mill.

Hab. Ecuador.

33. *CHONDROPOMA* (?) *SOLARE*, Pfr. (53 a). *T. clause umbilicata, oblongo-turrita, solida, liris filaribus albidis (interjectis minoribus) et costulis longitudinalibus confertissimis illas transgredientibus asperata, haud nitens, cinnamomea; spira subregulariter attenuata, truncata; sutura irregulariter subcrenulata; anfr. superst. 4½, modice convexi, ultimus non solutus; apertura verticalis, angulato-ovalis; perist. duplex, internum expansiusculum, adnatum, externum late expansum et radiato-plicatum, infra umbilicum subito resectum eumque lamina adnata claudens. Operc.?*

Long. 22, diam. 11 mill.

Locality unknown.

This very elegant shell presents the most intimate affinity to the Cuban *Chondropomata shuttleworthi, pudicum*, &c.; and I have no doubt that it belongs to the same genus.

34. *TROCHATELLA MOUHOTI*, Pfr. (22 a) (Pl. XXXVI. fig. 14).

T. trochiformis, solidula, peroblique rugoso-striata, alato-carinata, lutescens; spira conoidea, vertice minuto, laevigato, subpapillari; anfr. 6, plani, subundulati, omnes in alam undulatam, in superioribus subappressam, in ultimo liberam, deflexam dilatati, ultimus basi convexiusculus, minutissime spiraliter striatus; apertura perobliqua, lanceolata; perist. albidum, marginibus callo tenui nitido junctis, supero tenui, subrecto, basali arcuato, calloso, breviter reflexo, ad columellam brevissimam nodulifero.

Diam. maj. 17, min. 14, alt. 8 mill.

Hab. Lao Mountains, Camboja (*Mouhot*).

35. *HELICINA YORKENSIS*, Pfr. (93 a). *T. globoso-conica, solidula, subconferte spiraliter striata, carnea, fascia suturali flava et latiore fusco-violacea ornata; spira regulariter conoidea, vertice acutiusculo; anfr. fere 5, planulati, ultimus spiram paulo superans, periphæria rotundatus, subtus medio callo albo, granulato, circumscripto munitus; columella callosa, arcuata; apertura parum obliqua, subsemicircularis; perist. breviter expansum, margine basali arcuatim cum columella juncto.*

Operc. albidum.

Diam. maj. 5⅔, min. 5, alt. 4⅓ mill.

Hab. Cape York, North-east Coast of Australia (*Macgillivray*).

36. *HELICINA RETICULATA*, Pfr. (150 a). *T. trochiformis, solidula, liris confertis spiralibus striisque incrementi distinctis reticulata, carnea, maculis fulvo-roseis irregulariter picta; spira regulariter conoidea, vertice submammillari; anfr. 4½, planiusculi, ultimus periphæria subangulatus, basi callo parvulo, granulato, linea impressa circumscripto munitus; columella brevis, simplex; apertura parum obliqua, subtriangularis;*

perist. breviter expansum, margine basali cum columella angulum formante. Operc. castaneum, nucleo pallido.

Diam. maj. $6\frac{2}{3}$, min. 6, alt. $4\frac{2}{3}$ mill.

Hab. Cape Flattery, North-east Coast of Australia (*Macgillivray*).

EXPLANATION OF PLATE XXXVI.

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| Fig. 1, 2. <i>Alycaeus mouhoti</i> , p. 275. | Fig. 8. <i>Helix illustris</i> , p. 269. |
| 3. <i>Helix deliciosa</i> , p. 271. | 9, 10. <i>Helix laomontana</i> , p. 272. |
| 4. <i>Bulimus r meri</i> , p. 274. | 11, 12. <i>Helix benigna</i> , p. 269. |
| 5. <i>Clausilia mouhoti</i> , p. 273. | 13. <i>Hybocystis mouhoti</i> , p. 276. |
| 6. <i>Streptaxis pellucens</i> , p. 273. | 14. <i>Trochatella mouhoti</i> , p. 277. |
| 7. <i>Pupina mouhoti</i> *. | 15. <i>Helix horrida</i> , p. 272. |

8. DESCRIPTION OF NEW SPECIES OF MARINE SHELLS FROM THE PACIFIC ISLANDS. BY W. HARPER PEASE.

CYPRÆA GRANULATA.

T. ovata aut obeso-ovata, subgibbosa, subtenui, extremitatibus vix productis; dorso granuloso aut noduloso, nodulis lateralibus liris coadunatis, sulco dorsali vix impresso; lateribus submarginatis; basi convexa, lirata, liris remotis, per basem partim extensis, interdum liris intermediis; apertura angusta, antice latiore, lactea aut pallide rufescenti-fusca, nodulis albidis, rufescenti-fusco annulatis, liris rufescenti-fuscis; basi alba, liris basalibus rufo-fuscente marginatis, extremitatibus rufescenti-fuscis tinctis.

Shell rather light, ovate, or obesely ovate, somewhat gibbous; extremities slightly produced; back granulose or nodulous; nodules irregular in size, those near the margins connected by ridges; the ridges terminating at the margins, and seldom reaching the dorsal region, impressed by a slight dorsal groove, which is sometimes obsolete; sides slightly margined; base convex, ridged; ridges remote, especially those on the columella not extending to the margin, and those on the columella not reaching the inner edge, with the exception of a few of the anterior ones; occasionally a few short intermediate ridges; aperture narrow, slightly the wider anteriorly; cream-colour or light reddish-brown; nodules whitish, sometimes encircled by reddish-brown rings; ridges of the same colour; base white; basal ridges edged with reddish brown, and extremities stained with the same colour.

Length 32, breadth 20 mill.

From an examination of living specimens of the above species, from several parts of the Pacific, we are satisfied it is quite distinct from the *C. nucleus* or *C. madagascarensis*, with which it has been heretofore confounded. It differs from both of the above species in being lighter, and in the basal ridges being less in number and not extending to the margin, or becoming nearly obsolete as they approach

* The description of *Pupina mouhoti* will be given in a subsequent paper.

the margin. The dorsal ridges are also less in number, and in some specimens altogether wanting.

CONUS PURUS.

T. turbinata, superne subrotunda, subtilissime transversim et longitudinaliter elevatim striata; spira vix concava, spiraliter striata; apertura lata; omnino alba, epidermide tenui lutescente induta.

Shell turbinated, somewhat rounded at upper part, marked with very fine, unequal, transverse, and longitudinal raised striæ, the former the most distinct; spire very slightly concave, spirally striated; aperture broad; wholly white, covered with a thin, yellowish, membranaceous epidermis.

Length 40, breadth 21 mill.

DRILLIA NODULOSA.

T. pyramidal-oblonga; anfractibus 8, superne depressis, longitudinaliter nodoso-costatis, costis undecim, anfr. ultimo infra tuberculosi nodis cingulato; apertura ampla, sinu rotundato, profundo; canali brevi, lato; rufescenti-fusca, costis et columella ad basin albidis.

Shell pyramidally oblong; whorls eight, concavely depressed above, longitudinally nodosely ribbed, ribs about ten; body-whorl encircled by a row of tuberculous nodules, in continuation of the longitudinal ribs; aperture open, sinus round and deep; canal short, wide. Colour reddish brown; ribs and base of columella whitish.

Length 11, breadth $4\frac{1}{2}$ mill.

ANACHIS COSTELLIFERA.

T. oblongo-ovata, longitudinaliter costata, costis confertis compresso-rotundatis, infra suturas subconstrictis; anfr. 5, plano-convexis, anfr. ultimo inferne transversim striato; apertura ampla, sinu profundo, basi subtruncato, canali brevissimo; costis griseo-albicantibus, interstitiis interdum rufescenti-fuscis; anfr. ultimo rufescenti-fusco semibalteato aut irregulariter picto.

Shell oblong-ovate, longitudinally ribbed; ribs about twenty, close, compressedly rounded, extending the whole length of the whorls, very slightly constricted beneath the sutures; whorls five, plano-convex; aperture rather wide; sinus open, on the central third of the lip; base subtruncate; canal very short; ribs greyish white; interstices sometimes reddish brown; last whorl partially banded or irregularly painted with reddish brown.

Length 5, breadth 2 mill.

SIPHONARIA DEPRESSA.

T. ovata vel oblongo-ovata, depressa, tenuiuscula, subirregulari, radiatim costata et lirata, costis paucis, prominentibus, concentricè obsolete striata, apice subuncinato, siphone conspicuo; nigricans, intus nigra.

Shell ovate or oblong-ovate, somewhat irregular, much depressed, radiately ribbed and ridged; ribs few and prominent, particularly the one at the siphon, concentrically obsoletely striated; apex slightly uncinatè; siphon conspicuous. Colour blackish; ribs sometimes lighter, black within.

9. DESCRIPTIONS OF SIXTEEN NEW SPECIES OF BIRDS FROM THE ISLAND OF FORMOSA, COLLECTED BY ROBERT SWINHOE, ESQ., HER MAJESTY'S VICE-CONSUL AT FORMOSA. BY JOHN GOULD, ESQ., F.R.S., ETC.

PARUS CASTANEOVENTRIS, Gould.

A bar across the forehead and cheeks white; crown of the head, back of the neck, throat, and chest jet-black; on the nape a spot of pure white, bounded below by a slight mark of chestnut; mantle, back, shoulders, upper surface, wings, and thighs very deep blue-grey; abdomen and under tail-coverts rich chestnut; bill bluish black.

Total length, 4 inches; bill, $\frac{1}{2}$; wing, $2\frac{1}{2}$; tail, $1\frac{5}{8}$; tarsi, $\frac{5}{8}$.

Remark.—This species is very similar in colour to the *Parus varius* of Japan; but differs in having a much smaller amount of chestnut on the back, and in its smaller size.

ALCIPPE BRUNNEA, Gould.

Feathers of the crown and upper surface deep reddish brown, those of the crown slightly fringed with a darker tint, giving that part a scaled appearance; a longitudinal black stripe commences above the eye and passes down towards the nape, separating the brown colouring of the crown from the grey of the sides of the face and ear-coverts; throat and under surface brownish grey; flanks wood-brown; primaries and tail-feathers uniform chestnut-brown; thighs reddish brown; bill horn-colour; legs and toes flesh-white.

Total length, $4\frac{3}{4}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{3}{8}$; tail, 2; tarsi, $\frac{3}{4}$.

Remark.—A small brown bird, rather less in size than *Accentor modularis*.

MYIOPHONEUS INSULARIS, Gould.

Lores jet black; forehead crossed by a narrow band of shining deep blue; crown of the head, throat, back of the neck, all the upper surface and the tail obscure blackish blue; shoulders very bright metallic blue; primaries and greater wing-coverts margined externally with bright blue; feathers of the chest and upper part of the abdomen black, with shining blue tips; lower part of the abdomen, thighs, under tail-coverts, and the under side of the tail-feathers dull black; bill and legs black.

Total length, $11\frac{1}{4}$ inches; bill, $1\frac{2}{3}$; wing, $6\frac{5}{8}$; tail, $5\frac{1}{8}$; tarsi, $2\frac{1}{8}$.

Remark.—This is a much larger bird than the *Myiophoneus cæru-*

leus of China; it also differs in the finer blue of the breast, and in the total absence of the spangled spots of shining blue which occur on the back of that species.

GARRULAX RUFICEPS, Gould.

Lores and chin black; forehead and crown, down to the nape, light orange-red; ear-coverts orange-brown; mantle, back, rump, sides of the chest, flanks, thighs, and two middle tail-feathers light brown; primaries blackish brown, margined externally with light olive-brown; lateral tail-feathers light brown at their bases, and largely tipped with white; throat, centre of the chest, and abdomen white; bill blackish brown; legs, toes, and claws light flesh-brown.

Total length, $10\frac{1}{2}$ inches; bill, $1\frac{1}{8}$; wing, 5; tail, $5\frac{1}{4}$; tarsi, $1\frac{3}{4}$.

Remark.—This species is allied to *Garrulax albogularis* and *G. cæruleatus*; but differs from both in the uniform orange-red colouring of the crown.

GARRULAX PÆCILORHYNCHA, Gould.

Crown of the head, nape, back, rump, throat, and chest deep rusty brown; many of the feathers of the crown slightly fringed at their tips with black, a hue which is also observable on the tips of the ear-coverts; primaries and secondaries reddish brown on their inner webs; the external edges of the former light grey, and of the latter deep rusty chestnut; tail deep rusty chestnut, particularly the six central feathers, the remainder being darker and having less of the chestnut hue, these lateral feathers also become lighter and of a reddish fawn-colour towards their tips; abdomen and thighs deep blue-grey, tinged on the latter with rufous; under tail-coverts fawn-colour; legs and toes yellowish olive.

Total length, $9\frac{1}{4}$ inches; bill, $1\frac{1}{4}$; wing, $4\frac{3}{8}$; tail, $4\frac{1}{2}$; tarsi, $1\frac{1}{2}$.

Remark.—This species differs so much in colour from all other known species of the form, that it cannot be confounded with any of them.

POMATORHINUS ERYTHROCNEMIS, Gould.

A narrow bar across the forehead, knees, and under tail-coverts rusty red; lores and ear-coverts grey; crown of the head and back of the neck brownish grey, passing into the deep rusty chestnut of the back, shoulders, and external margins of the wing-feathers; inner margins of the wing-feathers blackish brown; tail blackish brown, with rusty margins; a streak of black, commencing at the base of the under mandible, passes downward to the chest, which is conspicuously spotted or rather blotched with black; throat and centre of the abdomen white; flanks and upper part of the thighs rusty olive-brown; bill much curved, and of a purplish brown.

Total length, $8\frac{1}{4}$ inches; bill, $1\frac{3}{8}$; wing, $3\frac{3}{4}$; tail, $3\frac{3}{4}$; tarsi, $1\frac{1}{2}$.

Remark.—This species conspicuously from every other known species of the genus. It is about the size of the common Thrush (*Turdus musicus*).

HYPSIPETES NIGERRIMA, Gould.

Entire plumage black, with the exception of the edges of the primaries and tail-feathers, which are pure grey, a tint which is also observable, but in a minor degree, on the margins of the greater and lesser wing-coverts, and on the feathers of the flanks and the back, on the latter, however, it is rather of a greenish cast than pure grey; bill blood-red; legs red.

Total length, $8\frac{1}{2}$ inches; bill, $1\frac{1}{8}$; wing, 5; tail, 4; tarsi, $\frac{3}{4}$.

Remark.—This species is somewhat allied to, but is a smaller bird than, the well-known *Hypsipetes psaroides* of India.

PERICROCOTUS GRISEOGULARIS, Gould.

Male: forehead, crown of the head, back of the neck, back, shoulders, and two central tail-feathers sooty black; wings black, with an oblique bar of scarlet across the primaries and secondaries, near their bases; throat and ear-coverts light grey; chest, abdomen, flanks, under tail-coverts, and rump rich scarlet; lateral tail-feathers black at their bases, and scarlet for the remainder of their length; thighs blackish brown; bill and legs black.

Total length, $6\frac{3}{4}$ inches; bill, $\frac{5}{8}$; wing, $3\frac{1}{2}$; tail, $3\frac{3}{4}$; tarsi, $\frac{3}{4}$.

Female: throat light grey, as in the male; crown, ear-coverts, back, and shoulders deep leaden grey; rump sulphur-yellow; chest, abdomen, under tail-coverts, the oblique band across the wing, and the tips of the outer tail-feathers rich Indian yellow; bill and legs black.

Remark.—This species is somewhat allied to *Pericrocotus saularis*, but differs from that bird in its clearly defined throat-mark and other characters.

GARRULUS TAÏVANUS, Gould.

Feathers covering the nostrils, a narrow bar on the forehead, and a longitudinal mark down the cheeks black; crown of the head, nape, back, and all the under surface vinous brown, tinged with grey on the centre of the back; rump and under tail-coverts white; primaries black, fringed on their outer margins with greyish white; the secondaries have the usual speculum of blue disposed in broad bars on their outer webs, and a patch of chestnut on the inner margin of the two shortest feathers, as in most of the true Jays; shoulders and spurious wing alternately barred with fine lines of blue and black; tail black; bill black; tarsi and toes flesh-colour.

Total length, $10\frac{1}{2}$ inches; bill, $1\frac{1}{5}$; wing, $6\frac{1}{5}$; tail, $5\frac{1}{2}$; tarsi, $1\frac{3}{8}$.

Remark.—This very distinct species, the smallest of the genus I have yet seen, has the same general colouring as the *Garrulus bispecularis* of the Himalayas and the *G. sinensis* of China, but differs from both in its smaller size and in the black colouring of the feathers covering the nostrils.

UROCISSA CÆRULEA, Gould.

Crown of the head, nape, cheeks, throat, and chest jet-black; body,

both above and below, and the thighs blue, of a cobalt tint in certain lights; all the primaries and secondaries fringed with white at their tips; upper tail-coverts light cobalt-blue, with a broad bar of black at their tips; two centre tail-feathers cobalt-blue, broadly tipped with white; the lateral feathers blue at their bases, to which succeeds a broad band of black, beyond which they are snow-white; bill and legs blood-red.

Total length, 21 inches; bill, $1\frac{5}{8}$; wing, $7\frac{1}{2}$; tail, $14\frac{1}{4}$; tarsi, $1\frac{5}{8}$.

Remark.—In size this fine new species is about equal to the *Urocissa sinensis*, but it differs from that and every other member of the genus in its stouter bill and in the blue colouring of the entire body.

MEGALÆMA NUHALIS, Gould.

Forehead dull olive; immediately before the eye a small patch of red; throat sulphur-yellow; remainder of the cheeks, the ear-coverts, back of the neck, and a band across the lower part of the throat pale greenish blue, to which succeeds a band of red, separating the sulphur-yellow of the throat from the yellowish green of the under surface; upper surface and tail green, with an obscure patch of red on the mantle; primaries blackish brown, externally margined with green; bill blackish horn-colour, except the base of the under mandible, which is sulphur-yellow; legs olive-black.

Total length, $7\frac{1}{2}$ in.; bill, $1\frac{1}{4}$; wing, $4\frac{1}{3}$; tail, $2\frac{3}{4}$; tarsi, 1.

Remark.—This very distinctly marked species is about the size of *Megalæma asiatica*.

PICUS INSULARIS, Gould.

Male: forehead crossed by a narrow band of buff; crown of the head scarlet; lores, cheeks, sides of the neck, and throat white; a black line, commencing at the base of the lower mandible, passes down between the ear-coverts and the throat, on to the sides of the chest, where it forms a broad patch; flanks buffy white, strongly striated with black; lower part of the abdomen and under tail-coverts rosy scarlet; mantle, shoulders, upper tail-coverts, and four middle tail-feathers black; centre of the back white, crossed with irregular rays of black, as in *Picus leuconotus*; wings black, spotted with white on both webs of the feathers, as in that species; outer tail-feathers alternately barred with black and white; bill bluish horn-colour; tarsi and feet lead-colour.

Total length, $9\frac{1}{4}$ inches; bill, $1\frac{1}{2}$; wing, $5\frac{3}{8}$; tail, $3\frac{1}{2}$; tarsi, $\frac{5}{8}$.

Female like the male in every respect, except in having a black instead of a red crown.

Remark.—This species is nearly allied to the *Picus leuconotus*, but is very distinct from that and every other member of the *Picidæ* I have yet seen; and it is certainly not included in the great work on this family of birds just completed by M. Malherbe.

GECINUS TANCOLO, Gould.

Lores, a narrow band across the forehead, back part of the head, nape, and a stripe down the cheeks black; centre of the forehead

blood-red; back dull green, passing into greenish yellow on the rump; shoulders and upper part of the wings dull wax-yellow; primaries olive-brown, with small elongated marks of buff on their external margins; internal webs of the greater coverts and primaries crossed with distinct bars of greyish white; throat and cheeks grey; under parts of the shoulders and axillaries alternately barred with greenish white and blackish brown; chest and under surface sordid green.

Total length, $10\frac{1}{4}$ inches; bill, $1\frac{5}{8}$; wing, $1\frac{5}{8}$; tail, $5\frac{1}{4}$; tarsi, $\frac{5}{8}$.

Remark.—The species to which this bird is most nearly allied is the *Gecinus occipitalis* of the Himalayas, from which however it is conspicuously different. I have adopted its Chinese name for a specific appellation.

EUPLOCAMUS SWINHOII, Gould.

Male: forehead black, gradually blending into the snowy-white lanceolate plumes which form a slight crest, and continue in a narrow line down the nape of the neck; back snowy white, offering a strong contrast to the narrow black line with which it is bounded on each side, and the rich fiery chestnut of the scapularies; lower part of the back, rump, and upper tail-coverts intense velvety black, broadly margined with shining steel or bluish black, these scale-like feathers gradually becoming of a larger size and of a more uniform black as they approach the tail-feathers; wings blackish brown; the greater and lesser coverts fringed with green; two centre tail-feathers snow-white, the remainder black; the somewhat elongated feathers of the chest and flanks black, with shining blue reflexions; thighs and under tail-coverts dull black; legs and spurs blood-red, except the tips of the latter, which are brown; sides of the face mottled to an extent seldom seen even among Gallinaceous birds; in front this appearance extends to the nostrils, while posteriorly it terminates in a point near the occiput; a large lappet hangs down over each cheek, and a more pointed one rises, in the form of a horn, high above the crown, the whole being of the finest red, and covered with papillæ, as in the *Gennæus nychthemerus*; bill light horn-colour.

Total length, 28 inches; bill, $1\frac{1}{2}$; wing, 9; tail, 17; tarsi, 4.

Female: this sex offers a strong contrast to the male, from there being no appearance of a crest in any specimen I have seen, and in the entire plumage being reddish or orange-brown, particularly the under surface; when examined in detail, however, many different but harmonizing tints are seen on the various parts of the body: on the back of the neck, mantle, scapularies, and lesser wing-coverts, the freckled brown feathers have lanceolate or spearhead-shaped markings surrounded with black down their centres, while the rump and upper tail-coverts are more uniformly and more finely freckled with orange and dark brown; primaries alternately barred on both surfaces with chestnut and dark brown; secondaries dark brown, conspicuously barred with ochre-yellow; throat brownish grey; chest orange-brown, each feather with two crescentic markings of dark brown; centre of the abdomen and thighs orange-brown, slightly freckled with darker brown; two centre tail-feathers dark brown, obscurely

barred with buff; lateral tail-feathers nearly uniform deep chestnut; bill horn-colour; space surrounding the eye and the legs red.

Total length, 18 inches; bill, $1\frac{1}{4}$; wing, $8\frac{1}{2}$; tail, 8; tarsi, 3.

Remark.—This exceedingly beautiful species is one of the most remarkable novelties I have had the good fortune to describe; in size it is somewhat smaller than the *Gennæus nycthemerus*, which it resembles in its red wattles and in the form of its tail, while in its strong legs, the scaly stiff feathers of the lower part of its back, the red-and-white colouring of the anterior portion of its upper surface, and in its steel-blue crest it more closely assimilates, in my opinion, to the members of the genus *Euplocamus*; and with that group, the Fire-backs, I have accordingly associated it.

In dedicating this fine bird to Mr. Swinhoe, I feel that I am only paying a just compliment to a gentleman who must ever rank among the foremost of those travellers who have enriched ornithology by their numerous Eastern discoveries.

Genus BAMBUSICOLA, Gould.

Generic characters.—Bill moderately long, and very similar in form to that of *Perdix*; nostrils covered by an operculum; wings moderately long, round, and concave, the fifth primary the longest; tail somewhat more lengthened than in *Perdix*, rounded or inclined to a wedge-shape; tarsi rather long, and armed with a well-defined but blunt spur; toes longer than in *Perdix*, the two lateral ones equal in length, and united at their base by a membrane; hind toe rather long and free.

Sexes alike, as in *Caccabis*, but the female destitute of a spur.

This is a very distinct form among the *Gallinaceæ*, the species of which, so far as we yet know, are only two in number, namely, the present bird and the *Galloperdix sphenurus* of China. Both evince a predilection for forests of bamboo, which circumstance has suggested the generic appellation. In point of affinity they equally approach the members both of the genera *Perdix* and *Caccabis*.

BAMBUSICOLA SONORIVOX, Gould.

Male: crown of the head rusty brown, each feather obscurely barred and freckled with blackish brown; lores, ear-coverts, chest, back of the neck, and chest grey, each feather minutely freckled with blackish brown; back and rump olive, each feather minutely freckled with blackish brown; those of the back, nearest the mantle, largely blotched with deep chestnut; these chest-marks also extend over the shoulders, near the tips of which is a lanceolate spot of white; a similar but more obscure mark also occupies the sides of the wing-coverts, but, instead of being white, it is pale fawn-colour; greater wing-coverts chestnut in the centre, then black, fringed with deep buff; primaries blackish brown externally, margined with reddish chestnut; two middle tail-feathers freckled brown, buff, and black; the remainder deep chestnut-brown; abdomen rich cinnamon, with

a bar of rich chestnut near the tip of all the feathers of the flanks; thighs cinnamon-brown; bill and legs blackish brown.

Total length, $9\frac{1}{2}$ inches; bill, 1; wing, $5\frac{1}{8}$; tail, 4; tarsi, $1\frac{3}{4}$.

Female similarly coloured.

The young, at about a month old, have acquired much of the colouring of the adults, but the centre feathers of the back and shoulders are darker, with lighter edges, giving this part of the plumage a very sparkling appearance.

NUMENIUS RUFESCENS, Gould.

Head, neck, upper and under surface reddish fawn-colour, deepest and most conspicuous on the rump and tail-feathers; down the centre of each of the feathers is a streak of blackish brown, broadest and most conspicuous on the back, rump, and upper tail-coverts; primaries blackish brown, strongly toothed on their inner margins with greyish white; tail-feathers irregularly crossed with blackish brown; thighs light buff.

Total length, 23 inches; bill, 7; wing, $12\frac{1}{2}$; tail, $3\frac{3}{4}$; tarsi, 5.

This is a very fine species, about the size of *Numenius arcuatus* and *N. australis*, from the former of which it differs in the absence of the white rump, and from the latter in its rufous colouring.

10. ON A BIRD SUPPOSED TO BE THE FEMALE OF CROSSOPTILON AURITUM, PALLAS, FROM NORTHERN CHINA. BY ROBERT SWINHOE, F.Z.S., H.M. CONSUL AT FORMOSA.

My friend Dr. Lamprey, of the 97th Regiment, stationed at Tsin-tsin, sent me, while I was at Amoy, the bird I now exhibit, in skin, with the statement that he had seen several of the same species, all of which were similar in plumage. My specimen I have taken to the British Museum, and compared, with the kind assistance of Mr. G. R. Gray, with Hodgson's bird from the Himalayas. That they are closely allied species there can be no gainsaying; but of their distinctness there can be little doubt. Our bird is much larger, has longer tarsi, bill higher at the base, white throat, with longer ear-feathers, deep brown plumage, and a differently shaped tail. From the development of its cheek-skin, its form of bill, as well as the appearance of its plumage, it bears the mark of an old bird; and from the shape of its tail one would infer that it was a male. But, on examining its legs, we find no spur, only a hard callosity, such as distinguish the females of the *Phasianidæ*. I am rather inclined, therefore, to concur with Mr. G. R. Gray in considering the bird a female, but the masculine form of tail is rather a difficulty. In comparing it with the specimen of *Crossoptilon* in the Museum, it is, however, easy to see that the tail of the Peking bird is proportionately smaller, and, judging from analogy, it is rather improbable that the mature male would wear such a dingy livery. Now, supposing this bird to be a female, we have no hesitation in saying that it is not the female of the *Crossoptilon* from Thibet; we must, therefore, compare it

with the description of the *C. auritum* given by Pallas in his 'Zoo-graphia Rosso-Asiatica,' vol. ii. p. 86. Pallas makes no mention of proportions and measurements, and, further, he tells us that the only skin he received from China had no legs; but the shape of the tail, with its eighteen side-feathers and four curved central feathers, answers very nearly, as well as the white throat and ear-plumes, the latter $1\frac{1}{2}$ inch long. But in general colour, and in many respects, they differ. Pallas's bird has the black plumelets on the crown bluish black; throat and ears white; the neck, the whole body as far as the rump, together with the bases of the wings, of one uniform bluish leaden; interior quills same colour as the back; primaries brown, the second, third, and fourth being margined exteriorly with white; tail with the four central tail-feathers curved and comose, of a bluish black; the four nearest *rectrices* on each side widest and entire, curved inwards, and nearly equal in length, blue at their extremities, the rest of the side-feathers decreasing gradually in length, the greater part of *their basal halves* being white, the apical portions bluish black.

Ours, from Peking, has the small plumes on the crown *purplish* black, bordered by an indistinct whitish occipital band. Throat and ears white. Neck deep shining black. Back, belly, and entire wings deep chocolate-brown; vent silky and paler. Rump and tail dingy white, the stems of the tail-feathers deep chocolate-brown, the ends of the tail-feathers being more or less deeply tipped with purplish black, the four central feathers being comose, and the nine others on each side being almost equally graduate and curved inwards.

Now the objections I take against considering this bird the female of *C. auritum*, Pall., arise first from its style of colouring. The male of *C. auritum* has the entire body a bluish leaden. In our bird, consequently, if a female of the same species, we might expect to find a uniform brown. But no; ours has a *black* neck and a *white* rump. The white margins to the quills might be a sexual difference; but it strikes me, from Pallas's description, ours has much smaller and somewhat differently shaped wings. In the tail, too, we should expect greater similarity of colouring, if not of form. In the colouring of its tail *C. auritum* more nearly approaches the *C. tibetanum*, Hodgs. The four central feathers are bluish black; the four next on each side, of *nearly equal* length, are tipped with blue; whereas the entire tail of our bird is dingy white, tipped with purplish black, the four feathers next to the central ones being graduated in much the same proportion as those that follow. I think, therefore, after due deliberation, that our bird, which there seem to be valid reasons for considering a female, is a species the male of which will be more beautiful than either the *C. tibetanum* or the *C. auritum*. If I am rightly informed, our specimen hails from Mantchuria, whereas Pallas's bird came from Mongolia, and Hodgson's from Thibet. For the present, therefore, I appropriate to myself the advantage of the doubt, and propose to introduce this as the female of a new species, which I propose to name *Crossoptilon mantchuricum*.

11. REMARKS ON ALL THE HUMAN ENTOZOA. BY T. SPENCER COBBOLD, M.D., F.L.S., LECTURER ON COMPARATIVE ANATOMY, ZOOLOGY, AND BOTANY AT THE MIDDLESEX HOSPITAL.

At the recent Cambridge Meeting of the British Association for the Advancement of Science, I adduced the following argument in favour of a more extended prosecution of experimental research in the department of human helminthology :—“As man is infested by a great variety of internal parasites, and some of them prove exceedingly troublesome, it is evident that a large amount of practical good would ensue if we were more perfectly informed respecting the origin and economy of these creatures; for not only are our personal interests directly affected by their intrusion, but we also suffer indirectly from the injury and destruction they occasion amongst our domesticated animals. At least thirty well-marked forms have been described as infesting the human body; and although most of the species are comparatively rare, yet a considerable number are exceedingly common in occurrence, and likewise often prove numerically abundant in one and the same individual.”

This argument was supported by a reference to certain recently ascertained facts, a more particular account of which, combined with the results of my own inquiries, I now submit to the consideration of the Zoological Society.

In the subjoined list I only record those which are perfectly distinct forms, and therefore probably good species. Many forms which were at first supposed to be distinct will be found in the synonymy placed at the head of each comment where the species is separately considered. The larvæ are noticed under the titles of the adults to which they are either known or presumed to be respectively referable. This method is followed even in cases where the adult condition is not known to occur in the human body or in any other “host:” thus, for example, the *Cysticercus acanthotriasis* is placed under *Tenia acanthotriasis*, although the mature tapeworm at present remains unknown :—

Human Entozoa.

1. *Fasciola hepatica*, Linnæus.
2. *Distoma crassum*, Busk.
3. — *lanceolatum*, Mehlis.
4. — *ophthalmobium*, Diesing.
5. — *heterophyes*, Siebold.
6. *Bilharzia hæmatobia*, Cobbold.
7. *Tetrastoma renale*, Delle Chiaje.
8. *Hexathyridium pinguicola*, Treutler.
9. — *venarum*, Treutler.
10. *Ascaris lumbricoides*, Linnæus.
11. — *mystax*, Rudolphi.
12. *Trichocephalus dispar*, Rudolphi.
13. *Trichina spiralis*, Owen.
14. *Filaria medinensis*, Gmelin.

15. *Filaria lentis*, Diesing.
16. *Strongylus bronchialis*, Cobbold.
17. *Eustrongylus gigas*, Diesing.
18. *Sclerostoma duodenale*, Cobbold.
19. *Spiroptera hominis*, Rudolphi.
20. *Oxyuris vermicularis*, Bremser.
21. *Tænia solium*, Linnæus.
22. — *mediocanellata*, Küchenmeister.
23. — *acanthotrias*, Weinland.
24. — *flavopuncta*, Weinland.
25. — *marginata*, Batsch.
26. — *echinococcus*, Siebold.
27. — *nana*, Siebold.
28. — *elliptica*, Batsch.
29. *Bothryocephalus latus*, Bremser.
30. — *cordatus*, Leuckart.

In this list it will be observed that I have purposely omitted the Acarine genus *Pentastoma*, the Annelid *Dactylius aculeatus* (Curling), and several other internal parasites not strictly referable to the Helminths.

Up to the present hour no one has recorded the occurrence of any acanthocephalous helminth within the human body, although it is well known that *Echinorhynchi* have been found in all the vertebrate classes, and even in the *Simiadae**.

1. FASCIOLA HEPATICA, Linnæus.

F. hepatica, Linnæus, Pallas, Fabricius, Müller, Fröhlich, Bosc, Blanchard, Cobbold, &c.

F. humana, Gmelin.

Distoma hepaticum, Abildgaard, Zeder, Mehlis, Rudolphi, Bremser, Delle Chiaje, Dujardin, Creplin, Siebold, Owen, Pluskal, Küchenmeister, Diesing, Weinland, Simonds, &c.

Planaria latiuscula, Goeze.

The general structure of this parasite is now thoroughly well understood, although some minor points, more especially in respect of the mode of origin of the branches of the water-vascular system, remain to be investigated. The old view of Mehlis, as to the termination of the excretory system by an open *foramen caudale*, although

* In connexion with this subject I may remark that I have just received (Nov. 1st) a most interesting brochure from Prof. Rudolf Leuckart, in which he describes a remarkable series of genetic changes discovered by him as occurring in *Echinorhynchus proteus*. Contrary to our previous notions, he proves by experiments (with eggs administered to the *Gammarus pulex* of our ponds and rivers) that the embryos materially differ from the adult forms, and stand in the same relation to them that the larval *Pluteus* and *Pilidium* respectively do to *Ophiurus* and *Nemertes*. An alternation of generations was certainly quite unsuspected. The title of the paper is "Helminthologische Experimentaluntersuchungen," having been communicated to the Göttingen königliche Gesellschaft der Wissenschaften on the 9th October, 1862. Prof. Busk has since given a translation of this paper in the 'Microsc. Journal' for January 1863.

rejected by Blanchard, is now generally accepted as correct. In other particulars, concerning the mode of distribution of the aquiferous vessels, the representations of the French naturalist appear to be trustworthy, and my own injections confirm his statements in all essential points*. Up to the present hour a complete history of the development of this species has not been made out; but the recent investigations of Van Beneden, Pagenstecher, Wagener, Filippi, and others enable us to form tolerably accurate conclusions respecting the abode and migrations of its larvæ. As, however, I have recently published the results of my investigations on this point in my paper "On the Common Liver Entozoon of Cattle," in the pages of the 'Intellectual Observer' (vol. i. p. 115 *et seq.*), I need not now recapitulate the deductions there recorded; but I may observe, in passing, that a well-sustained series of researches are still wanting to complete the chain of evidence†. The costly nature of these investigations has alone prevented my further prosecution of the necessary experiments. Hitherto, only nine instances have been recorded of the occurrence of this parasite within the human body; and for particulars respecting these I may also be permitted to refer to my "Synopsis of the Distomidæ," in the fifth volume of the Journal of the Proceedings of the Linnean Society.

2. DISTOMA CRASSUM, Busk.

D. crassum, Cobbold, Simonds.

D. buskii, Lankester, Moquin-Tandon.

Dicrocoelium buskii, Weinland.

This is a good species, and appropriately named; for, although Von Siebold (in Müller's Archiv for 1836, p. 234, and in his Lehrbuch, vol. i. p. 143) refers to a Distome infesting *Hirundo urbica* under this title, he has given no description of the worm. Dising places Von Siebold's *D. crassum* among his *species inquirendæ*, and it is very probably identical with the *D. maculosum* of Rudolphi. No other instance has occurred since the original fourteen specimens were discovered by Mr. Busk in the duodenum of a Lascar. From a careful examination of three examples, severally presented by the discoverer to the Museum of the Royal College of Surgeons, the Museum of the Middlesex Hospital Medical College, and to my private collection‡, I am satisfied that it is generically distinct from the above; but it is unnecessary to insist further on this distinction, as

* Specimens of the *Fasciola gigantea*, thus prepared, were exhibited by me at the Glasgow Meeting of the British Association in 1855, a description of them being given in the 'Report,' Sect., p. 108; and a more extended account of the same appeared in 'Edin. New Phil. Journ.' for 1855, plate 7.

† Since the above was written, I have received a communication from Professor Leuckart, of Giessen, in which he mentions that he has at last succeeded in solving many points respecting the phases of development through which this species passes. A full account of these changes will doubtless appear in the second division of his valuable work (*Die menschlichen Parasiten*) now in course of publication.

‡ I have forwarded this specimen to Prof. Leuckart in exchange for other rare parasites.—T. S. C., Jan. 10, 1863.

I have elsewhere fully exposed the fallacy of combining the genera *Fasciola* and *Distoma*. In two of the specimens which Mr. Busk injected with mercury, the injection has passed from the digestive into the aquiferous system, which latter, in its arrangements, does not differ materially from that of *Fasciola hepatica*. The original account in Dr. Budd's valuable work on Diseases of the Liver speaks of a "branched uterine tube;" but this description is manifestly erroneous, and probably refers to the division of the upper end of the vitelligene tube into the ducts which come from the yelk-forming glands on either side of the body.

3. DISTOMA LANCEOLATUM, Mehlis.

D. lanceolatum, Mehlis, Bucholz, Gurlt, Valentin, Chabert, Dujardin, Diesing, Blanchard, Baird, Küchenmeister, Leidy, Moulinié, Cobbold, &c.

D. hepaticum, Zeder, Rudolphi, Bremser, Olfers, Bojanus, Creplin, Gurlt, Owen.

D. conus, Gurlt.

Fasciola hepatica, Bloch, Jördens, Bosc.

F. lanceolata, Rudolphi, Moquin-Tandon.

Planaria latiuscula, Goeze.

Dicrocoelium lanceolatum, Weinland.

Only two instances of the occurrence of this well-marked form in the human subject are recorded, one by Bucholz, the other by Mehlis and Chabert. The latter occurred in France, in a girl twelve years of age, from whom Chabert expelled a large number of specimens by the employment of empyreumatic oil. The specimens found by Bucholz in the body of a prisoner who died from fever are, it is believed, still preserved in the Museum of the University of Jena. Mehlis was the first to establish clearly the non-identity of this species with the common fluke,—a view which was shared also by Schäffer and Rudolphi, but subsequently abandoned by the latter. Its structure has been well investigated by Valentin, Blanchard, Walter, and Küchenmeister, from examples occurring in the gall-bladder and biliary-ducts of our domesticated ruminants.

4. DISTOMA OPHTHALMOBIUM, Diesing.

D. ophthalmobium, Diesing, Küchenmeister, Cobbold, Moquin-Tandon.

D. oculi-humani, Gescheidt.

? *D. (lentis)*, Von Ammon.

Dicrocoelium oculi-humani, Weinland.

? *Monostoma lentis*, Nordmann, Gescheidt, Diesing, Küchenmeister, Cobbold, Weinland.

? *Festucaria lentis*, Moquin-Tandon.

Gescheidt found four specimens in the eye of a child five months old, born with lenticular cataract. No one of them exceeded half a line in length; and they were situated between the lens and its capsule, where they could be recognized as so many dark spots on the

surface of the lens. From the original description in Von Ammon's 'Zeitschrift für Ophthalmologie' we are scarcely warranted in concluding that the specimens were sexually mature. The author speaks of ovaries, but they were "indistinct," and they are not represented in the carefully executed figures given in Von Ammon's writings ('Klinische Darstellungen der Krankheiten des menschlichen Auges,' vol. i. t. 12, and vol. iii. t. 14). I think it likely that Von Nordmann's *Monostoma lentis* is identical with this worm; and I perceive that Dr. Weinland, of Frankfort, entertains a similar suspicion. Küchenmeister's idea that this *Monostoma* may be a young *Cysticercus cellulosæ* is not at all convincing; for no one ever heard of eight *Cysticerci* occupying one eyeball, and much less is it likely that they should occur thus gregariously in the human lens. Trematodes are seldom solitary; and all the circumstances render it probable that the worms extracted by Prof. Jüngken, in his case of cataract, were specifically identical with those removed after death from the eye of the little girl who died from infantile atrophy whilst under Von Ammon's care.

5. DISTOMA HETEROPHYES, Siebold.

D. heterophyes, Siebold & Bilharz, Küchenmeister, Diesing, Leuckart, Cobbold.

Fasciola heterophyes, Moquin-Tandon.

Dicrocoelium heterophyes, Weinland.

In the month of April 1851, Dr. Bilharz, of Cairo, discovered this minute worm in the small intestine of a boy; and on a second occasion he collected several hundred specimens under very similar circumstances. The parts infested displayed a multitude of reddish points, due to the presence of the dark-coloured ova seen in the interior of the worms. The length of the largest specimens did not exceed three-fourths of a line. Their anatomy is fully described by Siebold in the fourth volume of the 'Zeitschrift für wissensch. Zool.,' and also by Küchenmeister in his 'Manual.'

6. BILHARZIA HÆMATOBIA, Cobbold.

Bilharzia hæmatobia, Cobbold.

Gynæcophorus hæmatobius, Diesing.

Thecosoma hæmatobium, Moquin-Tandon.

Distoma hæmatobium, Bilharz, Küchenmeister, Moulinié.

Schistosoma hæmatobium, Weinland.

Most helminthologists agree as to the propriety of placing this remarkable trematode in a separate genus, but some dispute has arisen concerning the priority of the various titles which have been proposed. The generic name here adopted is one which I applied to a second species discovered by me six months before Diesing communicated his "Revision der Myzelminthen" to the Vienna Academy; but I shall have no objection to employ the title *Gynæcophorus*, proposed by him, if it be generally thought more appropriate. Weinland has expressed to me his willingness to abandon the title

Schistosoma in favour of *Bilharzia*, which he admits has the priority. Though it is of little consequence which name be retained, the genus itself is one of remarkable interest, not merely in a structural point of view, but also from its prevalence on the borders of the Nile. The first specimens were discovered by Dr. Bilharz, of Cairo, in the portal system of blood-vessels; and others were subsequently observed by him, Griesenger, Reinhard, and Lautner in the veins of the mesentery, bladder, and other parts, giving rise to a formidable and very prevalent disease. The anatomy of *Bilharzia* has been fully described by the original discoverer and by Küchenmeister; but I would observe, in passing, that it is rather singular that Moquintandon should express his belief that the sexes have been mistaken by such competent authorities. The circumstance of the smaller form being carefully described by them as furnished with uterine ducts containing eggs ought to leave no doubt in our minds as to the correctness of the generally received opinion, unless we have distinct evidence to the contrary. In connexion with this subject I would also again call attention to the circumstance of my having discovered the second species of *Bilharzia* (*B. magna*) in the portal system of an African Monkey (*Cercopithecus fuliginosus*). Those who pay regard to the distribution or limitation of particular forms will see in this fact a curious illustration of the affinities of habit; for there can be little doubt that the Sooty Monkey procures the larvæ of its *Bilharzia* from a source similar to that from which our Egyptian brethren procure the larvæ of *B. hæmatobia*, and it is not a little significant that the genus in question should only at present be known to infest men and monkeys. For further particulars in regard to this parasite I must refer to my previous papers in the 'Linnean Transactions' (vol. xxii. p. 364), 'Linnean Proceedings' (vol. v. Zool. Div. p. 30), 'Zoological Society Proceedings' (1861, p. 118), and in the 'Intellectual Observer' (vol. i. p. 352).

7. TETRASTOMA RENALE, Delle Chiaje.

T. renale, Delle Chiaje, Diesing, Dubini, Leidy, Weinland.

The occurrence of this entozoon as a human parasite appears hitherto to have escaped the notice of English zoologists, although discovered by Lucarelli and Delle Chiaje in 1833. All that we now know of it is due to the original description of Chiaje, from whose 'Elmintografia Umana' we learn that it attains a length of 5 lines, has an oval flattened body, and is furnished with four suckers disposed in a quadrate manner at the caudal extremity. The reproductive orifices are situated near the mouth. It infests the tubes of the kidney.

8. HEXATHYRIDIVM PINGUICOLA, Treutler.

H. pinguicola, Treutler, Jördens, Brera, Leidy, Weinland.

Hexastoma pinguicola, Cuvier.

Linguatula pinguicola, Lamarck.

Polystoma pinguicola, Zeder, Rudolphi, Bremser, Delle Chiaje, Owen, Dujardin, Dubini.

This species was once found by Dr. Treutler in a diseased ovarium ; and no second instance of its occurrence in Germany or elsewhere has since been recorded. A concise description of this trematode, which attains a length of 8 lines, is given in Prof. Owen's article "Entozoa" in the 'Cyclopedia of Anatomy and Physiology.' It is also figured from Treutler in various works. Van Beneden and Gervais have supposed that this parasite may, after all, have only been the *Pentastoma denticulatum*. This view is inadmissible. (See a footnote by Leuckart, in his monograph of the "Bau und Entwicklungsgeschichte der Pentastomen," p. 11.)

9. HEXATHYRIDIDIUM VENARUM, Treutler.

H. venarum, Treutler, Jördens, Rudolphi, Brera, Bremser, Diesing, Leidy, Weinland.

Hexastoma venarum, Cuvier.

Hexacotyle venarum, Blainville.

Linguatula venarum, Lamarck.

Polystoma sanguicola, Delle Chiaje, Frick.

P. venarum, Zeder, Rudolphi, Dujardin, Owen, Dubini.

This species is better known than the above. Treutler originally obtained two specimens from the blood of the anterior tibial vein of a young man who accidentally ruptured the vessel while bathing at Leipsic. Rudolphi and others sought to throw doubt on Treutler's observation, and referred these worms to the freshwater *Planariæ*. At Naples, however, Delle Chiaje subsequently procured specimens from the sputa of two young persons suffering from hæmoptysis ; and a fourth instance has also been noticed by Follina, where the worm was found in venous blood. This species attains a length of 3 lines, is cylindrico-lanceolate in shape, its six suckers being biserially disposed on the under side of the so-called head.

10. ASCARIS LUMBRICOIDES, Linnæus.

A. lumbricoides, Linnæus, Bloch, Göze, Werner, Gmelin, Schrank, Fröhlich, Rudolphi, Jördens, Brera, Otto, Bojanus, Deslongchamps, Bremser, Blainville, Nitzsch, Delle Chiaje, Cloquet, Schmalz, Gurlt, Cuvier, Owen, Creplin, Eschricht, Sortegana, Gluge, Siebold, Dujardin, Pruner, Blanchard, Küchenmeister, Richter, Moquin-Tandon, Weinland, &c. &c.

Fusaria lumbricoides, Zeder.

Lumbricus teres hominis, Tyson, Redi, Valisneri.

? *Nematodeum hominis (ventriculi)*, Déglard, Leveillé, Clesius.

? *N. hominis (viscerum)*, Pruner, Diesing.

? *Ophiostoma pontierii*, Cloquet, Delle Chiaje, Bremser.

This well-known parasite is by some still considered identical with *Ascaris megalocéphala* of the horse and *A. suilla* of the hog ; but I agree with Dujardin, Moquin-Tandon, Claparède, and others in regarding it as distinct. The anatomy of *Ascaris lumbricoides* has been well illustrated by Cloquet and others ; but the precise manner in which the young gain access to the human body is very imper-

fectly understood. It is well known that quantities of the immature ova are expelled their "host" *per anum*; and I have myself obtained the characteristic eggs from matters ejected by the mouth. Richter's and Davaine's experiments go to prove that, after the ova have escaped passively, they complete their development in open waters; and it would also appear that an interval of six months must elapse (after their expulsion) before the yelk-segmentation and consequent embryonic formation can take place. In Richter's experiment none of the embryos had emerged after the eggs had been in the water for a period of eleven months; and, in the case of *A. marginata* from the dog, Verloren's previous investigations have shown that the young embryos can retain their vitality for more than a year after their worm-like condition has been attained. According to Davaine (*Comptes Rendus*, 1858, p. 1217), the fully developed embryo is cylindrical, its length $\frac{1}{100}$ th of an inch, the mouth is not furnished with the three characteristic papillæ of the genus, and the tail terminates suddenly in a point.

His experiments also showed that their development *in ovo* was not facilitated by increase of temperature, neither were the mature eggs affected by several days' immersion in the gastric juice of rabbits and dogs. Further researches therefore are required to decide whether the young *Ascarides* eventually gain access to our bodies after the embryos have escaped from the eggs and have undergone a series of active wanderings elsewhere, or whether, as seems more probable, they are not directly transferred from river- and pond-water to the human stomach.

11. ASCARIS MYSTAX, Rudolphi.

A. mystax, Rudolphi, Bremser, Gurlt, Dujardin, Bellingham, Diesing, Siebold, Nelson, Allen Thomson, Meissner, Kölliker, Bischoff, Leuckart, Claparède, Cobbold, &c.

A. felis, Gmelin, Fröhlich, Rudolphi, J. V. Thomson, Pickells.

A. teres felis, Goetze.

A. cati, Schrank.

A. alata, Bellingham, Dujardin, Diesing.

Fusaria mystax, Zeder.

Although no one has hitherto regarded the *Ascaris mystax* as a human parasite, I am satisfied that Bellingham's *Ascaris alata* (about which there has been so much dispute) is neither more nor less than the well-known *A. mystax* of the Cat. But if this be doubted by Continental helminthologists, I invite their attention to evidence which, to any one conversant with the characters of *Ascaris mystax*, cannot fail to satisfy them that this nematode is liable to infest the human body. The first instance in which this parasite has been observed in man is recorded by Dr. Pickells in the 'Transactions of the Association of Fellows and Licentiates of the King and Queen's College of Physicians in Ireland.' The case is reported at length in vol. iv. pp. 189-221, and in vol. v. pp. 171-196, the text being accompanied by figures of a nematode unmistakably re-

ferable to *Ascaris mystax*. As this volume is not likely to be accessible to foreign writers, I adduce a few of the leading facts, which, if carefully weighed, will, I think, clear up all doubts as to the nature of Bellingham's *A. alata*, and at the same time rescue from oblivion a most interesting helminthological contribution.

Dr. Pickells's patient was a woman, aged twenty-eight years. The first worm came away in April 1822, and on being submitted to a distinguished naturalist, Dr. J. V. Thomson, of Cork, this authority remarked as follows:—"The *Ascaris* resembles most that which is so common an inhabitant of the stomach of the Cat (*Ascaris felis*), but it is rather longer in proportion to its thickness."

After an interval of one year and ten months (*i. e.* in Feb. 1824) several were passed; then again (in November 1825) eleven more; and subsequently (in March 1826) an additional batch of nine were thrown up alive. In all, Dr. William Pickells had "seen about fifty of various sizes." They were generally evacuated alive, and, in a majority of instances, without medicine. "They came away usually in groups of six or more:" and he adds, "I have sometimes found a whole group knit together by the extremities. The common Lumbricus (*Ascaris lumbricoides*) was also eliminated in some instances. One (of the latter) measured upwards of a foot."

Thus much for the first case. The second is almost equally convincing, if a comparison be instituted between the figures given by the authors. Continental writers have only referred to Dr. Bellingham's 'Catalogue of Irish Entozoa' for a description of *Ascaris alata*; but the account there given is very meagre, in fact a mere abstract. In the 'Dublin Medical Press' for 1831, vol. i. p. 104, Bellingham writes as follows:—"The only instance in which I have as yet met with the *Ascaris alata* was on the occasion of my prescribing for a child aged about five years, who exhibited symptoms of worms. I ordered some vermifuge medicine, and desired, in case any worms were voided, that they should be kept. A day or two afterwards the specimens from which I have taken the above description [given in his paper.—T. S. C.], and which had been expelled by the medicine, were brought to me; they were dead when I received them, and I could not learn that the child ever passed any since."

Dr. Bellingham then refers to Dr. J. V. Thomson's opinion as to the species of nematode in the case under Dr. Pickells's care, and himself admits that the latter worm was "one closely resembling his *Ascaris alata*." He concludes by stating that this *A. alata* "in general appearance is not unlike *Ascaris mystax*, which inhabits the stomach and intestines of the Cat; it differs, however, in having a greater diameter posteriorly than anteriorly, and in the lateral membranes of the head being broader in *A. mystax* than they are in the species under consideration."

I will not now enter further into this question; but I cannot help remarking, with surprise, that it is singular any doubt should have existed on the subject. None of the alleged differences are of any value as indications of specific distinctness; and the figures given (especially those by J. V. Thomson) are clearly referable to *Ascaris*

mystax. In conclusion, therefore, I would assure all medical gentlemen who may meet with cases of *Ascarides* that they would confer on entozoologists a favour, and on science an advantage, if, when in any doubt as to the specific character of these or other parasites, they would kindly submit them to the scrutiny of those who are intimately conversant with the science of helminthology*.

12. TRICHOCEPHALUS DISPAR, Rudolphi.

T. dispar, Rudolphi, Bradley, Cuvier, Bremser, Chiaje, Bellingham, Mayer, Busk, Siebold, Dujardin, Tutschek, Pruner, Wedl, Diesing, Küchenmeister, Leidy, Moquin-Tandon, Eberth, Cobbold, Weinland, &c.

T. hominis, Goeze, Schrank, Gmelin, Rudolphi, Jördens, Brera, Lamarck, Blanchard.

T. simiæ patas, Treutler.

T. lemuris, Rudolphi.

T. palæformis, Rudolphi, Dujardin.

Trichuris, Buttner & Ræderer, Wagler, Bloch.

Ascaris trichiura, Linnæus, Müller, Werner.

Few of the entozoa have excited more interest than this species, partly owing to the angry discussion which its discovery inaugurated, and partly on account of its singular and elegant whip-like appearance. The original name of *Trichuris*, given to it by Buttner, could not, of course, be allowed to stand when it became evident that the so-called tail was in reality the head and neck. The *Trichocephalus* is generally thought to be scarce in England—a persuasion which has probably arisen from the negligence of pathologists, whose arduous duties connected with the superintendence of *post mortem* examinations have perhaps left them little time for these inquiries†.

On the other side of the Channel this worm is so abundant in some localities that Mons. Davaine calculates that not less than one-half of the inhabitants of Paris are infested by it. The general organization of *Trichocephalus* has been well investigated, more particularly by Mayer, Siebold, Dujardin, Blanchard, Küchenmeister, and Eberth; but (as I have recently shown in my third memoir on "Entozoa," published in the Linnean Society's 'Transactions') the statement of Küchenmeister that there are no external appendages in the female of *Trichocephalus* comparable to those known to exist in the allied *Trichosomata* is incorrect. In connexion with these organs I have also endeavoured to throw light upon the conflicting statements of Mayer and Eberth, and I have demonstrated more fully the very

* Since writing the above, with great good fortune and most opportunely, a third case has been brought under my notice,—Dr. Lankester, F.R.S., having very kindly placed in my hands, last Thursday evening (Nov. 20), a nematode sent to him by Mr. Scattergood, of Leeds. This worm is *A. mystax*, from a child only thirteen months old, whose case I hope shortly to lay before the medical profession. I now exhibit the parasite to the Society. (See 'The Lancet' for Jan. 10, 1863, p. 31, where the case has since appeared.—T. S. C.)

† To Dr. Rutherford Haldane, F.R.C.P., Physician and formerly Pathologist to the Royal Infirmary of Edinburgh, I am indebted for several perfectly fresh examples of this worm.

marked differences existing between the males of *Trichocephalus affinis* and *T. dispar*. The presence of the last-named species in the human body is fortunately attended with very little inconvenience; but its development and mode of gaining access to the host has nevertheless been recently made the subject of diligent inquiry. Leuckart's, and especially also Virchow's, researches have entirely disproved Küchenmeister's notion that *Trichinæ* are the young of *Trichocephalus*; and the experiments of Davaine render it probable that the young get into the human body in a manner very similar to those of *Ascaris lumbricoides*. The latter authority finds that the eggs undergo no development whilst yet lodged within the host's intestine, and they are expelled *per anum* in the immature condition in which they make their escape from the body of the parent worm. It further appears that, after their expulsion, a period of six months must elapse before the embryonic formation commences—an interesting circumstance, and one which satisfactorily explains why it was that my own feeding-experiments (on a chicken and rabbit) with the fresh eggs of *Trichocephalus affinis* gave only negative results. According to Davaine, the fully developed embryo measures $\frac{1}{3\frac{1}{3}}$ rd of an inch in length, and to a certain extent resembles the parent, tapering gradually from behind forwards.

13. TRICHINA SPIRALIS, OWEN.

T. spiralis, Owen, Wood, Farre, Henle, Diffenbach, Fricke and Oppenheim, Paget, Knox, Harrison, Hodgkin, Leblond, Siebold, Kobelt, Nordmann, Valentin, Bischoff, Dujardin, Svitzer, Luschka, Küchenmeister, Gairdner, Sanders and Kirk, Cobbold, Herbst, Zenker, Virchow, Leuckart, Weinland, &c.

The experimental researches of Herbst, Leuckart, and more especially those of Virchow, afford us an almost complete knowledge of the development and economy of this minute parasite, the facts of which may be briefly summed up as follows:—(1.) *Trichinæ* are introduced into the human body by the ingestion of trichinous pork. This diseased meat, if imperfectly cooked or indifferently prepared in the form of sausages or hams, is capable of giving rise to severe febrile symptoms in those who partake of it; and in the case of a woman under the care of Prof. Zenker, of Dresden, it was the sole cause of death. There is reason to believe others have likewise perished from a similar cause. In hams long prepared and well smoked the *Trichinæ* are found dead; they resist death in decomposing flesh, also during a prolonged immersion in water; in the encysted condition they are unaffected by tolerably strong acid solutions. (2.) *Trichina spiralis* forms the type of a distinct genus of nematodes; it has no genetic relation whatever to *Trichocephalus dispar*; it reproduces viviparously like *Filaria dracunculus*. (3.) Non-encysted *Trichinæ* may exist in the flesh of animals without being visible to the naked eye; whilst encysted *Trichinæ*, where cretification has not commenced, are difficult of detection without the aid of a pocket lens. The latter observation is based on appearances which

I have also myself noticed in connexion with two cases where nearly all the voluntary muscles of the human body were crowded with *Trichinæ*. (4.) In a few days after the ingestion of fresh-encysted *Trichinæ*, the worms acquire sexual distinction and maturity; the ova and young are in a few more days equally rapidly developed, and the latter soon escape from the parent, *per vaginam*, to commence active migrations on their own account; this they do by penetrating the walls of the intestine of the host, from whence they pass quickly to the voluntary muscles, where they eventually become encysted. According to Virchow's conclusive testimony, all these phenomena occur within the space of a single month; and, in his experiments, even as early as three weeks after ingestion the young were found to equal in size those that he administered at the commencement. The genesis and migrations of *Trichina* are therefore astonishingly rapid, and probably without parallel in this class of parasites. ('Comptes Rendus,' for July 1860, p. 13; also in 'Annales des Sciences Naturelles,' series 4, vol. xiii. p. 109.) The organization of *Trichina* in the encysted condition has been accurately given by Owen, Luschka, Bischoff, Valentin, Sanders and Kirk, &c., its adult and embryonic structure being also beautifully illustrated by Leuckart ('Untersuchungen über *Trichina spiralis*,' 1861; and in the 'Göttinger Nachrichten' for April 30, 1860, p. 135).

14. FILARIA MEDINENSIS, Gmelin.

F. medinensis, Gmelin, Olfers, Rudolphi, Jacobson, Lamarek, Gescheidt, Chiaje, Richeraud, Chapotin, Williamson, Scott, Adam, Kennedy and Smyttan, Young and Jamieson, Cuvier, Weihe, Oppenheim, Charvet, Marc and Laennec, Leblond, Wagner, Clark, Blott, Eschricht, Oken, Siebold, Dujardin, Dutschek, Creplin, Fischer, Heath, Brulatour, Maisonneuve, Diesing, Carter, Busk, Cobbold, Cezilly, Robin, Thibaut and Benoit, Moquin-Tandon, Weinland, &c.

F. dracunculus, Bremser, Clelland, Pruner.

Furia medinensis, Modeer.

Gordius medinensis, Linnæus, Bruguière.

Vermis medinensis, Grundler.

Dracunculus, Lister, Gallandatus.

D. persarum, Kämpfer.

This species is well known to our medical brethren in India and the East; and probably no parasite has had so much written about it as the Guineaworm. Among modern investigators nothing can equal the patience and perseverance of Mr. Carter, F.R.S., of Bombay, who, month after month, for many years past, has been devoting his energies towards the elucidation of the habits, economy, and development of the *Dracunculus*. The structure of the adult female is well known; but it is still extremely doubtful if the male has ever been seen. Prof. Owen believed himself to have found the male, and he accordingly described it; but Mr. Busk's subsequent observations, as well as the experiences of those who, from their position, have become familiar with *Dracunculus*, alike go to prove that we are still

unacquainted with the male. It is by no means improbable, however, that one or other of the numerous male examples of *Filaria* belonging to Mr. Carter's closely allied genus *Urolabes* may turn out to be the long sought-for male of *Dracunculus*. The anatomy of the adult viviparously producing female is well known; but its mode of gaining access to the body is not absolutely determined, although an ultimate and complete solution of the problem cannot long be delayed. With extreme probability we may fairly assume that the young gain access by permeating the sudorific ducts of the skin, and that the maturation of the ova and embryos takes place after they have invaded the host. Females extracted from the human body have been described as attaining a length of 8, 10, or even 16 feet; but it is worthy of remark that Mr. Carter has never found them more than 32 inches long in the island of Bombay. The grown females resemble elongated sacs distended from end to end with myriads of young *Filariae*. The discovery of their viviparous mode of reproduction is, I believe, due to Jacobson; yet it is only within comparatively recent times that this discovery has become generally recognized. The structure of the young has been ably investigated by Carter, Busk, Robin, Moquin-Tandon, and others; and I have myself independently worked out their anatomy from specimens of remarkably fine *Dracunculi*, kindly placed in my hands by the late Sir George Ballingall. I found the young in a beautiful state of preservation, although the adult females had been preserved in Prof. Ballingall's private museum for a period of thirty years. In regard to the structure of the young, most of us agree in recognizing a slightly trilobed or tripapillated mouth; but Carter fails to recognize these tubercles, regarding the oral aperture as simple or "punctiform;" the body throughout its three upper fourths is cylindrical and finely striated transversely, after which it rapidly contracts to form the slender sharply-pointed tail. Robin, Moquin-Tandon, and myself recognize a distinct, rounded anal orifice; but whilst Prof. Busk has not recognized its existence, Carter, on the other hand, calls that which we described as the anus a gland, placing the alimentary outlet on one side and a little above it. Carter (whose figures, by-the-by, are very diagrammatic) may possibly be right; but I must further observe that Robin describes the anus as surrounded by a small hood or suspensory contractile lip, whilst he also speaks of a prolongation of the intestine downwards in the form of a *cul de sac* behind and beyond the anal orifice. The walls of the digestive tube are transparent and homogeneous, and fill up the perivisceral cavity without being organically united to the parietes of the body. Other disputed points in respect of the structure of the young cannot here be particularized; but in connexion with their peculiar economy both Busk and Robin have noticed the important fact that they will revive after having undergone a considerable amount of desiccation. Into the antecedent history and probable genetic relations of *Dracunculus*, we do not now propose to enter; but one interesting circumstance seems to me especially worthy of notice. Mr. Carter mentions that in a school of fifty boys bathing in a certain

pond, whose muddy sediment swarmed with the microscopic Tank-worm (*Urolabes palustris*, Carter), twenty-one were attacked with *Dracunculus* during the year; whilst the boys of other schools bathing elsewhere in the island were not infected, with the exception of one or two individual instances here and there. This remarkable occurrence, taken in connexion with Schneider's discoveries (respecting the causes inducing sexual maturity in *Alloionema appendiculatum* infesting the Black Slug, and in *Pelodytes hermaphroditus* infesting Snails), and also in combination with a multitude of other facts, some recorded by recent investigators, and others handed down to us by earlier writers, convincingly suggest the following conclusions:—(1.) The *Dracunculus* is a bisexual nematode, the female being parasitic during a portion of its lifetime. (2.) The male is probably very much smaller, non-parasitic so far as animals are concerned, and in all likelihood a *constant* inhabitant of fresh water and the mud of marshes or low-lying districts in the East. (3.) Guinea-worms do not gain access to the human body indirectly, by the mouth or stomach of the host, but directly, by penetrating the skin. (The young when introduced into the stomach of animals rapidly perish, as proved by Dr. Forbes.) (4.) The young acquire sexual maturity after their escape from the parent, the sexes associating in muddy waters during the monsoon, soon after which period the males probably perish, the females being left to watch their opportunity for further development by migration into the human body. (5.) Within the host it gives rise to a formidable entozootic disease (*dracunculiasis* of Galen), which, after prolonged monsoons, is not unfrequently severely endemic. (In the above remarks I have referred more particularly to the writings of Busk in 'Trans. Mic. Soc.,' old series, vol. ii. p. 65; of Moquin-Tandon in his 'Zoologie Médicale;' of Robin in 'Gazette Médicale de Paris,' 3rd series, vol. x. p. 365; and of Carter in 'Annals of Nat. Hist.' 3rd series, vol. iv. &c.)

15. FILARIA LENTIS, Diesing.

F. lentis, Diesing, Moquin-Tandon, Weinland.

F. oculi-humani, Nordmann, Gescheidt, Ammon, Siebold, Leidy.

F. oculi, Owen, Moquin-Tandon.

As Küchenmeister suggests, this worm may possibly turn out to be identical with the *Filaria lacrymalis* (Gurlt), a viviparous species infesting the eye of the horse. It was first discovered by Nordmann (1831) in a case of lenticular cataract under the care of Von Gräfe, and subsequently found by Jüngken under similar circumstances. Under the title of *F. oculi*, Moquin-Tandon (in his 'Zoologie Médicale') speaks of certain minute *Filiaræ*, "not uncommon in the negroes of the Angola coast;" and he gives other localities of its occurrence. As, however, he does not state what part of the body is infested by them, I am inclined to think the authorities he quotes have mistaken the little *Oxyurus vermicularis* for the species in question. In both the well-known cases above referred to, the *Filiaræ* appear to have been immature, notwithstanding that the first was described as possessing ovaries, oviducts, &c.

16. *STRONGYLUS BRONCHIALIS*, Cobbold.

S. longevaginatus, Diesing, Küchenmeister, Weinland.

Filaria bronchialis, Rudolphi, Owen, Leidy.

F. hominis bronchialis, Rudolphi, Dujardin, Diesing, Weinland.

F. lymphatica, Moquin-Tandon.

Hamularia lymphatica, Treutler, Jördens.

H. subcompressa, Rudolphi, Bremser.

Tentacularia subcompressa, Zeder.

Diesing and Weinland have expressed their suspicions as to the identity of *Filaria bronchialis* with *Strongylus longevaginatus*; whilst Küchenmeister has gone further and pronounced them to be one and the same species. Concurring in this view, I have thought it right to combine the specific title originally given by Rudolphi with the generic allocation employed by Diesing; and if helminthologists generally adopt our views of their identity, I think they will admit the propriety of the nomenclature here superscribed.

The original specimens were discovered by Treutler in Germany, during the winter of 1791, in the bronchial glands of an emaciated subject; whilst those sent to Diesing for description were discovered by Dr. Fortsitz at Klausenberg, in Transylvania, in the lungs of a boy six years old.

17. *EUSTRONGYLUS GIGAS*, Diesing.

E. gigas, Diesing.

Strongylus gigas, Rudolphi, Otto, Cuvier, Brera, Blainville, Chiaje, Owen, Gurtl, Dujardin, Stratton, Jackson, Blanchard, Küchenmeister, Leidy, Weinland.

S. renalis, Moquin-Tandon.

Ascaris renalis, Gmelin.

A. visceralis, Gmelin.

A. canis et martis, Schrank.

Fusaria renalis, Zeder.

F. visceralis, Zeder.

Lumbricus in renibus, Blasius.

L. martis et canis renalis, Redi.

L. sanguineus in rene canis, Hartmann.

L. gulonis sibirici, Pallas.

Diocotophyme, Collet-Meygret.

Though fortunately very rare in man, this worm is known to occur in a great variety of animals, especially in Weasels. According to Weinland and Jackson, it is particularly abundant in the kidney of the North American Mink (*Mustela vison*, Cuvier), destroying the substance of the organ, the walls of which become the seat of calcareous deposit. It has been found in the dog, wolf, glutton, raccoon, otter, seal, ox, and horse. Otto, Owen, and Blanchard have given descriptions of its anatomy, all of them recognizing a well-defined nervous system; further researches, however, are needed to explain away certain discrepancies in their writings, and especially also in regard to the water-vascular system, the very existence of

which (in nematodes generally) is denied by Dr. Williams of Swansea.

18. SCLEROSTOMA DUODENALE, Cobbold.

Strongylus quadridentatus, Siebold.

Anchylostoma duodenale, Dubini, Siebold, Pruner.

Ancylostomum duodenale, Diesing, Leidy, Küchenmeister, Moquin-Tandon, Creplin, Weinland.

This interesting worm was first discovered by Dubini at Milan, and, though at first thought rare, is now known to be tolerably common throughout Northern Italy. According to Pruner, Bilharz, and Griesinger, it is remarkably abundant in Egypt, the latter authority calculating that about one-fourth of the people are constantly suffering from a severe anæmic chlorosis, occasioned solely by its presence in the small intestines.

From the accurate descriptions of Siebold it becomes quite evident that this worm is closely allied to his genus *Syngamus*; and, as he has himself remarked, it might have been placed in the genus *Sclerostoma*. In this genus I have arranged it because the asymmetrical disposition of the so-called dental organs is not of itself sufficient for the establishment or retention of Dubini's genus *Anchylostoma*; otherwise, out of respect for the discoverer, I would prefer his nomenclature. *Sclerostoma duodenale* closely resembles the little worm (*Syngamus trachealis* of Siebold, *Sclerostoma syngamus* of Diesing) which gives rise to the "gapes" in birds; but the male of the latter species is comparatively small, whilst the vaginal outlet of the female is placed much further forward. Küchenmeister's 'Manual' furnishes an excellent account of the "Ægyptian chlorosis" produced by *Sclerostoma duodenale*; and those who are interested in checking the "gape disease" of fowls I may be permitted to refer to my recent memoir on '*Sclerostoma syngamus*,' in the 5th volume of the 'Journ. of the Proceed. of the Linn. Soc.,' Zool. Div., p. 304.

19. SPIROPTERA HOMINIS, Rudolphi.

S. hominis, Rudolphi, Dujardin, Diesing, Owen, Leidy, Moquin-Tandon, Weinland, Molin.

? *S. hominis* (var. *major*), Brighton.

? *S. gigas pullus*, Bremser.

S. rudolphii, Delle Chiaje.

Fresh instances of the presence of this worm in the human body are necessary to satisfy many as to its being a good species; but the occasional occurrence of nematodes within the *vesica urinaria* is a fact placed beyond dispute. The original six specimens of *Spiroptera*, discovered by Barnett in England, were transmitted to Rudolphi for description; and there do not seem to be fair grounds for disputing his accuracy. It may be well doubted, however, if Brighton's nematode, though found under similar circumstances in America, can be referred to the same species.

20. OXYURIS VERMICULARIS, Bremser.

O. vermicularis, Bremser, Chiaje, Dugés, Deslongchamps, Lamarck, Dutschek, Dujardin, Mayer, Siebold, Pruner, Blanchard, Leidy, Küchenmeister, Moquin-Tandon, Weinland.

Ascaris vermicularis, Linnæus, Müller, Fabricius, Bloch, Goeze, Werner, Gmelin, Schrank, Jördens, Brera, Rudolphi, Nitzsch, Creplin, Raspail, Owen, Bellingham.

Fusaria vermicularis, Zeder.

So far as the anatomy of *Oxyuris* is concerned, the investigations of numerous parasitologists, and more especially those of Walter (in the eighth volume of Siebold and Kölliker's 'Zeitschrift'), have left little to be accomplished; but the precise mode in which the young gain access to the human body is still uncertain. It is well known that the eggs have embryos developed within them prior to their escape from the parent, and in this respect, therefore, they differ from *Ascaris lumbricoides* and *Trichocephalus* on the one hand, and from the viviparous *Dracunculus* on the other. In all probability, the young escape from the eggs soon after the latter are expelled or migrate *per rectum*, and, like others of the *Nematoda*, gain access to the human body with our food whilst they are still in a sexually immature condition.

21. TÆNIA SOLIUM, Linnæus.

T. solium, Linnæus, Gmelin, Jördens, Rudolphi, Cuvier, Olfers, Chiaje, Mehlis, Owen, Creplin, Nordmann, Dujardin, Diesing, Küchenmeister, Moquin-Tandon, Weinland, Leuckart, &c.

T. solium (var. *abietina*), Weinland.

T. osculis marginalibus solitarius, Linnæus, Bradley.

T. cucurbitina, Pallas, Bloch, Batsch, Schrank.

T. cucurbitina plana pellucida, Goeze.

T. humana armata, Brera.

T. dentata, Gmelin.

T. fenestrata, Chiaje.

T. vulgaris, Werner.

T. communis, Moquin-Tandon.

T. albopuncta hominis, Treutler.

T. hydatigena anomala, Steinbach.

T. hydatigena suilla, Fabricius.

T. finna, Gmelin.

T. cellulosa, Gmelin, Treutler.

Cysticercus cellulosa, Rudolphi, Bremser, Chiaje, Owen, Blainville, Sömmering, Gurlt, Nordmann, Gescheidt, Creplin, Siebold, Dujardin, Diesing, &c.

? *C. fischerianus*, Laennec.

? *C. dycystus*, Laennec.

? *C. turbinatus*, Kæberle.

? *C. melanocephalus*, Kæberle.

Hydatigena cellulosa, Lamarck, Nordmann.

Hydatis finna, Blumenbach.

Vermis vesicularis, Brera.

Finna humana, Werner.

Vesicaria finna suilla, Schrank, Bay.

V. hygroma humana, Schrank, Bay.

V. lobata suilla, Fabricius.

Now that the organization and mode of development of this species is so well understood, it is a matter of regret that the manifest errors of earlier writers are not more carefully excluded from our ordinary manuals of zoology and comparative anatomy. I allude, for example, to such points as the still asserted presence of a mouth and digestive canal in *Tæniadæ*, which cannot be maintained after repeated demonstrations have clearly proved this view to be erroneous. These falsely so-called alimentary canals constitute the water-vascular system, and, without entering into minute details, I may here remark, in passing, that they do not form tubes of uniform thickness throughout their course, but present distinct bulbous enlargements at every joint, where the transverse branches are given off. This I have ascertained from the careful injection of a fresh Tapeworm recently sent me from Brighton by Mr. Murray, F.R.C.S.E.

In regard to the now well-established discovery of Küchenmeister respecting the development of the common Tapeworm (*T. solium*) from measly pork, I should not deem it worth while dwelling on the subject, did it not unfortunately happen that a few months back MM. Pouchet and Verrier gave a general denial to the statements of experimental parasitologists respecting the development of Tapeworms from *Cysticerci*. Those who have read the statement, as presented in the 'Comptes Rendus' (for May 5th, 1862, p. 958), or the translation of it recently given in the July number of the 'Annals of Natural History' (3rd series, vol. x. p. 77 *et seq.*), will at once perceive the causes which have led these gentlemen to form conclusions at variance with the experience of at least nine-tenths of the leading helminthologists of the day. As Prof. van Beneden remarks, they err greatly in supposing that any one regards the *Cœnurus* of the sheep as the larva of *Tænia serrata* of the dog, seeing that nearly all Continental experimentalists, following Küchenmeister, have maintained that the *Scolex* condition of this last-named Tapeworm is unquestionably the *Cysticercus pisiformis* of hares and rabbits. The researches of Leuckart are especially conclusive on this point; and my own experiments at Edinburgh in 1856 have left no doubt in my mind as to the correctness of this view. The negative result obtained by MM. Pouchet and Verrier in their last experiment (where they fed two dogs each with a hundred heads of *Cœnurus cerebralis*) certainly seems contradictory as regards the *Tænia cœnurus*; whilst, on the other hand, it tends to confirm the correctness of our opinion that *Cœnurus cerebralis* and *Tænia serrata* have no genetic relation subsisting between them. I, for one, however, shall be glad to repeat these and other similar experiments; and I may here also remark that it is of very little use for any one not familiar with the species to attempt these inquiries. I strongly suspect,

with Prof. van Beneden, that here lies the secret of MM. Pouchet and Verrier's adverse conclusions.

22. *TÆNIA MEDIOCANELLATA*, Küchenmeister.

T. mediocanellata, Küchenmeister, Müller, Gurlt, Eschricht, Van Beneden, Leuckart, Weinland.

T. solium, Bremser (and others, in part).

T. dentata, Nicolai.

T. cucurbitina grandis saginata, Goeze.

T. inermis, Moquin-Tandon.

T. tropica, Moquin-Tandon.

? *T. e capite bonæ spei*, Küchenmeister.

? *T. capensis*, Moquin-Tandon.

Tæniarhynchus mediocanellata, Weinland.

Cysticercus tæniæ mediocanellatæ, Leuckart.

The establishment of this species as distinct from *T. solium* is unquestionably due to Küchenmeister; but it is not a little curious to observe how accurately this determination was foreshadowed by that shrewd naturalist and theologian, J. A. E. Goeze, who, in his 'Versuch einer Naturg. der Engeweidwürmer thierischer Körper,' clearly indicates two forms of the common Tapeworm, remarking (p. 278):—"Die erste ist die bekannte grosse, mit langen dicken und gemästeten Gliedern, die ich *Tænia cucurbitina, grandis, saginata*, nennen will." The same author (p. 245), it will be remembered, also pointed out the resemblance subsisting between the tapeworm of the cat (*T. crassicollis*) and the vesicles ("Krystallblasen") and their contained "erbsförmige Blasen" (*Cysticercus fasciolaris*) of the mouse. It is unnecessary here to indicate the distinctive peculiarities of the two species; but the characters presented by the head are certainly insufficient to warrant the formation of a new genus for the reception of this species. Thinking otherwise, Dr. D. F. Weinland has suggested the generic title of *Tæniarhynchus*. In regard to the original development of this hookless flat-headed tapeworm, the recent experimental researches of Leuckart incontestably prove that the "measles," or *Cysticerci* which produce it, are to be found in the muscles and internal organs of cattle; and in his valuable work ('Die menschlichen Parasiten,' p. 406 *et seq.*), now in course of publication, he gives a condensed account of his experiments with the fresh eggs of *Tænia mediocanellata*. He fed two calves with the proglottides of this worm. The first animal experimented on died from a violent attack of the measles-disease, which resembles a kind of leprosy. On dissecting this calf, the muscles were found filled with measles, or imperfectly developed scoleces. On the second occasion a smaller number of proglottides (in all about fifty) were administered; but the febrile symptoms again appeared with such virulence that Leuckart thought this animal would die also. Fortunately, after the lapse of a fortnight from their commencement, some abatement of the disease took place; and this gradually continued until the animal was perfectly restored to health.

Eight-and-forty days subsequent to the feeding (*i. e.* reckoning from the earliest days of alimentation, for the feedings were continued at intervals up to the eighteenth day) Prof. Leuckart extirpated the left cleido-mastoid muscle, and whilst performing the operation had the satisfaction of seeing the cysticercus-vesicles lodged within the muscles. They were larger and more opalescent than those of *Cysticercus (Tænia) cellulosa*, but, nevertheless, permitted the recognition of the young worms through their semitransparent coverings. The heads of the contained cysticerci exhibited all the distinctive peculiarities presented by the head of the adult strobila (*Tænia mediocanellata*); and thus, taking the results of this experiment in connexion with previously ascertained facts, we are supplied with the most unequivocal evidence that man becomes infested by this second form of Tapeworm by eating imperfectly cooked veal and beef. In all probability, other animals are not liable to harbour the *Cysticercus tænia mediocanellatæ*; for Leuckart also tried to infect a sheep (to which he administered about sixty proglottides); but, on examining the flesh after the lapse of eight weeks, he failed to detect the presence of a single cysticercus-vesicle*.

23. TÆNIA ACANTHOTRIAS, Weinland.

T. (Cysticercus) acanthotrias, Weinland, Moquin-Tandon, Leuckart.

Acanthotrias, Weinland.

The specific distinctness of this new Tapeworm is founded on the examination of several cysticerci, "preserved in the Collection of the Medical Improvement Society, Boston, and in the Anatomical Museum, Cambridge, U. S." From twelve to fifteen of these cysts were found by Dr. Jeffries Wyman (1845) in the muscles of a woman about fifty years of age—a dissecting-room subject at Richmond, Va. Dr. Weinland, of Frankfort, during his stay in America (1858), on carefully examining one of these cysticerci, made the very curious and, in some respects, unique discovery that its rostellum was furnished with three rows of hooks, fourteen in each, the hooks themselves presenting the usual characters. Dr. Weinland proposes to elevate this species as the type of a new genus (*Acanthotrias*); but unless the (yet to be discovered) strobila displays other characters differing from those of ordinary Tapeworms, it is, perhaps, better to retain it among the *Tænia*.

24. TÆNIA FLAVOPUNCTA, Weinland.

T. flavopuncta, Weinland, Moquin-Tandon.

? *T. flavomaculata*, Molin.

Hymenolopis flavopuncta, Weinland.

The existence of this worm as a distinct species is also due to the

* Since the above was written, I have received from Mr. Frederick Turner, of 265 Fern Bank, Glossop Road, Sheffield, a finely preserved Tapeworm-head for examination. "It was from a very long worm," and is undoubtedly referable to *Tænia mediocanellata*, as the Society will perceive by inspection.

shrewd investigations of Dr. Weinland, made during his visit to America. Unfortunately, no perfect specimen has been seen; but, from portions of at least six examples of the strobila, Dr. Weinland has clearly established its claim to be recognized as a good species. The proglottides are short; and "there is a yellowish spot, clearly visible to the naked eye, situated about the middle of each joint, which reminds us very much of the colour and situation of the genital organs as known in *Bothryocephalus*." The reproductive orifices occur all along one side of the worm; and the eggs are unusually large. Only one instance of the occurrence of this species is yet recorded; and on this occasion they were obtained by Dr. Ezra Palmer, in considerable numbers, from an infant nineteen months old. They were expelled without medicine, their presence not having been even suspected. (See D. F. Weinland's 'Essay on the Tapeworms of Man,' p. 49; also his 'Beschreibung zweier neuer Tænioiden aus dem Menschen,' 1861, p. 8, t. 4.)

25. *TÆNIA MARGINATA*, Batsch.

T. marginata, Batsch, Rudolphi, Dujardin, Diesing, Leuckart.

T. cucurbitina, Pallas, Bloch (both in part).

T. lupina, Schrank.

T. cateniformis lupi, Goeze.

T. ex cysticercu tenuicollis, Küchenmeister.¹

T. tenuicollis, Günther, Moquin-Tandon.

T. hydatigena, Pallas, Bloch.

T. hydatula, Linnæus.

T. globosa, Rudolphi, Gmelin.

T. simiæ, Gmelin.

T. ferrarum, Gmelin.

T. caprina, Gmelin.

T. ovilla, Gmelin.

T. vervicina, Gmelin.

T. bovina, Gmelin.

T. apri, Gmelin.

Halysis marginata, Zeder.

Cysticercus tenuicollis, Rudolphi, Deslongchamps, Blainville, Bremser, Gurlt, Houston, Tschudi, Gulliver, Eschricht, Dujardin, Creplin, Leuckart, Gervais, Diesing, Leidy, Küchenmeister, Weinland, Cobbold.

? *C. visceralis hominis*, Rudolphi.

C. visceralis, Rudolphi.

? *C. hepaticus*, Chiaje.

? *C. vesicæ hominis*, Creplin.

C. lineatus, Laennec.

C. clavatus, Zeder.

C. globosus, Zeder.

C. simiæ, Zeder.

C. caprinus, Zeder.

C. cercopitheci cynomologi, Leuckart.

C. phacochoæri æthiopici, Cobbold.

- C. potamochari penicillati*, Cobbold.
C. cynocephali porcarii, Cobbold (MS.).
Hydatigena orbicularis, Goeze.
H. globosa, Batsch.
H. oblonga, Batsch.
Hydatis globosa, Lamarck.
Hydra hydatula, Linnæus.
Hydatula solitaria, Viborg.
Vesicaria orbicularis, Schrank.
Vermis vesicularis eremita, Bloch.

This species infests man only in the immature or cysticercal condition, the full-grown tapeworm (strobila) being found in the dog and wolf. It has often been confounded with the *Tænia serrata*, from which, however, it differs in the comparatively bulky size and peculiar form of its hooks; it is also a much larger worm, the proglottides nearly equalling those of *T. solium*. It does not seem possible for the strobila to take up its abode in the human body, because Dr. Möller's attempts to infest himself with it (by swallowing several specimens of *Cysticercus tenuicollis*) were unsuccessful. In the scolex condition this worm has an unusually wide distribution; for, in addition to its occasional presence in man, it has likewise been found in various monkeys, in cattle and sheep, in many other ruminants, in horses, in swine, and even in squirrels. The experiments of Küchenmeister, Leuckart, Luschka, and Röhl have fully established the fact that these various animals and ourselves become infested with the so-called *Cysticercus tenuicollis* by accidentally swallowing the eggs of *T. marginata*, or *Tænia ex cysticercu tenuicollis* (Küchenmeister), which is the same thing. The cysticerci occasionally attain an enormous size, as was the case with those I obtained from the Wart and Red River Hogs which died at the Zoological Society's Gardens in 1859 and 1860, and which I at first supposed to be referable to two hitherto unknown Tapeworms (Proc. Zool. Soc. March 12, 1861). Leuckart, however, to whom I forwarded one of the specimens, has corrected me in this matter. In one the caudal vesicle was pyriform and about 5 inches in length; in another it had the size and form of a cricket-ball. Eschricht and Schleissner have shown that these cysticerci are sometimes associated with *Echinococcus* in Iceland.

26. TÆNIA ECHINOCOCCUS, Siebold.

- T. echinococcus*, Siebold, Leuckart.
T. echinococcus scolicipariens, Küchenmeister.
T. granulosa, Gmelin, Prochaska.
T. visceralis socialis granulosa, Goeze.
T. nana, Van Beneden.
Echinococcus hominis, Rudolphi, Bremser, Rendtorff, Chiaje, Müller, Owen, Gescheidt, Eschricht, Kühn, Gluge, Bright, Focke, Creplin, Hausmann, Doyère, Rokitansky, Siebold, Lüdersen, Simon,

Cruveilhier, Curling, Portal, Foster, Thompson, Annesley, Keber, Virchow, Aran, Vögel, Lebert, Major, Livois, Thiel, Moquin-Tandon, Davaine, &c.

E. veterinorum, Rudolphi, Bremser, Blainville, Gurlt, Allesandrini, Owen, Dujardin, Gervais, Leuckart, Huxley, Weinland, &c.

E. scolicipariens, Küchenmeister.

E. altricipariens, Küchenmeister, Cobbold.

E. polymorphus, Diesing, Leidy.

E. granulosus, Rudolphi.

E. simiæ, Rudolphi.

E. giraffæ, Gervais.

Polycephalus hominis, Goeze, Jördens.

P. humanus, Zeder.

P. granulosus, Zeder, Cloquet.

P. echinococcus, Zeder, Tschudi.

Acephalocystis, Laennec, Diesing, Dujardin, Nitzsch, Siebold, Van Beneden, Moquin-Tandon, &c.

A. ovoidea, Laennec, Cloquet, Deslongchamps, Chiaje.

A. granulosa, Laennec, Cloquet, &c.

A. surculigera, Laennec, &c.

A. endogena, John Hunter, Owen.

A. exogena, Kuhl.

A. macaci, Cobbold.

A. ovis tragelaphi, Cobbold.

Vesicaria granulosa, Schrank.

Hydatigena granulosa, Batsch.

Hydatis, Lüdersen, Rudolphi, Olfers, Bremser, Leuckart, Kühn, Tschudi, Dujardin, Wilson, Rokitansky, Moquin-Tandon, Barker, Davaine, &c.

H. erratica, Blumenbach.

Following Küchenmeister, Weinland and others suppose that there are two distinct forms of *Echinococcus* severally referable to different Tapeworms, one of which is on all hands admitted to be Von Siebold's *Tænia echinococcus*, the other an unknown *Tænia*, also supposed to infest dogs. That *Echinococci* vary much, both in regard to the number of cephalic hooks they display at certain intervals of growth, and also in respect of the mode of evolution of the scoleces, few will deny; but, according to Leuckart, we are not therefore warranted in accepting Küchenmeister's view as to the specific distinctness of certain forms. Like others, I had been led away by Küchenmeister's authority, although I have had abundant opportunity of investigating these singularly interesting larvæ. The grounds on which Leuckart disputes Küchenmeister's view are, I think, perfectly satisfactory; for he shows conclusively that the proportional number of hooks fluctuates in both forms, whilst the alleged differences in the size and character of the hooks themselves have reference to their degree of development ('Die menschlichen Parasiten,' p. 328 *et seq.*). If this view be generally accepted, it cannot fail to suggest important hints as to the best mode of checking that formidable

endemic known as the Echinococcus-disease of Iceland, the best account of which we owe to the researches of Eschricht.

My friend Dr. Arthur Leared, M.R.C.P., who has just returned from a short tour in Iceland, has undertaken to draw up a report on the present state of our knowledge on this subject (with a view to its being ultimately laid before the Icelandic Parliament); and he has ingeniously suggested that every dog should be efficiently physicked at a certain given time, and that all the excreta, tapeworms included, should be buried at a considerable depth in the soil. The experiment should be extended over several seasons. The mature *Tæniæ* thus destroyed would, it is conceived, cut off the supply of embryos and *Echinococci*, and the endemic might thus be averted. To this suggestion I would add that, in place of burying the excreta, they should, in all cases, be burnt. If this latter suggestion be not carried out, it is more than probable that multitudes of the minute embryos will escape destruction, and ultimately find their way into the human body. I have previously urged this preventive measure with the view of lessening the prevalence of other entozoa, both of man and animals; and I again, in a social point of view, respectfully invite attention to the importance of this rule. All entozoa (not preserved for scientific investigation and experiment) should be thoroughly destroyed by fire when practicable, and under no circumstances should they be thrown aside as harmless refuse. In the case of *Tænia echinococcus* the greatest difficulty likely to be experienced lies in the circumstance of the extreme minuteness of the strobila, which, in the full-grown state, does not exceed the eighth of an inch in length. It is almost certain to be overlooked; and I fear, therefore, the treatment suggested by Dr. Leared will only be attended with partially beneficial results. As an additional security, I would recommend that boiling-hot water be thrown over the floor of the kennels or enclosures where the dogs subjected to Dr. Leared's treatment are kept. In this way nearly all the embryos would be destroyed. In regard to the structure of *Echinococcus* itself, very little now remains to be made out. The literature of the subject is of very great extent. One of the best memoirs extant is that communicated by Prof. Huxley to this Society; and, from repeated original investigations, I have been enabled to follow out and satisfy myself as to the accuracy of most of the facts therein recorded. I have sought, however, very diligently for the internal cilia described by Huxley, Virchow, and Lebert, hitherto without success. Respecting the well-known hydatids or acephalocysts, the majority of them are clearly undeveloped larvæ of *Tænia echinococcus*, comparatively few of them being referable to other Tapeworms*.

* Since the above was written, an instance of Echinococcus-disease in a young female has very opportunely come under my notice at the Middlesex Hospital; this case, unhappily, terminated fatally. On Sept. 30, I secured, and fed a house-dog with, several hundreds of heads of the scoleces, which, in all respects, corresponded with those of *Echinococcus veterinorum*, and I hope to be able to extend this experiment after the production of the *Tæniæ*. (This experiment only gave a negative result—probably on account of the cysts having been accidentally steeped in a solution of carbonic acid before I received them.—T. S. C. : Jan. 1863.)

27. *TÆNIA NANA*, Siebold.

T. nana, Siebold and Bilharz, Küchenmeister, Leidy, Moquin-Tandon, Leuckart.

T. ægyptiaca, Bilharz.

Diplacanthus nanus, Weinland.

Küchenmeister, in his enthusiasm, was led to indulge the hope that this minute Tapeworm would turn out to be his imaginary *Tænia echinococcus altricipariens*; and I find that Van Beneden has fallen into the error of describing the *Tænia echinococcus* of Siebold under the title of *T. nana*. This is unfortunate. Weinland, on the other hand, has suggested the formation of a new genus for the reception of this worm; but the so-called "bifid" character of the hooks (as described by Bilharz) is a misnomer, the "doubled" appearance being simply due to the close approximation of the claw and the anterior root-process (Leuckart). The hooks are essentially the same as those of other *Tæniæ*, only they are very minute and slightly peculiar in form. The full-grown strobila attains a length of 8 or 10 lines, and carries from 150 to 170 joints. The cysticercal condition is at present unknown; but Leuckart thinks it may be found in some kind of insect.

28. *TÆNIA ELLIPTICA*, Batsch.

T. elliptica, Batsch, Rudolphi, Creplin, Gurlt, Dujardin, Diesing, Leuckart, Cobbold.

T. canina, Pallas (also probably of Linnæus, Werner, Eschricht, Van Beneden).

T. canina felis, Werner.

?*T. cucumerina*, Bloch, Rudolphi, Creplin, Gurlt, Dujardin, Diesing, Leuckart, Cobbold.

?*T. cateniformis*, Goeze, Gmelin, Rudolphi.

T. cateniformis felis, Gmelin.

T. cuniceps, Rudolphi.

?*T. osculis marginalibus oppositis*, Linnæus.

?*Alyselminthus ellipticus*, Zeder.

A. cuniceps, Zeder.

?*Halysis elliptica*, Zeder.

From the statement long ago made by Eschricht, that he had received a *Tænia canina*, passed by a negro slave at St. Thomas, Antilles, and more especially from the clear evidences recently adduced by Leuckart ('Die mensch. Parasiten,' p. 402), there cannot be a shadow of doubt that either the *Tænia elliptica* of the cat or the *T. cucumerina* of the dog may be reckoned amongst the cestodes liable to infest man. Those who, with Leuckart, regard the cat's tapeworm as a distinct species from the *Tænia cucumerina* of the dog will probably (on reading the evidence put forth by Leuckart) come to the conclusion that both these worms infest the human body. I have examined these reputedly distinct forms, and I find that there are differences of size and outline affecting the joints, but I cannot yet follow Leuckart and pronounce them to be

of sufficient value for specific separation. Like Dujardin, I have not seen the head of *T. elliptica*, neither am I acquainted with any good figure of the head*. Goeze's drawings of *T. cateniformis* only represent a single row of little hooks; and it is well known that the same processes in *T. cucumerina* are very liable to fall off, so much so that it has been described as a hookless tapeworm. Van Beneden regards the two presumed distinct forms as identical, and, although his representations of the cephalic hooks of *T. canina* correspond very closely with those of the *T. cucumerina*, both of Dujardin and Leuckart, he speaks of three or four rows of hooks, whilst Dujardin says there are three, and Leuckart simply describes a succession ("mit einer mehrfachen Reihe"), though his excellent figure (fig. 118, p. 400, of his work) represents four; he also describes three or four rows as occurring in *T. elliptica*. It is therefore evident that variations occur in the same form as regards the head; and it is more than probable that differences of habitat may be sufficient to account for the variations of size and numerical development of the joints, which Leuckart regards as distinguishing marks between the elliptic tapeworm of the cat and the cucumerine cestode of the dog. Be this as it may, one or other of these forms has been noticed in the human subject several times; but as regards the source of their larvæ we are yet in uncertainty. When engaged (1856) in rearing *Tænia serrata* from *Cysticercus pisiformis*, I thought I had also hit upon the scoleces of *T. cucumerina*; but Leuckart has since extended my experiment by feeding rabbits with the proglottides of *T. cucumerina*, without producing any measles. Van Beneden has also tried to produce the young of *Tænia elliptica* in the rat, but without result. Weinland thinks the *Cysticercus* of *T. cucumerina* will be found in flies, and that dogs obtain the larvæ by their interesting habit of snapping at dipterous insects. This is, at least, ingenious †.

29. BOTHRYOCEPHALUS LATUS, Bremser.

B. latus, Bremser, Blainville, Leblond, Rudolphi, Leuckart, Nitzsch, Mehlis, Chiaje, Owen, Creplin, Haselberg, Siebold, Eschricht, Valentin, Wawruch, Dujardin, R. Leuckart, Küchenmeister, Leidy, Weinland, &c. &c.

Dibothrium latum, Diesing.

? *Tænia lata*, Linnæus, Pallas, Bloch, Goeze, Batsch, Gmelin, Schrank, Carlisle, Jördens, Rudolphi.

? *T. vulgaris*, Linnæus, Werner, Retzius, Gmelin, Jördens.

T. dentata, Batsch, Gmelin.

* I have now (Jan. 27, 1863) procured several heads of *T. elliptica*, and am still unable to pronounce the two forms to be distinct species.—T. S. C.

† In connexion with these views of Weinland and Leuckart, I may here mention that I have recently been feeding a number of cockroaches (*Blatta orientalis*) with the eggs of *Tænia cucumerina* of the dog, but I have not succeeded in rearing any *Cysticerci* in their bodies. Not discouraged by negative results (which often advance our science as much as positive ones), I shall presently feed them with the eggs of *T. elliptica* from the cat; and if I should succeed in thus giving the cockroaches the "measles," I shall have less hesitation in pronouncing Leuckart's opinion, as to the distinctness of these two tapeworm-forms, correct.

- T. tenella*, Pallas, Retzius.
T. grisea, Pallas, Schrank.
T. membranacea, Pallas, Batsch.
T. humana inermis, Brera.
T. (à anneaux courts), Bonnet.
T. (sans épine), Andry.

For our knowledge of the anatomy of this species we are mainly indebted to the researches of Eschricht; and it is only very recently that we have become acquainted with any part of the history of its development, through the investigations of Dr. J. Knoch, of Petersburg ('Petersburger medicinische Zeitschrift,' 1861, No. 3). Some account of these interesting discoveries has already appeared in a review in the first volume of the 'Lancet' for the current year (p. 101); and from these researches it would appear that the well-known ciliated infusorial condition of the embryo undergoes its transformations whilst still living in open waters; from this medium it is subsequently transferred to the human body, in a passive manner, by the same waters being used as drink. A full account of the larval metamorphoses is still needed; and we are promised this desideratum in the 'Memoirs' of the Petersburg Academy*. In the mean time, it may be remarked that two distinct species of *Bothrycephalus* have been described as occurring in the human body. One described by Mayer, of Geneva, is extremely doubtful; but we are indebted to Leuckart for explaining the grounds on which a good second species (*B. cordatus*) may be ranked with the already extended list of human entozoa. In the porpoise, I have discovered a closely allied cestoid (*Diphyllobothrium stemmacephalum*); but the form of the head left me in no doubt as to its specific and generic differentiation.

30. BOTHRYOCEPHALUS CORDATUS, Leuckart.

B. cordatus, Leuckart.

This species is new to science, and has only very recently been described by Leuckart, who received about twenty specimens from the eminent naturalist, Prof. Steenstrup. These examples were obtained at Godhaven, North Greenland, and were transmitted to Steenstrup by the Danish Inspector, Counsellor Orlík. Only one of the worms (about a foot long, or 26 centimetres), came from the human body, all the others being from dogs, in which animal it exists in considerable numbers. It differs from *B. latus* chiefly in the form of the head, which is heart-shaped (or, rather, obcordate), short and broad, and set on to the body without the intervention of a long neck. The segments are distinct from the very commence-

* This magnificent contribution to entozoology has just come to hand (Jan. 1863); but we have only space to remark that Dr. Knoch finds (contrary to Küchenmeister's statements) six hooks present in the ciliated embryos, as obtains in the non-ciliated proscoteles of *Tænia*. With these embryos he performed a variety of interesting experiments on various animals, and succeeded in rearing, in dogs, not only larval tapeworms, but also sexually mature examples of *Bothrycephalus latus*.—T. S. C.

ment near the head, and so rapidly do they increase in width that the anterior end of the body becomes lancet-shaped. About fifty joints only are immature; and in the longest example (115 centimetres) Leuckart counted a total of 660 joints. It is, however, a smaller species than *B. latus*, and is further distinguished by displaying a greater number of calcareous corpuscles, and more particularly also in the "form of the uterine rosette, which is not only smaller and longer, but likewise exhibits a greater number of lateral processes." Leuckart thinks the *T. vulgaris* of Linnæus and Pallas may be identical with this species. To the naked eye, judging from the figures, *B. cordatus* at first reminds one of Goeze's thick-set *Tænia pectinata*; but the structure of the latter is very different*.

12. ON SOME TIENTSIN BIRDS, COLLECTED BY MR. FLEMING, R.A., IN THE POSSESSION OF MR. WHITELEY. BY ROBERT SWINHOE, ESQ., CORR. MEMB.

A collection of birds, made in the neighbourhood of Tientsin by Mr. Fleming of the Royal Artillery, having come into the possession of Mr. Whiteley, that gentleman has placed them in my hands for inspection and identification. The series comprises only two novelties which have not hitherto been described; but most of the birds are interesting on account of the locality. I will proceed, without further comment, to give a list of them, with what few remarks I may deem necessary.

1. POLIORNIS PYRRHOGENYS, Temm. Faun. Japon.

There are here two skins, in worn plumage, which Mr. Gurney considers the same as the Japanese species.

2. CIRCUS MELANOLEUCUS, Gmelin.

I observed this bird myself near Tientsin. The single specimen in this collection is rather large.

3. FALCO SUBBUTEO, L.

4. FALCO VESPERTINUS, L.

5. ACCIPITER SOLOENSIS, Horsf.

There are two Sparrow-Hawks, one of which, a male, is evidently this species, and agrees well with specimens procured in the South of China. The other is also a male, but apparently different. It is, however, identical with skins in my collection from Canton, Amoy, and Formosa. I should be inclined to consider this *A. gularis*,

* A few days back (Sept. 19th) I received several fine examples of *T. pectinata* from Canada. They were obligingly forwarded from Kingston by Prof. George Lawson, Ph.D., LL.D., who informs me that they were obtained, in May 1861, from the intestines of a porcupine (*Hystrix dorsata*). This worm was hitherto only known to infest the hare, the rabbit, and the marmot.

Temm., of Japan, were it not that the black streaks on the throat are wanting. Mr. Gurney is inclined to consider it an undescribed species.

6. OTUS VULGARIS, Fleming.

The European species.

7. SCOPS BAKKAMÆNA, Pennant.

Probably synonymous with *S. japonicus*.

8. NINOX JAPONICUS.—*Strix hirsutus japonicus*, Faun. Japon.

This Mr. Gurney considers the Japanese rather than the Indian bird.

9. ARUNDINAX OLIVACEUS, Blyth.

This agrees perfectly with an Indian specimen in the British Museum, as also with a figure in Von Schrenck's work on the Zoology of Amoorland, named *Salicaria (Calamoherpe) ædon*, Pall. On referring to Pallas's 'Zoographia,' I find the bird there described as *Turdus ædon*,—*Muscicapa ædon* being quoted as a synonym from an older work, viz. Pallas's 'Travels.' The specific name *ædon* ought therefore to have the precedence; but as the larger Nightingale is designated by that term, I should say it would be as well to retain Blyth's name.

10. SALICARIA CANTILLANS, Temm. Faun. Japan.

Apparently this bird, hitherto only known from Japan.

11. CYANECULA SUECICA, L.—*C. cerulecula*, Pall.

The red-spotted variety, in every way similar to the European bird.

12. CALLIOPE CAMTSCHATKENSIS, Gmel.

13. IANTHIA CYANURA, Pallas.

Agrees with Japanese specimens, which differ from *I. rufilata*, Hodgs., in having a white eyebrow-mark, where the latter has only a bright blue one, and in being more dingy in the upper parts. The Siberian specimens in the British Museum again differ from both in having a rufescent eye-streak, and in having the throat and breast buff-colour instead of white.

14. LARVIVORA GRACILIS, mihi, Ibis, 1861, p. 262.

This pretty species I have procured in the South of China, whence I described and named it in the 'Ibis.' It much resembles *L. cyanea* of Blyth in form, and a good deal as to colouring. Its bill, however, is longer, and its wings shorter. Instead of having the under parts pure white, as in this species, *L. cyanea* has the lower neck, breast, and flanks a fine red buff, the chin and two streaks proceeding from it only being white. *L. cyanea* is also distinguished by a narrow pure white eye-streak.

15. PRATINCOLA INDICA, Blyth.

16. TCHITREA INCEI, Gould.

A male, female, and mature male in white dress of this species, which differs from *T. affinis*, of Malacca, in having a much smaller bill.

17. ERYTHROSTERNA ALBICILLA, Pallas.—*E. leucura*, Gmelin.

Agrees with Indian specimens of this bird in the Museum.

18. XANTHOPYGIA LEUCOPHRYS, Blyth.

It seems strange that this species should occur in the north, instead of the ordinary Japanese species, *X. narcissina*, Temm.

19. NILTAVA CYANOMELÆNA, Temm. Faun. Japon.

One specimen.

20. PHYLLOSCOPUS CORONATUS, Temm. Faun. Japon.

21. ANTHUS RICHARDI, Vieillot.

22. NEMORICOLA INDICA, Gmelin.

Identical with Indian specimens in the British Museum.

23. BUDYTES CINEREOCAPILLA, Savi.

Almost identical with those from South Europe, the wing-coverts only being a little more distinctly tipped with yellow.

24. MOTACILLA BOARULA, L.

25. MOTACILLA OCULARIS, Swinhoe.

Like *M. lugubris*, but with perennially grey back, less white on the wings, and carpal region grey instead of black. Of *M. dukhunnensis*, Sykes, with which Mr. Blyth compares this bird, I have seen a specimen in the Indian Museum. It is not one of the white-winged group, and wants the black eye-streak—approaching rather *M. alba*, L.

26. ZOSTEROPS JAPONICUS, Temm. Faun. Japon.

The true *Z. japonicus* differs from our southern species, *Z. simplex*, mihi, in its larger size, in rust-coloured flanks, and in wanting the first primary quill-feathers.

27. TURDUS SIBIRICUS, Pallas.

In full male plumage.

28. TURDUS PALLENS, Pallas.

29. TURDUS FUSCATUS, Pallas.

30. PETROCINCLA MANILLENSIS, Gmelin.

31. *ORŒCETES GULARIS*, n. sp.

In my visit to Peking, I procured a specimen of this bird in not quite mature plumage, and noted it in my list in the 'Ibis,' 1861, p. 332, no. 41, as a new species. Mr. Fleming's specimen, being a fully matured male, affords me an opportunity of now describing it. It is closely allied to that interesting and beautiful form, *O. cinclorhynchus* of the Himalayas, being, like it, a tree-bird, rather than a rock-bird. Our species is smaller in size, and has a shorter and more robust bill. *O. cinclorhynchus* is at once distinguished in having the throat and neck a blue-grey, like the crown, in having the wings and tail edged with blue, and in having the white spot that adorns the wing on the six inner tertiary quills, instead of on only the second and three consecutive feathers. I will now proceed at length to define the species.

ORŒCETES GULARIS, n. sp.

Crown of the head, extending down back of neck, and carpal region of the wings clear French or lazuline grey. Loral space, sides of neck, under parts, rump, and upper tail-coverts deep reddish buff. Auriculars, onwards to the back, back, scapulars, and lesser wing-coverts black. Wings and tail hair-brown, with a surface-wash of pale grey, chiefly conspicuous on the basal half of the latter. The feathers of the wing edged with pale buff, the greater coverts and tertials being strongly tipped with the same. A white spot, comprising basal portions of the outer webs of the second, third, fourth, and fifth tertiaries, ornaments the wing. The singularly distinctive character whence I have drawn its name consists in a white line which, starting from the centre of the chin, runs down in front quite to the breast, broadening as it descends to the form of an isosceles triangle, a line of black spots edging for some distance the rufous that flanks its sides. Bill blackish brown, with bright yellow rictus, and inside to mouth. Legs and claws brown, strongly washed with ochre. Iris deep brown. Total length 7 inches, wing 4, tail $2\frac{8}{10}$.

32. *OTOCORYS PENICILLATA*, Gould.

This is identical with a skin from the Altai Mountains in Mr. Gould's collection, marked *O. sibirica*; but as no authority is given for that designation, I have preferred retaining the above name, which is synonymous with *O. albigula*, Brehm.

33. *EMBERIZA RUTILA*, Pallas.

A fine male.

34. *EMBERIZA STRACHEYII*, Moore.

This agrees well with a mounted skin from Kumaon, in the East Indian Museum, bearing the above denomination.

35. *FRINGILLA MONTIFRINGILLA*, L.36. *CARPODACUS ERYTHRINUS*, Meyer.

37. FREGILUS GRACULUS, L.

An immature specimen, with clipped wings. It is smaller than our English specimen, and has smaller tarsi; these may, however, be attributable to its immaturity. The true *F. graculus*, L., appears also to occur in Java, apud Moore.

38. STURNUS CINERACEUS, Temm.

39. STURNUS DAURICUS, Pall.

40. YUNX TORQUILLA, L.

41. GECINUS CANUS, Gmel.

A female.

42. PICUS MAJOR, L.

One specimen of this form is most closely allied to *P. luciani* of Malherbe; but as the two examples I have, from the same locality, differ a good deal in many points held to be of specific value, I do not well see how the numerous variations from the normal *P. major* throughout China can be properly identified by the apparently unstable characters pointed out by M. Malherbe.

43. PICUS HYPERYTHRUS, Vigors.

The female specimen in this collection and a male in my own do differ slightly from the Himalayan specimens: ours have more rufous on the neck, and the back more banded with black and white; but the general characters are so entirely the same that I do not feel justified in separating them.

44. CUCULUS CANORUS, L.

One skin, identical with English specimens.

45. DICRURUS MACROCERCUS, Lath.

46. CHIBIA HOTTENTOTA, L.

Very similar to Indian specimens.

47. LANIUS BUCEPHALUS, Temm. Faun. Japon.

48. CHARADRIUS LONGIPES, Temm.

In fine summer plumage.

49. TRINGA SUBARCUATA.

In fine summer plumage.

50. TEREKIA JAVANICA.

In fine summer plumage.

51. TOTANUS FUSCUS.

In fine summer plumage.

52. *TOTANUS CALIDRIS*, L.

In fine summer plumage.

53. *LIMOSA RUFA*.

In fine summer plumage.

54. *ARDETTA SINENSIS*, Gmel.55. *RALLUS INDICUS*, Blyth.

Identical with Indian specimens.

56. *PORZANA BAILLONI*.

Identical with British specimens.

I have purposely deferred to the last a skin, unfortunately with the wings clipped, of a species of House Martin (*Chelidon*). Of this genus there have hitherto been only two recognized species—the common European Martin (*C. urbica*, L.) and the Cashmere Martin (*C. cashmerensis*, Gould), the Nepal Martin (*Delichon nipalensis*, Moore) being of an intermediate form between the true Martins and the Sandmartins. The Cashmere Martin is at once distinguishable from its English congener by its much smaller size, by its deep brown axillaries, and by its shorter and much less furcate tail, as also by the browner colour of its upper parts. That it is a good species, there can be no doubt. Mr. Whiteley's specimen, a mature bird, in the steel-blue colour of the upper parts assimilates to the European bird; but differs from it strikingly in its smaller size, in its much less emarginate tail, in its deep brown axillaries, and in having the whole of its upper tail-coverts pure white, instead of partially steel-black. Its breast, moreover, shows no sign of the partial brown band of the House Martin. Now, strange enough, Capt. Blakiston has brought from Hakodadi, Japan, another Martin, which, on the other hand, assimilates to *C. cashmerensis* in its proportions, colour of the back, and almost even tail; but differs from it in having a black chin, black instead of brown axillaries, and in having the ends of the lower tail-coverts broadly tipped with black. For the Japanese species I would suggest the name *C. blakistoni*, after its discoverer; and for the Pekin bird the name *C. whiteleyi*, after the gentleman to whom this collection belongs, and to whom we are indebted for the privilege of exhibiting before this Society this interesting series of North China birds.

Note.—Since the above was read before the Society, I have perused carefully the description of the House Martin of Siberia, given in Pallas's 'Zoographia Rosso-Asiatica,' and find that the bird therein described at full length answers in every respect to Mr. Whiteley's bird from Pekin, and does not agree with the European Martin (*Chelidon urbica*, L.), to which it has been wrongfully referred by later Russian ornithologists. The name of the Pekin species will therefore have to stand *Chelidon lagopoda*, Pallas.—R. S.

The following lists of additions to the Menagerie during the months of June, July, August, September, and October were read to the Meeting:—

JUNE.

1 Hybrid between Common Pheasant & Fowl	<i>Phasianus colchicus</i>	} Presented by Lord Wharnclyffe.
1 Rhesus Monkey	<i>Gallus domesticus</i>	
1 Flamingo	<i>Macacus rhesus</i>	Miss Reynell.
4 Griffon Vulture	<i>Phenicopterus antiquorum</i>	Rees Williams, Esq.
1 Lesser Spotted Woodpeckers.	<i>Gyps fulvus</i>	Rees Williams, Esq.
2 European Thick-knees ..	<i>Picus minor</i>	John Gould, Esq., F.R.S.
1 Quebec Marmot	<i>Edicnemus crepitans</i> ..	E. C. Newcome, Esq.
1 Flying Fox	<i>Arctomys empetra</i>	Lieut.-Col. Rhodes.
1 Arctic Fox	<i>Pteropus medius</i>	Sir John Lees, Bart.
1 Golden Plover	<i>Canis lagopus</i>	Percy Godman, Esq., F.Z.S.
2 Green Parrakeets	<i>Charadrius phivialis</i>	Percy Godman, Esq., F.Z.S.
1 Hen Harrier	<i>Conurus tiriacula</i>	Lady Gilbert.
2 Grey Shrikes	<i>Circus cineraceus</i>	M. Jules Verreaux.
1 Maugé's Opossum	<i>Lanius excubitor</i>	Lord Lilford.
2 Green Woodpeckers	<i>Dasyurus maugæi</i>	F. J. C. Wildash, Esq.
1 Hoopoe	<i>Gecinus viridis</i>	} Purchased.
2 Indian Doves	<i>Upupa epops</i>	
2 Guillemots	<i>Chalcophaps indica</i>	
2 Razor-bills	<i>Uria troile</i>	
2 Puffins	<i>Alca torda</i>	
1 Cape Hyrax	<i>Fratercula arctica</i>	
3 Moluccan Deer	<i>Hyrax capensis</i>	
1 Slender Loris	<i>Cervus moluccensis</i>	
1 Martinique Waterhen ..	<i>Loris gracilis</i>	
1 Prehensile-tailed Capromys	<i>Porphyrio martinicus</i> ..	
2 Spider Monkeys	<i>Capromys prehensilis</i> ..	
1 Squaco Heron	<i>Ateles frontatus</i>	
3 Cuckoos	— <i>hybridus</i>	
7 Hoopoes	<i>Herodias comata</i>	
1 Little Bittern	<i>Cuculus canorus</i>	
4 Kingfishers	<i>Upupa epops</i>	
1 Galago	<i>Aræta minuta</i>	
4 Golden Orioles	<i>Alcedo hispida</i>	
2 Wapiti Deer	<i>Galago demidoffii</i>	
1 Hybrid between Barbary and Red Deer..	<i>Oriolus galbula</i>	
1 Persian Deer	<i>Cervus canadensis</i>	
1 Alpaca, male	— <i>barbarus</i> , ♂	} Born.
1 Arabian Baboon	— <i>elaphus</i>	
	— <i>wallichii</i>	
	<i>Auchenia pacos</i>	
	<i>Cynocephalus hamadryas</i>	

Of these, *Galago demidoffii* was stated to have been exhibited for the first time in the Society's Menagerie.

JULY.

		Presented by
1 Wild Boar	<i>Sus scrofa</i> , var.....	Rev. G. Portal.
1 Lesser Sulphur-crested Cockatoo.	<i>Cacatua sulphurea</i>	E. Boys, Esq.
1 Cheetah (from Syria) ...	<i>Felis jubata</i>	H. R. H. the Prince of Wales.
11 Indian Fishes	<i>Osphronemus trichopte- rus</i> .	} Capt. Gideon.
	<i>Leuciscus</i> , sp. nov.? ex ins. Ceylon.	
	<i>Turtur</i> , sp.?	
2 Doves	<i>Sciurus palmarum</i>	M. J. Verreaux.
4 Palm-Squirrels.....	<i>Ardea purpurea</i>	Miss Emily Lamprell. Lord Lilford, F.Z.S.
1 Purple Heron	<i>Platycercus baueri</i>	} F. J. Rooper, Esq., F.Z.S.
1 Bauer's Parrakeet	<i>Sus scrofa</i> , var. <i>pluviceps</i>	
2 Japanese Pigs	<i>Hystrix leucura</i>	F. Rangel, Esq.
2 Ceylonese Porcupines ..	<i>Cercoleptes caudivolvulus</i>	H. E. Smith, Esq.
1 Kinkajou	<i>Chamaeleo africanus</i>	H. Harvey, Esq.
1 Chameleon	<i>Gubernatrix cristatella</i> ..	Miss Williams Wynn.
1 Black-crested Cardinal..	<i>Sciurus</i>	} Mrs. Turnbull.
7 Malabar Squirrels	<i>Lemur macaco</i>	
1 Ruffed Lemur	<i>Crocodylus</i> , sp.?	D. W. E. Brown, Esq.
7 young African Crocodiles	<i>Lophortyx californianus</i>	John Brettall, Esq.
1 Californian Quail	<i>Macacus rhesus</i>	W. H. Pollard, Esq.
1 Rhesus Monkey	<i>Ara ararauna</i>	Mrs. Heathcote.
1 Blue and Yellow Maccaw	<i>Caccabis chukar?</i>	Mrs. C. Gammon.
1 Partridge (from China)..	<i>Cacatua sulphurea</i>	Mrs. John Brown.
1 Lesser Sulphur-crested Cockatoo.	<i>Cœlogenys paca</i>	F. Godman, Esq.
1 Spotted Cavy	<i>Pelias berus</i>	Albert Mitchell, Esq.
3 Common Adders.....	<i>Edicnemus grallarius</i> ...	} Dr. Mueller, C.M.
2 Australian Thick-knees.	<i>Porphyrio melanotus</i> ..	
2 Porphyrios	<i>Coturnix dactylisonans</i> ...	Lady Cust.
2 Common Quails	<i>Spizaetus zomurus</i>	W. Chambers, Esq.
1 Spotted-breasted Crested Eagle.	<i>Emys</i> , sp.?	Miss Scott.
4 Water-Tortoises	<i>Canis aureus</i>	John Tudor, Esq.
1 Indian Jackal	<i>Coccothraustes vulgaris</i> ..	W. Nash, Esq., F.Z.S.
1 Hawfinch	<i>Semnopithecus entellus</i> ...	} Capt. Kelsall, R.E.
2 Entellus Monkeys	<i>Macacus pileatus</i>	
3 Toque Monkeys	<i>Alligator lucius</i>	
1 Alligator	<i>Crotalus horridus</i>	
2 Rattlesnakes	<i>Lepus timidus</i>	
6 Leverets	<i>Turdus torquatus</i>	
1 Ring-Ouzel	<i>Semnopithecus leuco- prymnus</i> .	
1 Budong Monkey	<i>Agapornis roseicollis</i>	
1 Parrakeet	<i>Cercopithecus pluto</i>	
1 Pluto Monkey	<i>Vidua paradisæa</i>	
1 Whydah Bird	<i>Ateles frontalis</i>	} Purchased.
1 Spider Monkey	<i>Emys</i> , sp.	
1 Water-Tortoise	<i>Euplectes</i> — ?	
4 Napoleon Weaver Birds.	<i>Lemur mongoz</i>	
2 Lemurs.....	— <i>nigrifrons</i>	
	<i>Dolichonyx oryzivorus</i> ..	
4 Rice-birds	<i>Coturnix dactylisonans</i> ...	
3 Common Quails	<i>Eupsychortyx cristata</i> ...	
1 Crested Ortyx	<i>Cercopithecus lunulatus</i> ..	
1 Lunulated Monkey	<i>Alligator lucius</i>	
2 Alligators.....	<i>Pyranga rubra</i>	
4 Scarlet Tanagers		

JULY (continued)

2 Blue Grosbeaks	<i>Guiraca cœrulea</i>	}	Purchased.
6 Ludovician Grosbeaks..	— <i>ludoviciana</i>		
2 Indian Silverbeaks	<i>Munia malabarica</i>	}	Born.
1 Cockatoo	<i>Cacatua sanguinea</i>		
1 Little Dusky Parrot ..	<i>Pionus sordidus</i>	}	
2 Collared Peccaries	<i>Dicotyles torquatus</i>		
2 Punjab Wild Sheep ..	<i>Ovis cycloceros</i>		
1 Eland, female	<i>Oreas canna</i>		
1 African Civet	<i>Viverra civetta</i>		

Of these, *Spizaëtus zonurus* was stated to be exhibited for the first time in the Society's Menagerie.

AUGUST.

1 Indian Rock Snake	<i>Python molurus</i>	}	Presented by R. C. R. Cocq, Esq. Capt. Fitzgerald.
1 Common Wolf	<i>Canis lupus</i>		
2 Arctic Foxes	— <i>lagopus</i>	}	E. Thornton, Esq. — Spooner, Esq.
1 King Vulture	<i>Gyparchus papa</i>		
1 Coati mondi	<i>Nasua fusca</i>	}	R. W. Keate, Esq.
1 S. American Monkey ..	<i>Cebus</i> — ?		
2 Crested Curassows	<i>Crax alector</i>		
2 Globose Curassows	— <i>globoicera</i>		
2 Capuchin Monkeys	<i>Cebus capucinus</i>	}	Miss F. Darvall. Edward Mellish, Esq.
1 Spotted Cavy	<i>Celogenys paca</i>		
1 Prehensile-tailed Porcu- pine.	<i>Cercolabes prehensilis</i> ..		
1 Blue and Yellow Maccaw	<i>Ara ararauna</i>	}	E. M. Cookesley, Esq. G. N. Kilsall, Esq.
2 Cockateals (fem.)	<i>Calopsitta nova-hollandia</i>		
1 Aye-aye	<i>Chiromys madagascari- ensis</i> .		
1 Striped Hyæna	<i>Hyæna striata</i>	}	Herr Gätke. Dr. Mueller, C.M.
1 Ceylonese Monkey	<i>Semnopithecus leuco- prymnus</i> .		
1 Tengmalm's Owl	<i>Nyctale tengmalmii</i>	}	— Terry, Esq. Gent. Cadet Fenton.
4 Laughing Kingfishers..	<i>Dacelo gigantea</i>		
2 Piping Crows	<i>Gymnorhina leuconota</i> ..	}	— Hume, Esq.
1 Kangaroo	<i>Halmaturus</i> , sp. ?		
1 Smooth Snake	<i>Coronella lævis</i>	}	Purchased.
2 Dingoes	<i>Canis dingo</i>		
1 Bronze-wing Pigeon ..	<i>Phaps chalcoptera</i>	}	Obtained by the So- ciety's Collector.
1 Kangaroo	<i>Halmaturus</i> , sp. ?		
2 Kingfishers	<i>Alcedo ispida</i>	}	
1 Common Jay	<i>Garrulus glandarius</i>		
1 Ceylonese Monkey	<i>Semnopithecus leuco- prymnus</i> .		
2 Golden Orioles	<i>Oriolus galbula</i>	}	
1 Squirrel	<i>Sciurus dorsalis</i>		
4 Dormice	<i>Myoxus muscardinus</i> ..	}	
2 Passenger Pigeons	<i>Ectopistes migratorius</i> ..		
1 pair of Indian Antelopes	<i>Antilope cervicapra</i>	}	
4 Springboks	<i>Gazella euchore</i>		
2 Steinboks	<i>Calotragus campestris</i> ..	}	
1 Rock Conies	<i>Hyrax capensis</i>		
1 Crested Porcupine	<i>Hystrix cristata</i>	}	
1 Genet	<i>Genetta</i> , sp. ?		
1 African Ichneumon	<i>Herpestes</i> , sp. ?		

AUGUST (continued).

1 African Rock-Snake	<i>Python seba</i>	} Obtained by the Society's Collector.
1 Puff Adder	<i>Clotho arietans</i>	
1 Sambur Deer	<i>Cervus aristotelis</i>	} Born.
2 Hog Deer	— <i>porcinus</i>	
1 Lion	<i>Felis leo</i>	

Of these, *Chiromys madagascariensis*, *Coronella laevis*, and *Sciurus dorsalis* were stated to have been exhibited for the first time in the Society's Menagerie.

SEPTEMBER.

		Presented by
1 Swinhoe's Deer	<i>Cervus swinhoii</i>	} R. Swinhoe, Esq., C.M.
2 Formosan Monkeys	<i>Macacus cyclopis</i>	
4 young Turtles	<i>Chelonia viridis</i>	H. P. Morgan, Esq.
1 Palm-Squirrel	<i>Sciurus palmarum</i>	H. Sturrock, Esq.
1 Common Tortoise	<i>Testudo graeca</i>	Mr. King.
1 Bonnet-Monkey	<i>Macacus radiatus</i>	W. Mare, Esq., Jun.
2 Ortolan Buntings	<i>Emberiza hortulana</i>	} W. Russell, Esq., F.Z.S.
2 Woodlarks	<i>Alauda arbovea</i>	
1 Titlark	<i>Anthus pratensis</i>	
2 Brazilian Canaries	<i>Sycalis brasiliensis</i>	
1 Chaffinch	<i>Fringilla caelebs</i>	
1 Diamond Sparrow	<i>Amadina lathami</i>	
1 Mule Bullfinch	<i>Pyrrhula vulgaris</i>	
1 Cross-bill	<i>Loxia curvirostra</i>	
1 Rufous-neck Weaver Bird	<i>Hyphantornis textor</i>	
1 Jackdaw	<i>Corvus monedula</i>	
1 Magpie	<i>Pica caudata</i>	
2 Elegant Parrakeets	<i>Euphema elegans</i>	
1 Sallé's Parrakeet	<i>Chrysotis salléi</i>	
1 Redbreast	<i>Erythacus rubecula</i>	
1 Whitethroat	<i>Sylvia cinerea</i>	
1 Blackcap	— <i>atricapilla</i>	
2 Blackbirds	<i>Turdus merula</i>	
1 Misselthrush	— <i>viscivorus</i>	
1 Red-breasted Thrush	— <i>migratorius</i>	
1 Lemming	<i>Lemmus norvegicus</i>	F. Godman, Esq., F.Z.S.
1 Yarra Trout	<i>Galaxias scriba</i>	Capt. Ridgers.
1 Jackal (from Patras)	<i>Canis aureus</i>	Capt. Amlot.
1 Sea-Eagle	<i>Haliaëtus albicilla</i>	Mr. Xenos.
1 Globose Curassow	<i>Crax globicera</i>	A. N. de Pothomier, Esq.
1 Black Spider Monkey	<i>Ateles belzebuth</i>	} Purchased.
1 Siamese Monkey	<i>Macacus</i> — ?	
1 Common Magpie	<i>Pica caudata</i>	
1 Toque Monkey	<i>Macacus pileatus</i>	
1 Java Squirrel	<i>Sciurus plantani</i>	
2 Japanese Pheasants	<i>Phasianus versicolor</i>	
2 Black-backed Jackals	<i>Canis mesomelas</i>	
3 Kangaroo Mice	<i>Hapalotis mitchellii</i> ?	
4 St. Helena Seed-eaters	<i>Crithagra butyracea</i>	
1 Bonnet-Monkey	<i>Macacus radiatus</i>	
1 Mooruk	<i>Casuarus bennettii</i>	Hatched.
1 Japanese Deer	<i>Cervus sika</i>	Born.

Of these, *Macacus cyclopis* and *Sciurus plantani* were stated to have been exhibited for the first time in the Society's Menagerie.

OCTOBER.

2 Spotted Covies	<i>Cœlogenys paca</i>	Presented by
1 Macaque Monkey	<i>Macacus cynomolgus</i>	P. N. Bernard, Esq.
1 Water-Rail, Australia ..	<i>Rallus pectoralis</i>	Capt. Welstead.
1 Axis Deer, female	<i>Cervus axis</i>	T. Aspinwall, Esq.
2 Buffon's Touracos	<i>Corythaix buffoni</i>	J. D. Mullins, Esq.
1 Indian Minah	<i>Gracula intermedia</i>	Russell Gordon, Esq.
2 Indian Doves	<i>Turtur</i> , sp.	} P. Sinclair Laing, Esq.
1 Ring-tailed Lemur	<i>Lemur catta</i>	
2 Eagle Owls	<i>Bubo maximus</i>	Lieut. C. R. Cock.
2 Flying Phalangers	<i>Belideus sciureus</i>	Hon. Mrs. Steuart.
1 Peregrine	<i>Falco peregrinus</i>	W. T. Dayne, Esq.
2 Purple Guans	<i>Penelope purpurascens</i>	Thos. Fraser, Esq.
2 Water-Tortoises	<i>Emys</i> — ?	S. Sandbach Parker, Esq.
1 Canadian Goose	<i>Bernicla canadensis</i>	Mrs. A. B. White.
1 Cross-Fox	<i>Canis fulvus</i> , var.	} Capt. Wishart.
1 Douroucouli Monkey	<i>Nyctipithecus felinus</i> ? ..	
1 White-headed Parrot ..	<i>Picus senilis</i>	} Purchased.
12 Grey Mulletts	<i>Mugil chelo</i> ?	
5 Crested Blennies	<i>Blennius palmicornis</i>	
2 Montagu's Harriers	<i>Circus cineraceus</i>	
2 Grey Wagtails	<i>Molacilla yarrellii</i>	
1 Kangaroo Rat	<i>Hypsiprymnus</i> , sp. ?	
1 Trumpeter	<i>Psophia crepitans</i>	
1 Saki Monkey	<i>Pithecia monachus</i>	
1 Squirrel Monkey	<i>Callithrix sciureus</i>	
1 Negro Tamarin	<i>Hapale ursulus</i>	
2 West African Pigs	<i>Sus scrofa, hybridus</i> ? ..	
2 Common Boas	<i>Boa constrictor</i>	
6 Australian Finches	<i>Brotogeris pyrrhopterus</i> ..	} Born.
4 Parrakeets	<i>Conurus xanthopterus</i> ..	
	— <i>tui</i>	
2 Fruit-eating Pigeons ..	<i>Carpophaga microcera</i> ..	
	<i>Ptilopus fasciatus</i>	} Hatched.
1 Red-eared Monkey	<i>Cercopithecus erythrotis</i> ..	
2 Moustache Monkeys ..	— <i>cephus</i>	
1 White-nosed Monkey ..	— <i>nictitans</i>	
3 Chameleons	<i>Chamæleo africanus</i>	
2 Crimson-eared Waxbills	<i>Estrela phenicotis</i>	
3 Pumas	<i>Felis concolor</i>	
1 Leopard	— <i>leopardus</i>	
5 Black Swans	<i>Cygnus atratus</i>	

Of these, *Pithecia monachus*, *Carpophaga microcera*, and *Ptilopus fasciatus* were stated to have been exhibited for the first time in the Society's Menagerie.

December 9, 1862.

E. W. H. Holdsworth, F.L.S., Esq., in the Chair.

Dr. Cobbold exhibited a series of microscopic preparations of rare Entozoa, which he had just received from Prof. Leuckart, of Giessen. Among the more remarkable were *Distoma heterophyes* and *D. hæmatobium* (from Egypt), an adult *Trichina spiralis*, *Tænia nana* (Egypt), *T. cœnurus*, *T. echinococcus*, and the new *Bothryocephalus cordatus* of Leuckart, from Greenland.

The following papers were read :—

1. NOTES ON THE ANATOMY OF PITHECIA MONACHUS (GEOFF.).
BY W. H. FLOWER, CONSERVATOR OF THE MUSEUM OF
THE ROYAL COLLEGE OF SURGEONS.

(Plate XXXVII.)

I confess to some hesitation in giving the above specific name to the subject of the present communication, as the original description of the species (Tableau des Quadrumanes, 'Annales du Muséum,' tom. xix. 1812) is too brief for satisfactory identification, and I have had no opportunity of examining the type specimen in the Paris Museum. It is exceedingly like the *Pithecia irrorata* of Dr. J. E. Gray, described and figured in the 'Zoology of the Voyage of the Sulphur' (1842), part 1, p. 14, of which the type is in the British Museum, and which differs from the previously described *P. hirsuta* of Spix (Simiarum et Vespertiliorum Brasiliensium Species novæ, 1823, p. 14, and plate 9) in wanting the short, bristle-like, whitish hairs on the cheeks; but as the present specimen agrees in this respect with Spix's species rather than Gray's, I have little doubt that it ought to be referred to the former, if they are distinct.

In the 'Catalogue Méthodique de la Collection des Mammifères du Muséum d'Histoire Naturelle de Paris,' 1851, by M. Isidore Geoffroy Saint-Hilaire, there is but one species with which, as far as can be ascertained by the short specific characters there given, it agrees; and this is the *P. monachus* of the elder Geoffroy; and as the learned author of the catalogue has satisfied himself as to the identity of this species with *P. hirsuta* of Spix, it becomes necessary to discard the latter name, and retain the one which has the priority of date.

The dimensions of my specimen are rather inferior to those assigned by Spix to *P. hirsuta*, and to those of the examples of *P. irrorata* in the British Museum; but it must be considered that it is a scarcely adult female, and at the time of death was in extremely poor condition, which last circumstance may also account for the hair, especially on the tail, being less crisp and curled than in the above specimens. It also seems to differ from them somewhat in the relatively greater length of the tail*.

* Since writing the above, the skin was taken to Paris by my friend Dr. Murchison, and, with the valuable assistance of M. Pucheran, compared and pronounced to be identical with the specimens of *P. monachus* (including the original one described by Geoffroy) in the Muséum d'Histoire Naturelle.

As I am not aware of any anatomical observations upon this genus, it appears desirable to put on record some notes made at the dissection of this specimen. It was not to be expected that any striking character would be found in which it would differ from animals of allied genera; the principal point of interest, in fact, was the brain, a description of the form and convolutions of which has hitherto been a desideratum, being one of the few omitted in M. Gratiolet's great work on the Cerebral Folds of the Primates.

The animal died in the Gardens of the Zoological Society, on the 24th of October, 1862, after having lived there about a fortnight, during which time Mr. Wolf was able to make the characteristic sketch which accompanies this communication (Pl. XXXVII.).

It was a female, nearly adult. All the permanent teeth were in place in the lower jaw; but the posterior upper molars had not cut the gum on either side. The state of emaciation to which it was reduced could scarcely be exceeded. In this condition the weight was 19 ounces avoirdupois. The dimensions were as follows:—

	inches.
Length from the vertex of the head to the root of the tail	11
Length of tail (including $1\frac{1}{2}$ inch of hair only)	18
— head, from tip of nose to occiput	2·9
Greatest breadth of head	$1\frac{3}{4}$
Length of upperarm	$3\frac{1}{2}$
— forearm	$3\frac{1}{2}$
— hand	$2\frac{1}{2}$
— thigh	$4\frac{1}{4}$
— leg	$4\frac{1}{2}$
— foot	4

The large hood of long loose hair upon the upper part of the head, neck, and shoulders, from under which the comparatively bare face emerges, gives a very peculiar appearance to the general physiognomy. The face is long and narrow; the nose large and full, its breadth ·6 inch; the nostrils wide apart, quite lateral in situation; the chin rapidly retreating. The eyes of moderate size, their axes directed straight forwards; the width of aperture ·45 inch; the diameter of the iris ·3 inch; colour of the iris hazel-brown. The skin of the face is of a dark purplish brown, almost black upon the nose, and paler around the eyes; it is sparingly covered with short coarse hairs of a whitish colour. Rather more than half an inch of the forehead is clothed with these short hairs, directed upwards in the middle, and outwards on the sides. Above this comes the hair of the hood, directed forwards. On each cheek is a well-marked patch of yellowish white hair, directed downwards and forwards, terminating in front by a distinct line extending from the inner canthus of the eye to below the angle of the mouth. In front of this line the dark colour of the skin predominates over the white of the short scattered hairs, except along the margin of the upper lip, where these are longer and more abundant. The ears are large, and roundish in form, quite naked, and of the same colour as the skin of the face; a considerable patch of skin behind them is free from hair.

The hair on the body is rather harsh in texture, long, loose, and sparing in quantity, so that when separated the skin is readily seen. It is particularly long on the shoulders, and stands out from the body, giving great apparent fulness to all this part. On the back of the neck and top of the head it is directed forwards, forming the before-mentioned hood.

An individual hair from the shoulder measures 3 inches in length. The first inch from the root is very fine, and of a brownish-black colour; then it becomes thicker, and of a deeper black; and in the last half-inch it tapers to a point, and is of a dirty yellowish white. Hair of this character covers the upper part and back of the head, the neck, shoulders, back, arms, thighs, and tail, the terminal portion on the posterior part of the body being pale yellowish brown. On the forearm it is shorter, black tipped with white. On the legs the black predominates. The dorsal surface of the hands and feet, including the toes, is covered with short, perfectly white hair, through which the black skin of these parts is scarcely seen. The throat, breast, belly, and inside of the thighs are very sparingly covered with fine, pale yellowish brown hair. The tail is entirely covered, to an equal extent all round, with long, coarse, curved, black hair, tipped with pale brown. The hair is longest and the tail appears thickest near the body, and gradually tapers towards the end. I may here observe that the curling condition of the hair so conspicuous in the specimens in the British Museum, and in the figures referred to above, is almost absent in this individual—a circumstance, as before said, probably due to the bad health of the animal for some time previous to its death; and hence the tapering instead of the bushy end to the tail.

The hands are rather small. The thumb is short, and appears naturally to lie in the direction of the other fingers. Its extremity is level with the distal end of the first phalanx of the second digit. The second and fifth digits are of equal length, extending as far as the distal end of the second phalanx of the third and fourth, which are also of equal length. The nails are black, subcompressed, and pointed, that of the thumb slightly more flattened, and broader at the base, than the others.

The sole of the foot is long and narrow; the hallux well developed, widely separated from the other toes, with a flat, subtriangular, pointed nail. In relative length the other toes stand in the following order—second, fifth, third, and fourth; but the difference between them is not very great. Their nails are long, curved, compressed, and pointed.

The orifice of the vulva is a narrow longitudinal cleft situated on the lower part of the symphysis pubis. Immediately in front of it is a subcylindrical and slightly tapering tongue-like clitoris, a quarter of an inch long, and of a pink colour. On its under surface is a groove continuous with the orifice of the vulva. The perinæum is about $\frac{1}{3}$ inch in length.

The brain weighed, immediately after removal, 460 grains, or $\frac{1}{8}$ th part of the entire (very emaciated) body. The general form as seen from above is a regular oval, nearly as broad before as behind (fig. 1).

The whole of the cerebellum and the olfactory lobes are covered by the cerebrum. The length of the cerebral hemispheres is 1·8 inch; their greatest breadth 1·5 inch; their height 1·2 inch. The upper surface is arched, the parietal region being well developed. The occipital lobes are full and broad, but not much elongated posteriorly, so that they scarcely do more than cover the cerebellum in this direction. The frontal lobe is depressed, and deeply excavated below; the temporal lobe well developed. In general form the cerebrum resembles that of some of the *Cebi*; it is less pointed in front than the brains of most of the Old World Apes, and less elongated and depressed than in *Nyctipithecus*, *Callithrix*, and *Hapale*. The olfactory lobes are smaller than in most of the allied forms. There is nothing calling for particular notice in the base of the brain (fig. 2), except that the

Fig. 1.

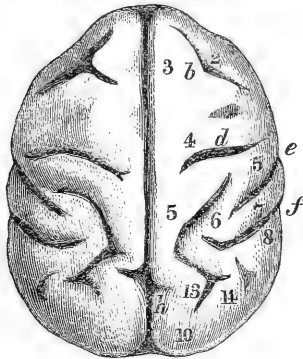
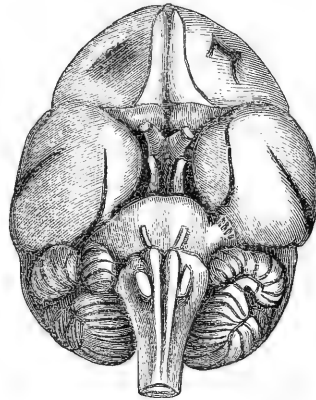
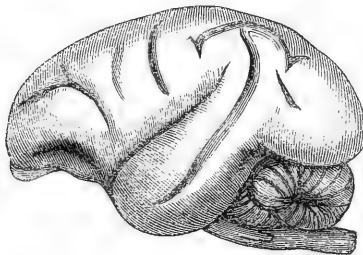


Fig. 2.



corpora albicantia are not confluent, and the olivary bodies form distinct projections on the medulla oblongata $\cdot 2$ inch long. The cerebellum is large, the flocculi being particularly well developed.

Fig. 3.



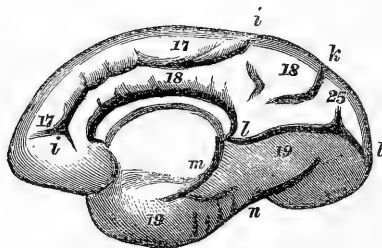
The corpus callosum is $\cdot 7$ inch long; the portion of the cerebrum anterior to it $\cdot 4$; that posterior to it $\cdot 7$ inch.

The outer face of the cerebral hemisphere (fig. 3) is marked by a

few, but deeply cut, and characteristic sulci*. 1. The *fissure of Sylvius* (*e*) slopes upwards and backwards to about two-thirds of the distance between its commencement and the margin of the great longitudinal fissure, and then ends abruptly without joining the antero-temporal. 2. On the frontal lobe is a deeply marked fissure (the *supero-frontal*, *b*) running transversely backwards and outwards, bent at an obtuse angle in the middle. 3. Separated by a wide interval (antero-parietal gyrus) from this is the simple, straight *postero-parietal* (fissure of Rolando, *d*). 4. Behind this is the sulcus bounding the upper border of the angular gyrus, having the form of a broad pointed arch. 5. The long and deeply marked *antero-temporal* sulcus (*f*) runs from the apex of the temporal lobe, upwards beyond the end of the fissure of Sylvius, curving slightly forwards at its termination near the point of the aforesaid arch. 6. Of the *temporo-occipital* (external perpendicular, *h*) the traces are but small; its commencement is seen above, in a notch on the border of the hemisphere, and again there is an indication of it at the posterior termination of the angular sulcus, but it does not interrupt the perfect superficial continuity from the parietal to the occipital lobe of both first and second external annectent gyri (13 and 14). In this respect *Pithecia* agrees with *Ateles* rather than *Cebus*. The absence of this fissure (so constant in the Old World Apes) in all the smaller American Monkeys, and its imperfect condition in others of the family, show that it is a less important characteristic of the Simian brain than is the antero-temporal or even the angular.

On the inner face of the hemisphere (fig. 4), the sulci present the

Fig. 4.



ordinary and typical character of the Primatial type of brain, in a simple form. The *calloso-marginal* sulcus (*i*) is very well marked, and inclines upwards almost to the margin of the hemisphere at its hinder end. It has several small secondary sulci connected with it. The *occipito-parietal* (internal perpendicular, *k*) runs down from the margin of the hemisphere, and then bends abruptly forwards. That most characteristic sulcus, the *calcarine* (*l*), the bottom of which corresponds with the hippocampus minor in the posterior cornu of the lateral ventricle, is deeply cut, runs directly backwards, and

* For the nomenclature of these parts of the brain, see a paper by Prof. Huxley, "On the Brain of *Ateles paniscus*," Proc. Zool. Soc., June 11, 1861.

divides posteriorly into two branches, of which the lower is the longer. The *collateral sulcus* (*n*), instead of passing downwards and forwards along the inner side of the temporal lobe, turns abruptly outwards, and appears on the outer face, in the rather sharp angle on the inferior border of the hemisphere at the junction of the occipital and temporal lobes.

The dental formula is, I. $\frac{2-2}{2-2}$, C. $\frac{1-1}{1-1}$, P. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$ =36.

The incisors of both upper and lower jaw project forward, so that their anterior edges form together an angle of 100°. The upper central incisors are of moderate size, and rounded at the edges. The upper lateral incisors are extremely small; there is a considerable diastema between them and the canines, which are strong and conical, and project downwards and somewhat outwards. The two rows of the upper molar series are perfectly straight and parallel. The premolars increase in size from the first to the third, the first being notably smaller than the others and unicuspidate. The first molar is rather larger than the second; their crowns are square, nearly flat, but grooved longitudinally in the middle, the raised edge on the outer and inner sides being slightly divided into two tubercles. The crown of the third molar is just beneath the gum. The four lower incisors are long and narrow, of nearly equal size, the outer ones slightly rounded at the corners; their cutting edges form a continuous gently curved line. A very small interval exists between them and the sharply pointed conical canine, which is of very nearly the same size as the upper one. The first premolar is very small; the two succeeding ones increase in size. The first and second molars are nearly equal, and the third not very markedly inferior. As with the upper series, these teeth are very slightly tuberculated; they have the appearance of being considerably worn, but, as the animal was so young, this is scarcely probable. There is a carious spot on the posterior part of the third premolar on both sides.

The length of the tongue, from the base of the epiglottis to the tip, is 1·4 inch; its breadth ·5 inch; its sides are parallel, the end square, with the corners slightly rounded. The sublingual organ is fleshy, except towards the end, which is sharp-pointed and cleft at the extreme tip; it is free to the extent of ·25 inch, and its apex is ·3 from the tip of the tongue.

The left lung has two lobes, quite separate from one another, each having a special division of the bronchus; the right lung is composed of four distinct lobes. The main arterial trunks are given off from the aorta as in man, the innominate dividing into right subclavian and right carotid, and the left carotid and left subclavian coming off separately.

The stomach is simple, its general form nearly globular, but the pyloric portion is lengthened and tubular. The cardiac and pyloric orifices are much approximated. The small intestine, from the pylorus to the ileo-cæcal valve, measures 50 inches; its diameter is nearly uniform throughout, about ·4 inch. Peyer's agminated glands, the largest $1\frac{1}{2}$ inch long, are scattered at tolerably regular distances

all along the canal almost to the duodenum. There are no valvulae conniventes, and nothing to distinguish the ileum from the jejunum. The length of the colon, from the ileo-cæcal valve to the anus, is 22 inches: it is rather smaller than the cæcum in calibre, rapidly diminishing for the first 3 inches, then acquiring a uniform diameter of about $\cdot 4$ inch, which is somewhat increased in the descending portion and rectum. The cæcum is large and long, of greater calibre than the colon, from which it is distinctly marked off by a constriction, passing obliquely round the intestine, and slightly diminishing in size as it approaches its terminal end, which is obtuse and rounded. It presents a tolerably uniform curve, almost a semicircle in the same plane. Its length is $4\frac{1}{2}$ inches; its diameter, at 1 inch from the ileo-cæcal valve, 1 inch.

The liver weighed 190 grains. Its anterior margin is deeply cleft by three fissures, dividing it into four lobes. Of these, the first (from the left) and the third and fourth are of about equal size. The second is double the size of either of the others, and notched on its anterior margin by the fissure of the round ligament, while the gall-bladder lies on its under surface. The Spigelian lobe is distinct. The cystic duct is $\cdot 6$ inch long, and joins the hepatic duct at a very acute angle. The common bile-duct, rather more than an inch in length, enters the posterior part of the duodenum, with the pancreatic duct, half an inch from the pylorus. The spleen is simple, long and narrow, tapering at the lower, more obtuse and notched at the upper end, $2\frac{1}{2}$ inches long, and $\cdot 4$ inch wide at the middle.

The suprarenal bodies are very obtuse (slightly flattened) cones, their axis measuring $\frac{1}{2}$ inch, and the longest diameter of their base about the same. The weight of each is 3 grains. Their colour is dark purple, deeper than that of the kidney. The base of the right is closely approximated to the corresponding kidney. The left, which is more rounded in form, is less closely connected. The kidneys are of the same form as in the human subject. Their length is $\cdot 85$ inch. The right is placed slightly lower than the left. The left kidney weighed 24 grains; the right about a grain less. The urinary bladder, when distended, is capacious, of an elongated pyriform shape, having a globular fundus and a cylindrical or rather fusiform neck. The uterus is very small, elongated, and cylindrical, not bifid; $\cdot 75$ inch long, and $\cdot 2$ inch in diameter. The ovaries are $\cdot 3$ inch long, narrow, pointed at each end, and slightly flattened, of a pale pinkish colour.

The vertebral formula of this specimen is, cervical 7, dorsal 13, lumbar 6, sacral 3, caudal 26.

There is considerable variation in the number of the vertebræ in the different genera of American Monkeys; and even among species of the same genus, and individuals reputed (though perhaps on insufficient grounds) to belong to the same species, the number is not constant. The specimens contained in the British Museum (Catalogue of the Bones of Mammalia, 1862) and in the Museum of the Royal College of Surgeons give the following results. Those marked with an asterisk belong to the last-named collection; the numbers in the others are given on the authority of the above-named Catalogue.

	Cerv.	D.	L.	S.	Caud.
<i>Ateles chameck</i>	7	14	4	3	33
— <i>paniscus</i> *	7	13	4	3	31
— <i>arachnoides</i> *	7	14	4	3	31
— <i>geoffroyii</i>	7	14	4	3	33
— <i>belzebuth</i> *	7	14	4	3	31
— <i>belzebuth</i>	7	13	4	3	33
<i>Brachyteles hypoxanthus</i>	7	13	5	3	?
<i>Lagothrix humboldtii</i>	7	14	4	3	30
<i>Mycetes seniculus</i>	7	14	5	3	27
— <i>ursinus</i>	7	14	5	3	?
<i>Cebus fatuellus</i>	7	14	5	3	26
— <i>cirrhifer</i>	7	14	5	3	?
— <i>apella</i>	7	14	5	3	27
— <i>hypoleucus</i>	7	12	7	3	30
— <i>capucinus</i>	7	14	5	3	?
— <i>capucinus</i> *	7	13	6	3	23
— ? *	7	14	6	3	24
— ? *	7	14	5	3	25
<i>Ouakaria calvus</i>	7	13	6	3	18
— <i>spixii</i>	7	13	6	3	18
<i>Pithecia monachus</i> *	7	13	6	3	26
<i>Saimaris sciurea</i>	7	13	7	3	27
— <i>sciureus</i> *	7	13	7	3	24
<i>Nyctipithecus felinus</i>	7	13	6	3	18
— <i>trivirgatus</i> *	7	15	7	3	27
<i>Iacchus cedipus</i>	7	13	6	3	33
— <i>vulgaris</i>	7	13	6	3	28
— <i>vulgaris</i> *	7	13	6	3	19
— <i>auritus</i>	7	13	6	3	28

2. LIST OF BIRDS FROM THE SULA ISLANDS (EAST OF CELEBES),
WITH DESCRIPTIONS OF THE NEW SPECIES. BY ALFRED
RUSSEL WALLACE, F.Z.S.

(Plates XXXVIII., XXXIX., XL.)

These islands must not be confounded with the *Sooloo* Islands, between Borneo and Mindanao. On our maps they are written *Zula*, or *Xulla*; but as neither of these gives the correct pronunciation, I write the name exactly as it is pronounced by the natives. The group consists of three islands, *Sula Mangola* to the east, *Sula Taliabo* to the west, and *Sula Bessi* to the south. They lie nearly equidistant between Celebes and the Moluccas, being about eighty miles from the nearest part of Celebes, but with several intervening islands; only forty from Bouru, but a clear sea between them; and about ninety from Batchian, with the Obi Islands intervening. The two larger of the Sula Islands are each about fifty miles long and twelve to fifteen wide.

Islands so small, and so surrounded by others whose productions are more or less known, might be expected to be not worth visiting by the naturalist, as it would seem most probable that they would contain only the common species of the surrounding islands. Be-

lieving such to be the case, I should probably have taken no trouble to obtain a collection from thence, had I not been told by many of the natives who trade to Sula that a beautiful little bird of the Parrot family was found there and in no other place. In consequence of this and other more or less vague information about its productions, I arranged with my assistant, Mr. Allen, to go there for two months. Owing to bad weather, ill health, and the usual troubles about boats, men, and provisions, he obtained but a very small collection, made on the southern and eastern islands. Only forty-eight species of birds were obtained, yet out of these there were seven new species, which appear to be altogether peculiar to this little group of islands; five or six others are rare birds of the Moluccas or Celebes, and the remainder the commoner species from the same countries.

But although the Sula Islands show a mixture of the forms of Celebes and the Moluccas, yet these countries have not contributed towards its fauna in anything like an equal proportion. Deducting ten species which have a wide range over a large portion of the Archipelago, and even beyond it, and dividing the remainder into two portions—those that may be supposed to have been derived from Celebes on the one hand, and from the Moluccas and islands to the east and south of them on the other,—we shall find that the Celebesian forms are almost exactly double the rest. Twenty species are identical with birds found in Celebes, and five new species are of Celebesian forms; whereas only eleven species are found also in the Moluccas, and but two of the new species can be affiliated to Moluccan types. Twenty-five of the species of the Sula Islands must therefore have been derived from Celebes, and only thirteen from the Moluccas. The accompanying Table (p. 335) shows the species distributed according to their derivation.

It is further interesting to remark that all the Raptores and all the Pigeons and Parrots, but one of each group, are Celebesian species or forms; while among the Moluccan species are many active but weak-flying birds, including five species of Flycatchers, which would be most likely to be carried over by strong winds. Further, the birds derived from the Moluccas contain three genera which do not occur in Celebes.

From these facts it seems to me clear that the Sula Islands are really an outlying portion of Celebes, and must at some former period have had a much closer connexion with that great island than at present. The Moluccan species must therefore be considered as immigrants, many of them from Bouru, which is only forty miles distant; and the fact that some of these early Moluccan immigrants have already become modified into distinct forms, some of which may be classed as species, others as varieties, shows for how long a period of time the small and scattered islands of the Moluccas must have remained in their present disconnected state.

The following Table shows the geographical affinities of the birds of the Sula Islands:—

Table showing the Geographical Affinities of the Birds of the Sula Islands.

Species found also in Celebes.	New species allied to Celebes forms.	Species found also in the Moluccas.	New species allied to Moluccan forms.	Species of wide range.
<ol style="list-style-type: none"> 1. <i>Tanygnathus albirostris</i>. 2. <i>Spilornis rufipectus</i>. 3. <i>Baza magnirostris</i>. 4. <i>Halcyon melanorhyncha</i>. 5. <i>Halcyon rufa</i>, n. s. 6. <i>Dendrochelidon wallacii</i>. 7. <i>Artamus monachus</i>. 8. <i>Myiagra puella</i>, n. s. 9. <i>Dicrurus pectoralis</i>, n. s. 10. <i>Graucalus temmincki</i>. 11. <i>Dicaeum celebicum</i>. 12. <i>Anthreptes lepidus</i>. 13. <i>Corvus validus</i>, var. 14. <i>Treron griseicauda</i>. 15. <i>Ptilinopus melanocephalus</i>. 16. <i>Carpophaga luctuosa</i>. 17. <i>Carpophaga paulina</i>. 18. <i>Macropygia albocapilla</i>. 19. <i>Turacena menadensis</i>. 20. <i>Rallina minahasa</i>, n. s. 	<ol style="list-style-type: none"> 1. <i>Loriculus sclateri</i>, n. s. 2. <i>Trichoglossus flavoviridis</i>, n. s. 3. <i>Eudynamis facialis</i>, n. s. 4. <i>Oriolus frontalis</i>, n. s. 5. <i>Rallus sulcirostris</i>, n. s. 	<ol style="list-style-type: none"> 1. <i>Platycercus dorsalis</i>, var. 2. <i>Ceyx lepida</i>. 3. <i>Monarcha cinerascens</i>. 4. <i>Pachycephala lineolata</i>, n. s. 5. <i>Pachycephala rufescens</i>, n. s. 6. <i>Pachycephala cilo</i>, n. s. 7. <i>Campephaga melanotis</i>. 8. <i>Nectarinea auriceps</i>. 9. <i>Calornis metallica</i>. 10. <i>Calornis obscura</i>, var. 11. <i>Chalcophaps moluccensis</i>. 	<ol style="list-style-type: none"> 1. <i>Pitta crassirostris</i>. 2. <i>Crimiger longirostris</i>, n. s. 	<ol style="list-style-type: none"> 1. <i>Todiramphus sanctus</i>. 2. <i>Todiramphus collaris</i>. 3. <i>Merops ornatus</i>. 4. <i>Eurystomus pacificus</i>. 5. <i>Hirundo javanica</i>. 6. <i>Nectarinea frenata</i>. 7. <i>Esacus magnirostris</i>. 8. <i>Numenius uropygialis</i>. 9. <i>Egretta symnathophora</i>. 10. <i>Egretta nigrirostris</i>.

There are in all thirteen new species described in the present paper, a few of which are also in my collections from Celebes and the Moluccas. In many cases I have given, from my own notes, the colours of the feet, bill, and iris, as well as the dimensions, from the fresh-killed specimens of rare or interesting species which have been previously described. In the following list of the species I have followed the arrangement of Bonaparte's 'Conspectus,' a work which is in the hands of every ornithologist.

TANYGNATHUS ALBIROSTRIS.

Psittacus sumatranus, Raffl. Linn. Trans. xiii. p. 281.

T. macrorhynchos, ♀, Blyth, Cat. p. 3.

Psittacodis sumatranus, Wagl.

Eclectus sumatranus, Gray, Gen. of Birds.

I have obtained specimens of this bird from the south and north of Celebes and the Sula Islands. The bill is entirely white, with a semitransparent fleshy or waxy tinge when alive, in both sexes and in the fully adult bird; the tip alone is slightly dusky. The iris is very pale yellow or yellowish white, and the feet dull olive. The cry of this bird is different from that of *T. mülleri*, to which it is nearest; and it is universally recognized by the natives of Celebes as another bird.

As this species has received no other specific name than *sumatranus*, given to it by Sir Stamford Raffles, under the mistaken idea that it was an inhabitant of Sumatra, I have renamed it *albirostris* from its most characteristic feature. However much I may reprobate the practice of needlessly changing specific names, I think that one so mischievously erroneous as the present must not be retained. Not only is the present bird and the whole genus to which it belongs absent from Sumatra, but they inhabit another primary zoological division of the earth—the great Australian region, of which Celebes and the islands east of it form a part.

Hab. The Celebes group.

LORICULUS SCLATERI. (Pl. XXXVIII.)

Viridis; vitta gulari, flexura alarum, uropygio tectricibusque caudæ superioribus coccineis; macula magna dorsali rubra, aurantiaco marginata; rostro nigro; pedibus luteis.

Delicate green, rather deeper on the head and wings; forehead with a tinge of reddish brown; a stripe on the throat, a spot on the outer margin of the wing, the rump, and upper tail-coverts (which nearly reach the end of the tail) bright red; a large spot on the back, extending in a triangle from between the shoulders to the red on the rump, orange-yellow, deepening in the middle to rich orange-red, which colour forms a band across the back; wings and tail beneath blue; quills black, the outer edge green above, the inner edge blue beneath; bill black; cere and base of the upper mandible yellow; feet yellow; iris yellow.

Total length $5\frac{1}{2}$ inches; wing $3\frac{1}{2}$ inches; bill, to nostril, $\frac{1}{2}$ inch.

Hab. Sula Islands.

Remarks.—In this fine species the sexes are alike. I have named

it after Dr. Selater, the indefatigable Secretary to the Zoological Society of London, to whose kind assistance and extensive knowledge of ornithology I am much indebted.

TRICHOGLOSSUS FLAVOVIRIDIS. (Pl. XXXIX.)

Viridis; capite, pectore et abdominis lateribus flavis; pectoris plumis viridi marginatis; abdomine flavo-viridi; cauda subtus fusco-flava; rostro aurantiaco-rubro; pedibus plumbeis.

Grass-green; head deep yellow, obscurely fasciated with dusky green, and bounded on the nape by a narrow dusky collar; face, cheeks, and chin dusky olive, each feather margined with yellow; neck, breast, and upper part of the belly bright yellow, each feather narrowly margined with dark green, producing a regular scaly appearance; belly, vent, and under tail-coverts yellowish green, more irregularly banded with dark green; between the shoulders the feathers have a yellow central band, forming a large spot more or less concealed by the arrangement of the plumage; quills dusky black, all but the first with the outer web green, and the first five with the extreme edge yellow; beneath, the secondaries and tertiaries have a yellow spot on the inner web; tail above of an ochreish green, becoming ochre-yellow on the inner web of the lateral feathers, beneath entirely dull ochre-yellow; bill orange-red; orbits bare, yellow; feet lead-colour; iris orange.

Total length 8 inches; wing $4\frac{5}{8}$ inches; tail $3\frac{1}{3}$ inches.

Hab. Sula Islands and Celebes (?).

Remarks.—I obtained a bird in Menado, which, as far as my memory serves, was the same species as this; and one of my servants, a native of Menado, assured me the bird was found there. My specimen was carried away by a rat, while drying, and was never recovered. There is therefore, I think, little doubt but this pretty species inhabits N. Celebes; but there, having to compete with *T. ornatus*, it is comparatively scarce, whereas in the Sula Islands it reigns alone, and is much more abundant.

PLATYCERCUS DORSALIS, var.

Psittacus dorsalis, Q. & G. Voy. de l'Astrol. t. 21. f. 1.

Rostrum aurantiaco-rubrum, apice corneo.

This bird agrees with my specimens from New Guinea; but the bill in those is black, with a red spot at the base only, near the nostrils; in this variety the bill seems all reddish, except a pale tip and dusky portion at the sides of the upper mandible. This is a curious example of interrupted distribution, the Moluccas intervening with their distinct species, *P. amboinensis* in Ceram, and *P. hypophoniis* in Gilolo. I can, however, discover no difference of plumage to separate the birds.

Hab. Sula Islands and New Guinea.

BAZA MAGNIROSTRIS.

Pernis magnirostris, Kaup, Isis, 1847, p. 343.

P. crassirostris, Kaup, Contr. to Orn. 1850, p. 77.

Hab. Sula Islands and Celebes (Philippine Islands, B.M.).

SPILORNIS RUFPECTUS.

Spilornis rufpectus, Gould, Proc. Zool. Soc. 1857, p. 222.

Hab. Sula Islands and Celebes.

HALCYON MELANORHYNCHA.

Alcedo melanorhyncha, Temm. Pl. Col. 391.

Bill and feet dusky black; base of bill reddish; inside of bill and soles of the feet orange-red; iris dark.

Hab. Sula Islands and N. Celebes.

HALCYON RUF.

Rufa, supra purpureo et violaceo micans; gula pallidior; uropygio albo, violaceo tincto, plumarum apicibus plus minusve cæruleis; rostro pedibusque rubris.

Rufous, the whole of the upper parts tinged purplish violet; beneath with sometimes a faint violet gloss; chin and throat paler; a broad stripe on the rump rosy violet, or blue, formed by white feathers tipped with blue; wings short; quills entirely rufous-brown; bill and feet red; iris dark olive.

Total length 11 inches; wing $4\frac{5}{8}$ inches; bill, to gape, $2\frac{5}{8}$ inches.

Hab. Sula Islands and Celebes.

Remark.—This species differs from *Halcyon coromanda major*, Schleg. (*H. schlegeli*, Bp.), in the quite different proportions of the quill-feathers, as given in Bonaparte's 'Conspectus;' in this respect it is more like the much smaller species from Sumatra, &c., *H. coromanda*, Lath. (*H. lilacina*, Bp.).

TODIRAMPUS SANCTUS.

Halcyon sancta, Vig. & Horsf.; Gould, Austr. t. 21.

Hab. Sula Islands and Java, to New Guinea.

TODIRAMPUS COLLARIS.

Alcedo collaris, Scop.

Halcyon collaris, Sw. Zool. Ill. pl. 27.

Hab. Sula Islands, and from the Malay peninsula to New Guinea.

CEYX LEPIDA.

Ceyx lepida, Temm. Pl. Col. 591, fig. 1.

Hab. Sula Islands and the Moluccas.

MEROPS ORNATUS.

Merops ornatus, Lath.; Gould, Austr. ii. pl. 16.

Hab. Sula Islands, Celebes, Timor, and New Guinea.

Remark.—The specimens agree with those of Ternate in having more brown on the head, and less blue on the breast, than the Timor and Lombock specimens.

EURYSTOMUS PACIFICUS.

Coracias pacifica, Lath.*Eurystomus australis*, Sw. ; Gould, B. Austr. ii. t. 17.*Hab.* Sula Islands, Celebes, Bouru, Moluccas, and New Guinea.

DENDROCHELIDON WALLACII.

Dendrochelidon wallacii, Gould, P. Z. S. 1859, p. 100 ; Birds of Asia, fig.*Hab.* Sula Islands and Celebes.

These specimens agree with those of Macassar in colouring, but differ so little from fine Javanese specimens of *D. klecho* that I should not myself have ventured to consider them distinct.

EUDYNAMIS FACIALIS.

Nigro-chalybeus ; *fronte, gula facieque albis* ; *rostro pedibusque nigris*.

Male entirely glossy blue-black, except the chin and face, as far as the eyes, white ; bill and feet black.

Total length 14 inches ; wing $7\frac{1}{2}$ inches ; tail $6\frac{1}{2}$ inches.

Hab. Sula Islands.

This species, of which I possess but a single fine specimen, is very like *E. melanorhynchus* of Celebes, but is smaller and of different proportions, the wing of that species being 8 inches, and the tail $8\frac{1}{2}$ inches in length. The white of the face is slightly mixed with black feathers, and two small white feathers occur in other parts of the plumage, which led my friend Dr. Selater to suppose that it might be a case of incipient albinism. This, however, would not affect the determination of the species, which depends on its different proportions from its nearest ally.

PITTA CRASSIROSTRIS.

Pitta crassirostris, Wallace, Proc. Zool. Soc. 1862, p. 188.*Hab.* Sula Islands.

CRINIGER LONGIROSTRIS.

Supra flavo-viridis, capite obscuriore ; *subtus flavescens, abdomine crissoque vivide flavis* ; *remigum pogonio interno fusco-nigro* ; *rectricum margine interno apicibusque oblique, flavis* ; *rostro obscuro* ; *pedibus pallidis*.

Rich olive or greenish yellow ; throat and breast dusky yellow ; the rest beneath pure yellow ; primaries and secondaries with the inner web black ; the lateral tail-feathers with the tip and inner margin yellow, the four middle feathers entirely olive-yellow ; bill very long, horny black ; feet pale fleshy olive.

Total length 10 inches ; wing $4\frac{3}{4}$ inches ; tail $4\frac{1}{4}$ inches ; bill, to gape, $1\frac{3}{8}$ inch.

Hab. Sula Islands.

Remarks.—This fine species is very distinct from *C. flavicaudus*, Bp., by its long bill and longer and differently coloured tail.

ORIOIUS FRONTALIS. (Pl. XL.)

Flavo-aurantiacus; corona occipitali latissima, alis caudaque nigerrimis; dorso concolore; remigibus ex toto nigris; cauda elongata, rectricibus lateralibus plus minusve flavis, mediis duabus ex toto nigris vel puncto apicali flavo.

Pure deep yellow, the black on the head leaving only a small frontal spot; wings entirely black, rarely showing a minute tip or edging of yellow; yellow on the tail beneath generally less than in *O. acrorhynchos*, diminishing regularly to the middle feathers, which are wholly black, or in some specimens show a yellow point on the extreme apex of the web; bill flesh-colour; feet plumbeous; iris red.

In the female the two middle tail-feathers are olivaceous yellow, the tertiaries olive-margined, and the primaries white-edged. A variety of the female occurs with the bill jet-black.

Length 11·3 inches; wing 6 inches; tail $4\frac{3}{4}$ inches.

Hab. Sula Islands.

This species is very like *O. acrorhynchos* of Manilla, but differs sufficiently in its richer and more uniform colour, longer tail, jet-black wings and middle tail-feathers, and the smallness of the frontal yellow spot.

ARTAMUS MONACHUS.

Artamus monachus, Bp. Consp. p. 343, ex Temm.

Albus, capite cinereo, alis caudaque fusco-plumbeis.

Pure white; head and neck ashy, with a warm purplish tinge; lores blackish; wings and tail ashy lead-colour, primaries blackish on the outer webs and towards the tips; under wing-coverts and base of wings and tail beneath white, shading into ash-colour; bill pale blue; feet lead-colour.

Total length 8 inches; wing $5\frac{3}{4}$ inches; tail $2\frac{7}{8}$ inches; bill, to gape, $1\frac{1}{8}$ inch.

Hab. This fine species inhabits the mountain districts of N. Celebes, as well as the Sula Islands.

HIRUNDO JAVANICA.

Hirundo javanica, Lath.; Temm. Pl. Col. 82. fig. 2.

I have specimens of this bird from Sumatra, Borneo, Java, and Lombock, as well as the Sula Islands. It agrees well with Temminck's figure, and scarcely differs from *H. neoxena*, Gould, figured in the 'Birds of Australia,' but in being darker on the under surface, and having a brassy tinge on the wings.

Hab. Sula Islands and westward to Sumatra.

MYIAGRA PUELLA.

Cerulea; dorso abdomineque cæruleo-cinereis; ventre et caudæ tectricibus inferioribus albis, cinereo tinctis; alis caudaque cinereis, plumis cæruleo marginatis.

Delicate cobalt-blue, paler and with an ashy tinge on the body beneath; the belly and under tail-coverts nearly white, tinged with ashy blue; wings and tail ashy, the feathers with the outer edges blue; bill and eyelids blue; iris dark; feet blue-lead.

Total length $6\frac{1}{2}$ inches; wing 3 inches.

Hab. Sula Islands and Celebes.

Remarks.—I have retained for this species the name attached to my Celebesian specimen by Mr. G. R. Gray. In both sexes it is alike, and differs from the common *M. cærulea* of the Malay peninsula and islands in the absence of the black crown-spot and collar.

MONARCHA CINERASCENS.

Drymophila cinerascens, Temm. Pl. Col. 430. fig. 2.

Hab. Sula Islands, Moluccas, and Timor.

PACHYCEPHALA LINEOLATA.

Supra cinerea, olivaceo tincta, subtus albo-fulvescens; gula et pectoris plumis tenuiter nigro striatis; rostro pedibusque fusco-nigris.

Above ash-coloured, more or less tinged with olive-green; beneath pale-ochreish yellow; the feathers of the throat and breast with a median dusky stripe; lores light ash; chin nearly white; quills dusky, bordered with olivaceous; bill and feet blackish; iris dark.

Total length $5\frac{3}{4}$ inches; wing $2\frac{7}{8}$ inches.

Hab. Sula and Bouru Islands.

Remarks.—A specimen from Bouru is rather larger and a little more coloured; but having only one specimen from each locality, I cannot venture to separate them. This species is very like *P. simplex*, Gould, but is a little larger, and has a more definite coloration and markings.

PACHYCEPHALA RUFESCENS.

Supra fusco-plumbea, capite obscuriore; subtus alba, pectore et abdomine rufescentibus; remigibus rectricibusque fusco-nigris, cinereo-brunneo marginatis.

Above dull-brownish ash; head darker; lores ashy; beneath white, on the breast and belly more or less rufous-tinged; quills dusky, rather broadly margined with brownish ash; under wing-coverts white, rufous-tinged; tail dusky, the feathers towards the base margined with ash; bill and feet black; iris dark.

Total length 6 inches; wing $3\frac{1}{8}$ inches.

Hab. Sula and Bouru Islands.

Remark.—The male specimen from Bouru is rather brighter in colour.

PACHYCEPHALA CLIO.

Olivaceo-viridis, subtus cum cervice flava; capite, genis, colli lateribus et torque pectorali lato nigris; gula alba; cauda ejusque tectricibus superioribus nigris; remigibus tectricibusque

alarum nigris, olivaceo marginatis; rostro nigro, pedibus obscuris.

Fœm. *obscurior; capite fusco; gula albescente; pectore et abdomine pallide rufis; crisso flavescente; tectricibus caudæ inferioribus flavis; alis caudaque olivaceo-brunneis.*

Very like *Pachycephala melanura*, Gould, from which it differs only in the broader pectoral band, the rather larger size, and the upper tail-coverts, which are black; whereas by Gould's figure and description they are olive-yellow or green, like the back.

Total length $6\frac{3}{4}$ inches; wing $3\frac{1}{2}$ inches.

Hab. Sula Islands and Bouru.

Remarks.—The genus *Pachycephala* does not occur in Celebes; so that we must consider this bird to have come from the Moluccas; and it already shows slight differences, which may be taken as indications of its becoming modified into a distinct race.

DICRURUS PECTORALIS.

Nigro-cæruleus; alis nitide æneis; plumis pectoris maculis magnis purpureo-æneis terminatis; colli plumis lateralibus, elongatis, purpureo-nitidis.

Rich blue-black; wing of a brilliant metallic-bluish green; the feathers of the head and breast terminating in metallic purple spots, which on the breast are large and very conspicuous; sides of the neck with elongated metallic-purple plumes; the tail and rump also have metallic tinges; tail rather short, and moderately forked and recurved; bill moderate; iris red.

Total length 12 inches; wing 6 inches.

Hab. Sula Islands.

Remark.—This fine species seems distinct from any of its allies: it is most like the Celebesian form; but that has always a *white iris*.

GRAUCALUS TEMMINCKII.

Ceblepyris temminckii, Müll. Verh. Nat. Gesch. Ethnog. p. 190.

Hab. Sula Islands and Celebes (*Müller*).

CAMPEPHAGA MELANOTIS.

Campephaga melanotis, G. R. Gray, P. Z. S. 1860, p. 353.

Hab. Sula Islands, Batchian, and Gilolo.

DICÆUM CELEBICUM.

Dicæum celebicum, Müll. Verh. Nat. Gesch. iii. p. 162.

Hab. Sula Islands and Celebes.

NECTARINIA FRENATA.

Nectarinia frenata, Müll. Verh. Nat. Gesch. Zool. t. viii. fig. 1.

Hab. Sula Islands, Celebes, and the Moluccas.

NECTARINIA AURICEPS.

Nectarinia auriceps, G. R. Gray, Proc. Zool. Soc. 1860, p. 348.

Hab. Sula Islands, Batchian, and Gilolo.

ANTHREPTES LEPIDA.

Certhia lepida, Lath.

Anthreptes javanica, Sw. Zool. Ill. t. 121.

Hab. Sula Islands, Celebes and islands westward of it.

Remark.—This is the furthest eastern range of the species, which does not reach the Moluccas.

CORVUS VALIDUS, var.

Corvus validus, Schleg. "Not. sur le genre *Corvus*."

In size between *C. validus* and *C. enca* (but the latter has the third quill longest): fourth and fifth quills longest, nearly equal; third a little longer than the sixth; second between sixth and seventh; wings reach nearly to end of tail; wings $10\frac{3}{4}$ to 11 inches; tail $5\frac{3}{4}$ inches; total length 16 inches; bill 2 inches to $2\frac{1}{8}$ inches to root of feathers on culmen $\times \frac{3}{4}$ inch deep. Skin bare and black behind the eye; tail rounded; side feathers $\frac{1}{2}$ inch, shorter than middle feathers, entirely purple-black, less glossy beneath; iris olive-brown.

Hab. Sula Islands, Celebes, Java, and Sumatra.

CALORNIS METALLICA.

Lamprotornis metallica, Temm. Pl. Col. 266.

C. viridescens et amboinensis, G. R. Gray.

I cannot separate the birds of this little group, whether from Amboina, Ceram, Gilolo, Batchian, or the Aru Islands, from this specimen from Sula; and as Temminck first described the Amboina bird, his name must be retained.

Hab. Sula Islands and the Moluccas.

CALORNIS OBSCURA, var.

Lamprotornis obscura, Bp. (ex Forst.) Consp. Gen. Av. 417.

The numerous modifications of this bird, varying slightly in colour, form, and dimensions in every island of the Moluccas, cannot, I think, be separated into distinct species, for the simple reason that it is quite impossible to characterize them intelligibly, or even to separate them from each other, when their localities are unknown. This variety is rather larger and rather greener than the type form of Gilolo. *C. mysolensis*, G. R. Gray, has a more purple tinge, and *C. placidus*, G. R. Gray, MSS., more olivaceous. These I would consider all as local varieties. *C. cantoroides*, G. R. Gray, from Mysol, will alone stand as a good species, being very distinct from *C. obscura* in its short square tail.

Hab. Sula Islands and the Moluccas.

"Length $9\frac{1}{2}$ inches; iris red."

TRERON GRISEICAUDA.

Treron griseicauda, G. R. Gray, B. M. Cat. Columbæ, p. 10.

Flavo-viridis; pileo genisque plumbeis; dorso medio scapularibusque purpureo-castaneis; dorso superiore lateribusque colli fulvo tinctis; uropygio rectricibusque duabus mediis lutescentibus; tetricibus caudæ inferioribus rufis, ad basin albo variis; alis plumbeo-nigris, tetricibus remigibusque secundariis flavo marginatis; rectricibus nigris, albo-griseo terminatis; rostro albo-viridi, basi viridi-olivaceo; pedibus rubris.

Fœm. Dorso scapularibusque fusco-viridibus; tetricibus caudæ inferioribus albis, viridi maculatis.

Greenish yellow, richer on the rump, and lighter beneath; top of head and cheeks in front of the eyes ashy blue, paler near the bill; keel of the bill bare above the nostrils; chin nearly white; sides of the neck above and between the shoulders tinged with orange-brown; wings slaty black; secondaries and wing-coverts more or less broadly yellow-margined; under tail-coverts rufous, more or less marked with white and green at the base and on the thighs; tail with the two middle feathers entirely olive-yellow, the rest slaty black with a broad terminal band of ashy white; wings beneath, under wing-coverts, and sides of the body ash-coloured; bill pale yellow-green, the base dark olive-green; iris red; orbits bare, green; feet red. The female wants the purple colour on the back and wings, and has the under tail-coverts white or rufous white, more or less green-spotted.

Total length $10\frac{1}{4}$ inches; wing 6 inches.

Hab. Sula Islands and Celebes.

Remark.—I have compared this with a specimen named by Mr. G. R. Gray, in the British Museum.

PTILONOPUS MELANOCEPHALUS, var.

Columba melanocephala, Gm.; Knip, Fig. i. t. 30.

The numerous specimens sent are all slightly different from those obtained in Java, Lombock, and Celebes—the yellow streak on the throat being of a much deeper colour, and the black occipital patch decidedly smaller.

In the Java bird the bill is yellow, with a greenish horny tip, the bare skin of the orbits is green, the feet pink, and the iris yellow.

Hab. Sula Islands, Celebes, Lombock, and Java.

CARPOPHAGA LUCTUOSA.

Columba luctuosa, Reinw.; Temm. Pl. Col. 247.

The specimens agree with those from Celebes; but a variety occurs with the outer tail-feathers black at the tip. This species may be at once distinguished from others of the white group of *Carpophaga* (*Myristicivora*) by the powdery-white colour almost concealing the black of the wings.

The bill and feet are bluish lead, with the tip of the former bright yellow; and the iris is almost black.

Hab. Sula Islands and Celebes.

CARPOPHAGA PAULINA.

Columba paulina, Temm.; Knip, Fig. i. t. 4.

The specimens have the rich brown of the nape rather less dilated than in those from Celebes. Bill lead-colour, the base above as far as the nostrils deep red; eyelids red; feet purplish red; iris blood-red.

Hab. Sula Islands and Celebes.

MACROPYOGIA ALBICAPILLA.

Macropygia albicapilla, Temm.; Bp. Consp. ii. 57.

Bill and feet dusky purple; iris pinky pearl-colour. This agrees with the specimens from Menado (Celebes), and is quite distinct from the species that occur in the Moluccas.

Hab. Sula Islands and Celebes.

TURACÆNA MENADENSIS.

Columba menadensis, Q. & G. Voy. Astr. t. 30.

Bill and feet black; orbits bare, red; iris blood-red. The sexes in this species are alike.

Hab. Sula Islands and Celebes.

CHALCOPHAPS MOLUCCENSIS.

Chalcophaps moluccensis, G. R. Gray, Proc. Zool. Soc. 1860, p. 361.

The female of this species has the crown fuscous; the forehead whitish, mixed with brown; the whole under surface of a light purplish brown somewhat irrorated with fuscous; the upper tail-coverts and tail are more or less rufous, with the feathers black-tipped; the purple and vinaceous colours on the back of the male are replaced by a dusky-olive tint. In the adult bird of both sexes the bill is coral-red, and the feet pink; iris dark olive.

Total length 10 inches.

Hab. Sula Islands, Bouru, and all the other islands of the Moluccas.

RALLUS SULCIROSTRIS.

Similis R. celebensi, sed gula nigra, rostro magis elongato, mandibulæ inferioris basi utrinque sulcata et naribus elongatis linearibus.

Very near *Rallus celebensis* (Q. & G. Voy. Astr. pl. 24), perhaps only a variety of that species; the chin, cheeks, and throat are, however, generally black, or but slightly irrorated with white; the bill is decidedly longer and less elevated in proportion at the base; the nasal furrow is longer, and the nostrils longer and linear; on the sides of the lower mandible is a furrow reaching half the length of

the bill; above olive-brown, head more dusky; beneath black; the breast, belly, and under tail-coverts narrowly white-banded; the vent rufous-tinged; quills obscurely banded with rufous-white and black; bill black; feet olive; iris red (in *R. celebensis* it is deep brown).

Total length 11 inches; wing $5\frac{3}{4}$ inches.

Hab. Sula Islands.

RALLINA MINAHASA.

Obscure rufo-olivacea; capite, collo pectoreque rufis; abdomine crissoque nigris, albo fasciatis; rostro nigro, subtus viridescente; pedibus nigris.

Head, neck, and breast entirely rufous, paler on the chin and upper part of the throat; back, wings, and tail dark olive-brown; belly and under tail-coverts black, with numerous white transverse bands somewhat irregularly placed; under wing-coverts black, with white spots, and several of the quills with white spots or bands towards the base; these are more conspicuous in the young bird, in which also the white bands on the under surface are broader; bill black, the basal portion beneath green; feet black; iris orange-red.

Total length 10 inches; wing 5 inches.

Hab. Sula Islands and N. Celebes (Minahasa).

Remarks.—This species is near *R. tricolor*, G. R. Gray; but the rufous colour does not extend so far on the back, and the colours of the back and abdomen are different. It is also smaller in all its parts.

ESACUS MAGNIROSTRIS.

Charadrius magnirostris, Lath.

Edicnemus magnirostris, Temm. Pl. Col. 387.

Hab. Sula Islands, Celebes, New Guinea.

NUMENIUS UROPYGIALIS.

Numenius uropygialis, Gould, B. Austr. vi. pl. 43.

N. minor, Müll.?

Hab. Sula Islands, the Moluccas, and New Guinea.

EGRETTA SYRMATOPHORA.

Herodias syrmatophora, Gould, B. Austr. vi. t. 56.

Hab. Sula Islands and Moluccas.

EGRETTA NIGRIROSTRIS.

Ardea nigrirostris, J. Gray, Zool. Misc. 1838; Ill. Ind. Zool. ii. t. 49. f. 2.

Hab. Sula Islands and Timor.

3. DESCRIPTION OF A NEW SPECIES OF LEMUR.

BY A. D. BARTLETT.

(Plate XLI.)

In size this animal nearly equals the Ruffed Lemur (*Lemur macaco*), which animal it also much resembles in form and habits.

The living specimen now exhibited was purchased for the Society from a dealer in Liverpool, in the month of October 1861, and has been in the Menagerie since that time. It was stated, by the person who brought it to this country, that the natives of Madagascar, from whom it was obtained, said it was of a very rare kind, and that it had been kept as a pet upwards of two years in that country.

I have compared this animal with the descriptions and specimens that I have been able to find in the British Museum and several other museums on the Continent, and I feel satisfied that this animal is specifically distinct from any that I have met with. I therefore propose to call it the White-whiskered Lemur (*Lemur leucomystax*)—a name that will, I think, enable any one to recognize the species, it being remarkable for its long and perfectly white whiskers, in which its ears are almost entirely concealed; the face is greyish black, darkest on the nose and back part of the head; the feet are brown, inclining to black on the toes. The prevailing colour of the body, limbs, and tail is reddish brown on a grey ground, darkest on the middle of the back; on the lower part of the back, at the base of the tail, is a white patch; the tail is lighter in colour than the body, the underside and tip nearly white; the belly is greyish white; the eyes are yellow-brown. On examination, I find the animal is a female; and I imagine, from her voice, which is a kind of hoarse croaking bark rapidly and frequently repeated, that the male would probably produce a louder and more powerful note.

I am led to infer this from having repeatedly heard the voice of both male and female of *L. macaco*. The voice of the male of this species is certainly very astonishingly powerful, and can be heard a great distance; while the voice of the female, although loud and discordant, is comparatively weak. Nevertheless it is a very unpleasant series of loud, grunting, grating barks, sufficient to alarm a nervous traveller should he be in the forest at dark and unacquainted with the size and nature of the animal producing these loud and dismal sounds.

4. ON THE MAMMALS OF THE ISLAND OF FORMOSA (CHINA).

BY R. SWINHOE, ESQ., F.R.S., H.M. VICE-CONSUL AT FORMOSA.

(Plates XLII., XLIII., XLIV., XLV.)

The island of Formosa lies almost due north and south, off the coast of China, in length about 120 miles, and varying in breadth from 20 to 80 miles, its nearest point to the adjacent mainland being

not less than 80 miles. It is nearly equally divided by the tropical line, and in entire area is about equal to Ireland. One-third of the island, comprising the greater part of the western side, consists of level land; the rest, of undulated and mountainous country, the peaks of some of the ridges attaining a height of 12,000 feet, and being covered with perennial snow. This island was till lately a sealed book to us, the few naturalists who had hitherto visited it having had no opportunities of penetrating into the interior. To my researches last year good fortune cleared the way; and on the opening of a port in Formosa by treaty, I had the pleasure of being appointed the pioneering consul to it. I had on two previous occasions visited the island,—the first time rather venturously, in a native lorch, in March 1856, when I spent a fortnight in Hongsan in the north-west; and a second time on a voyage of discovery in H.M.S. 'Inflexible,' which lasted a month, during which time we completely circumnavigated the island, touching and making a short stay at all the most interesting places. In both these expeditions my efforts had been rewarded with the discovery of some novelties; I was therefore the more determined, on my being located on the island this last time, to carry on my explorations with redoubled vigour. I did not quite complete a year of office in Formosa before sickness compelled me to return to England. From July to November 1861 I sojourned in the south-west, in or near the city of Taiwanfoo; and from December to May I spent in the north-west district of Tamsuy. During these brief seasons, I must confess, I laboured very hard in the cause of natural history; and though my researches do not enable me to give anything like a complete list of the mammals of the island, yet I think I have done my best to take off the cream in the shape of novelties. But in my series many widely distributed families are not represented,—the *Mustelidæ* and *Muridæ*, for instance. Doubtless some species of the Weasel group must occur, though I met with or heard of none. Moreover, there must surely be some examples of the Rat group; but, beyond the cosmopolitan *Mus decumanus*, I found none. My series of *Vespertilionidæ*, too, must be deficient from the difficulty in procuring specimens; but this I will leave Mr. Tomes to deplore. There must also be a Fox in the island. The marine mammals I had no opportunity of collecting; but the distance from the coast of China is not sufficiently great to warrant one to expect distinctness of species. I heard of a large Whale, some 60 feet long, that was stranded on a sand-spit below Taiwanfoo, and demolished by the natives. I did not see the animal, but I imagine it was of the same species that is not uncommon, during May, in the Straits of Namo, close to the mainland, and which I take to be a *Balenoptera*—perhaps the *B. arctica*, noted also from Japan. In my present article I have been enabled to bring before the Society eighteen mammals from the island of Formosa. All of these, with the exception of the Hogdeer and the Hare, are mountain animals, and consequently of a mountain type,—those that are identical with species found in China being generally darker and of more lively tints, and those that differ more resembling forms from the Himalayan Mountains than their represen-

tative species on the plains of China. It is, however, probable that, if we were better acquainted with the fauna of the hilly regions of the interior of China, we should find quite intermediate forms. On the whole, I am rather surprised that the isolation of the island has not tended to diversify animal forms more than it appears to have done. On the mountains of the interior, were they properly explored, we should doubtless discover more novelties; but the regions of the plains appear to agree, in flora as well as in fauna, almost entirely with the plains of the Chinese mainland. The Monkey is an animal frequenting the coast, and, in all probability, when we ascertain the rock-species found on some of the small groups of Chinese islands, we shall find them identical. The Sun-Bear is wondrously close to the Indian species, and, if the same, is sure to occur in some of the inner ranges of China. The Leopard is undoubtedly peculiar, and, I think, confined to the island. The Wild Cat and the Civet are certainly the Chinese species, the former having an extended range throughout tropical and semitropical Asia. The *Paguma* is a Chinese form, showing an insular variation, incipient, so to speak, and scarcely strong enough in its distinctness to warrant specific separation. The *Helictis* and the Mole have felt the varying force of isolation and adaptation to peculiar circumstances,—the mountain-influences sequestering the former from its Chinese ally, and making it affine to a cognate mountain species in the Himalayas.

The Squirrels are so similar to the Himalayan species, that I cannot believe the result produced by climatal causes, and have little doubt that future research will bring to light their occurrence in the intermediate hilly and wooded ranges of China. Of the larger species a close ally occurs in China, the *Sciurus cinnamomeiventris*; but, it strikes me, this latter animal is from the plain-country, and that the mountains will be yet found to yield the true Himalayan type, which occurs in Formosa, viz. the *S. erythræus*. The two Flying Squirrels we should expect to find distinct, as they vary in almost every island. The Pig I cannot speak about with certainty; but if a true *Porcula*, the fact would be greatly interesting, as more immediately connecting Formosa with the Himalayan chain. No *Porcula* is known to occur in China; but there is no reason why it should not have existed in former times, and been destroyed by its larger congener the Wild Boar (*Sus scrofa*) from the north. The Mountain-Deer are interesting as being the only species that offer most variation from their cognate China forms; but this may arise through ignorance on our part with regard to the Wild Deer of China. There is certainly a strong resemblance between the *Cervus taiwanus* and the smaller *C. sika* of Japan, and between the Deer Goat of Formosa and the *Capricornis crispa* of Japan; and indeed these two appear to offer the only resemblance between the fauna of these two countries. I should, however, judging by analogy, be rather inclined to derive both these Formosan *Cervidæ* from allied species that did exist in past times, and perhaps do even now exist in the unexplored parts of the opposite mainland. Geologists are, I understand, strong in the belief that Formosa was originally connected with Japan on the north and the

Philippines on the south ; but if any evidence can be deduced from the fauna of a country, I think a comparison of the present list with the 'Fauna Japonica,' as well as a glance at my series of Birds, Reptiles, &c., will sufficiently prove that a stronger connexion exists with the mainland of China than with the islands of Japan. In viewing the recently formed and still forming plains of Formosa on the western side, one would expect to find Chinese types among the birds brought by migration, and among the mammals by introduction of the Chinese colonists. But where we should chiefly look for affinity, viz. to the living productions of the ancient mountain-ranges of the interior, we are struck with their thorough similarity to congeneric Chinese forms, rather than to those of the neighbouring islands of the Philippines on the south, or the Japanese islands on the north. It is true that the resemblance or identity of these productions is more with the Himalayan forms ; but no zoologist or botanist that has collected in the mountains about Foochow can have failed to be struck with the similarity of the plants, as well as the birds, of the interior mountain-ranges of China with those of the Himalayas. I do not speak so confidently of mammals, because these are generally so rare in China that their acquisition is difficult ; but I can see no reason why the same law should not hold good for them as for other productions of nature.

Before entering upon my list, I must tender my best thanks to Dr. Gray for his kindly advice and assistance, in looking over my series of skins, and in aiding me to make the remarks of which this paper is the result.

1. *MACACUS CYCLOPIS* (Plate XLII.), n. sp. *Rhesus Monkey*. Chinese, *How-tsze* or *Kaou*.

I have presented a pair of Formosan Monkeys to the Society's Gardens, where they may be seen alongside of the true *M. rhesus* from India and a closely allied red species from Assam. From the true Rhesus the Formosan species is easily distinguished by its round head and flat face, its naked forehead, dark-whiskered cheeks, and strong ruff-like beard. The tail in true Rhesus is about 9 inches long, thin, and tapering ; in the Formosan it is stout and bushy, and over a foot. The fur of the Formosan is thicker, more woolly, slaty-coloured, and much darker. Its ears are smaller and more feathered. The deep red tint on the rump is wanting ; its legs are blacker ; and there is a distinct black line along the top of the tail. The female of this species is smaller and rather lighter-coloured.

The Assamese Rhesus is much redder than either. Its head is long, and face projecting, but not so much as in the Indian animal. Like it, its tail is short and tapering ; but in the bare eyebrows and dark whiskers it approaches the Formosan.

Our Formosan species is certainly distinct from the above two, and from anything I can meet with in the British Museum ; I therefore give it the above provisional name.

This, as far as I could learn, was the only species of Monkey in the island of Formosa. It affects rocks and declivities that over-

hang the sea, and in the solitary caverns makes its abode. On the treeless mountain in the S.W., called Apes' Hill, it was at one time especially abundant, but has since almost entirely disappeared. About the mountains of the north and east it is still numerous, being frequently seen playing and chattering among the steep rocks, miles from any tree or wood. It seems to be quite a rock-loving animal, seeking the shelter of caves during the greater part of the day, and assembling in parties in the twilight, and feeding on berries, the tender shoots of plants, grasshoppers, Crustacea, and Mollusca. In the summer it comes in numbers during the night, and commits depredations among the fields of sugar-cane, as well as among fruit-trees, showing a partiality for the small, round, clustering berries of the Longan (*Nephelium longanum*). In the caverns among these hills they herd; and in June the females may frequently be seen in retired parts of the hills, with their solitary young ones at their breasts. These animals betray much uneasiness at human approach, disappearing in no time, and skulking in their holes till the intruder has passed. They seem, too, to possess abundance of self-complacency and resource; for I have frequently seen a Monkey seated on a rock by himself, chattering and crying merely for his own amusement and gratification. Whatever Mr. Waterton may say of the tree-loving propensity of Monkeys in general, it is very certain that this species shows a marked preference for bare rocks, covered only with grass and bush; for if he preferred the forest, he might very easily satisfy his desire by retiring a few miles further inland, where he would find it in abundance. But, on the contrary, in the forest he is only an occasional intruder, resorting thither when food fails him on the grassy hills by the sea, where he loves to make his home.

Rock-Monkeys are also found, I am told, in the island of *Lintin*, near Hongkong, as well as on a few other islands on the Chinese coast; but, as I have never seen any of them, I am unable to say whether they are of the same species as the Formosan. The Chinese have a fanciful idea that the tail of the Monkey is a caricature of the Tartar pendant into which they twist their long back hair, and they invariably chop it off any Monkey that comes into their possession. Hence the difficulty of procuring Monkeys in China with perfect tails.

2. *URSUS TIBETANUS?* *Sun-Bear of Formosa.* Chinese, *Jin-heung*.

This appears to be a rare animal in the island, found only in the highest mountains of the interior. It is much valued by the Chinese for the medicinal property of its flesh and bones, as also for the dainty dish afforded by its paws. I offered large sums for an entire animal, without success. At last, through the civility of a high mandarin, I was enabled to procure the mutilated skin that I have brought home. This skin appears to carry the white crescent-mark on the back; but on being carefully examined by Dr. Gray, that gentleman saw at once that the animal had been skinned from the back, and that in nature the white mark ornamented the breast.

Judging from this skin, I should say the Formosan Bear measured about four feet from muzzle to tail, and stood about three feet high. It is clothed with rather short, somewhat rigid, black hair, and carries a white mark, like an inverted horse-shoe, on its breast, between its fore legs.

I have compared the skin with the Sun-Bears in the Museum. Its nearest ally is the *Heliarctos tibetanus*, which has, however, longer and shaggier hair, especially about the cheeks and legs. This, as Mr. Gerrard observed, might be attributable to seasonal dress. The white horse-shoe on the Tibetan Bear is very similar to that on ours, but has blunter ends.

The other two Horse-shoe Sun-Bears with which I compared it were the *Heliarctos euryspilus*, from Borneo, and the *H. malayanus*, from Malacca. The former of these has short blackish-brown fur, and has only an imperfect-shaped brownish white horse-shoe on the breast. The latter is a small species, with much shorter, softer, and browner fur.

The Formosan Bear is certainly far more nearly allied to the Tibetan than to the other two. I think that, in all probability, when an opportunity arrives for examining its anatomy, it will be found a distinct species. At present I can only call attention to the fact of its resemblance to the Tibetan species, rather than to its representatives in nearer countries.

The common mode of capturing the Bear among the savages in Formosa is, I am told, to tree him, after the same manner that Friday did the animal mentioned in 'Robinson Crusoe,' and then to dispatch him with matchlocks. Bears are often tamed by the Chinese, and taught to dance and play tricks, as in India and Europe.

I observe in the 'Fauna Japonica' that a crescent-breasted Bear also occurs in Japan, which Temminck refers, without hesitation, to the *Heliarctos tibetanus* of the Himalayas*.

3. LEOPARDUS BRACHYURUS (Pl. XLIII.), n. sp. *Formosan Leopard*, Chinese, *Pah*.

This is another animal from the distant wilds of the interior, whose skins the savages bring to the borders to barter with the Chinese. I have seen two or three skins, all of which agree in the one peculiar feature, the shortness of the tail. It belongs, in general appearance and style of colouring, to the Long-tailed Leopard group, of which I have examined four specimens in the British Museum, marked *L. macrocelis*, one being from Sumatra, the other three from India. I have also examined a closely allied species from Tibet, *L. macrocelides*, Hodgs. In the paleness of its yellow fur, and in the disposition of its markings, the Formosan is again here more nearly allied to the Tibetan; but the shortness of the tail in one species (only about one-half the length of that of the other) is quite a sufficient character to distinguish it. I have unfortunately only a flat skin in

[* The Japanese Bear, since the arrival of living specimens in Europe, has been acknowledged to be distinct, and has been described as *Ursus japonicus*. See *antea*, p. 261.—P. L. S.]

my possession, and therefore cannot give particulars as to measurement. In size it is rather smaller than *L. macrocelides*, but agrees with it almost entirely in markings. Its tail, however, is only $1\frac{3}{4}$ feet long, more bushy, and is indistinctly banded with black.

Like most of its allies, this animal is nocturnal in its habits. It commits great havoc among the Deer, for which it lies in ambush. It fears the approach of the armed savage, and never attacks man until provoked.

4. *FELIS VIVERRINA*, Hodgs. *Wild Cat of Formosa*. Chinese, *Swan Neaou*.

I have examined specimens of this Cat from the Himalayas, India, and Malacca. They all vary in size, length of tail, colour and size of spots, and tint of fur. To this species ours undoubtedly belongs; but its colours are much livelier, and the spots more distinct. It is much sought after by the Chinese for its soft, pretty skin, to make cuffs and collars for their coats, 4s. 6d. being the usual price given for a single skin. The animal is therefore comparatively rare, and not easy to procure. I dare say, however, in the wilder parts of the wooded interior it may not be uncommon.

It is stated, with what truth I cannot say, that some ninety years ago the Chinese colonists of Formosa, being very anxious to exterminate the savages from the mountains, imported a pair of Tigers from China, and let them loose in the woods. The savages at first took them for a large variety of Cat, and tried to make friends with them; but some of their number having fallen victims to the ferocity of the Tigers, the animals were soon pursued and dispatched with their javelins. A joke was raised against the parties concerned, for their absurd idea; and the hill where this introduction took place was christened and still bears the name of the *Great-Cat Hill*.

5. *VIVERRA PALLIDA*. Chinese, *Pe-bah*.

I have compared our *Viverra* from Formosa with two from China. Ours only differ in being much darker, and having more distinct spots.

This is not an uncommon species in Hongkong and the adjacent islands. In Formosa it is the commonest of all the carnivorous group. Skulking during day in the dark ravines that intersect the hilly country in the north-west, in the twilight it threads its way with great speed through the long grass, and searches the fields for small mammals and birds. It is much dreaded by the Chinese for the havoc it commits in the hen-roost; and as its skin is somewhat valued for lining to great-coats, its haunts and creeps are sought after, and traps laid for it. Of these the slip-knot noose for the head and feet is the most commonly practised, and the most killing. As the cool season approaches, hawkers may daily be met with, even in the villages, offering for sale the stretched skins of these animals. The poorer classes, who are unable to purchase the dearer furs, make use of these cheaper, yet pretty, skins. I extract a note from my journal on a freshly killed female of this species:—"Purchased 27th Feb-

ruary. This specimen, a female, has, just below the anus, an apparatus like a large swollen vagina, which I at first took for that organ; but on further examination, the true vagina occurred a little above, also much swollen. The vagina-like apparatus, which is the musk-bag, is not deep, and possesses strong contracting-muscles. It was empty, but emitted a strong musky odour, which tainted the skin and the flesh of the entire animal. The beast measured $32\frac{1}{2}$ inches, of which the tail measured 13 inches. The eyes were well sunk in the inner corner of the sockets, and glared with hollow light, as do cats' eyes, as well as those of many other animals of erepuscular habits. The stomach, on dissection, I found empty, and the ovary small. The Chinese eat the flesh of this animal; but a portion that I had cooked was so affected with the Civet odour, that I could not palate it."

6. *PAGUMA LARVATA*, J. E. Gray. Var. *taivana*. Chinese, *Yu-meen-maou* (Gem-faced Cat).

There are two specimens in the British Museum of *P. larvata*, brought from China by Mr. Reeves. With these I have carefully compared our single specimen, an adult male. I note the following differences:—The ears in ours are smaller and rounder. Its tail is two inches shorter, and has only two inches of black tip, instead of half the tail being black; it is also much larger. Its general tints, again, are much darker. But as the colouring, the distribution of black and white on the face and neck, and the black feet agree entirely, I cannot but regard this as a strong insular variety of the Chinese form. The body of this animal I have brought home; so that the skeleton, as well as the skin, will shortly be open to scientific investigators at the British Museum. Dr. Günther has kindly assisted me in dissecting the body, which I had preserved in spirits. I subjoin our notes upon it.

"Testes outside abdominal cavity; kidneys on the same level; spleen very elongate and narrow. Stomach externally horseshoe-shaped; the cardiac portion dilated, as broad as the fundus; the pyloric branch narrowed; membrane of stomach and pyloric portion thickened; stomach containing a few bones of birds, one wing of an hemipterous insect, and a large quantity of thick green berries with minute seeds (*Ficus*, sp.?). Small intestines $7\frac{1}{4}$ times as long as the trunk. Mesenterium with a very thin and broad layer of glandular substance accompanying the *ductus choledochus*. At the distance of two lengths of the trunk there is a large round patch of glands on the side of the wall of the intestines; at $2\frac{1}{2}$ lengths there occurs a second patch; five others follow at rather long distances, the last being in the immediate neighbourhood of the cæcal appendage; this last is about four times the size of the others, and is of an oblong form. Cæcum well developed, one inch long, including the *processus vermicularis*. Rectum about the length of the trunk."

"Liver divided into four lobes, each of which has one or two small notches. Gall-bladder oblong-ovate, firmly attached to the lower side of the middle lobe. Tongue covered with a thick layer of in-

verted bristles; base of tongue having two large *papillæ*, with three smaller ones further in the rear. No clavicle."

I will now extract my note on the fresh animal. "A specimen killed 14th April. Iris mottled chestnut, the pupil in death appearing perpendicularly ovate, and hence probably in life contracted to the linear form, as in the true Cats. Paws very large and plantigrade. Musk-bag between the testicles, shallow and empty. Penis and testes strongly developed; the exposable portion of the former $1\frac{1}{2}$ in. long, $\frac{1}{5}$ inch wide, 1 inch of its length towards the apex being covered with short, inverted, horny *papillæ*; from the apex there projects a thin, pointed piece, shaped like a finger, $\frac{4}{10}$ th in. long, which is also covered with *papillæ* at its basal portion. The aperture of the *penis* occurs at the junction of the finger-shaped protuberance with its apex."

This is by no means a common animal in Formosa, the male adult subject of this paper being the only one I have ever seen. It was brought to me dead, and I can therefore give no notes as to its habits.

7. HELICTIS SUBAURANTIACA, n. sp. (Pl. XLIV.)

I have compared this with *H. moschata* from the Himalayas, and with the Chinese specimens brought by Mr. Reeves. The Chinese animal is light reddish brown on the upper parts, with a white mark down the nose, extending backwards a little behind the ears. Its under parts are whitish, and its tail is small and sparsely covered with white hairs, especially near the tip. The Himalayan species is much paler, has the tail larger and whiter, and the white extending in a line some way along the back. In these two last particulars, as well as in general appearance, ours approaches more nearly the Himalayan type.

In the Formosan a line of white starts from the occiput and runs down to about the middle of the back, narrowing as it goes. A large spot of orange-white adorns the forehead. A line of deep purplish brown, approaching to black, runs from eye to eye above the muzzle, continues over each eye, and joins again behind the whitish forehead-spot, and then extends over the neck on each side of the white line till it gets lost in the paler colour of the back. Another line of the same runs under each eye, and forms a dark spot on each cheek. Under parts whitish orange, the inside of the ears, under part of fore legs, and line down the belly being strongly washed with orange-ochre. The purplish brown of the back runs into the tail, but soon yields to a white, which is chiefly conspicuous at its bushy end. In size the Formosan animal is rather larger than the Chinese, but about the same as the Himalayan.

One was brought to me alive, bound so tightly with cords that it did not survive many days. It fed readily on the bodies of birds, rolling itself up and sleeping throughout the day, but becoming restless and active in the evening. It uttered a peevish cry when disturbed. The Chinese called it the *Kay-che-bah*, or Fruit Civet. When alive, the facial line turns upwards towards the nose, which is

somewhat pointed and flesh-coloured. The eye is small and brown, and much sunken in the inner corner of the lids. This again gives no appearance of nocturnal habits; yet in confinement I observed the animal asleep the greater part of the day; further, from what I learned from the natives I should say it was for the most part crepuscular. It lives much on fruit and berries, as well as on birds and small mammals. It climbs trees with agility, and is frequently taken curled up in the corner of some large branch. Its fur is pretty, but long and coarse, and therefore not much valued.

8. *TALPA INSULARIS*, n. sp. Chinese, *Puh-kan-teen* ("not see the sky, or blind").

I have not yet had the opportunity of comparing the dentition of this animal with that of its congeners, but I have no hesitation in pronouncing it a good species, simply from the fact of its being a *blind Mole*. The North China species I sent home Dr. Gray distinguished as separable from *T. leucura*, Blyth, of India, to which it is a close ally. That Chinese Mole I examined, and found it to have an eye peering through open lids. The Formosan species has an eye, but without lids; the skin is closed over it. I extract my note on the animal soon after death. "The length of this Mole is $5\frac{1}{10}$ inches; tail $\frac{1}{2}$ inch, with a few long whitish hairs, chiefly at the end; length of hand $\frac{8}{10}$ inch; breadth of hand $\frac{7}{10}$ inch; the inner of the three tubercles on the palm of the hand is lengthened, and shaped like a false toe, but has no nail. It is a small species, with very short tail, and slightly turned-up snout. Eye size of No. 10 shot, seen through a thin skin, which covers it, and gives it a leaden look. I had this Mole alive, and placed it on the table. It shuffled about pretty fast from one end to the other, moving all the while its head from side to side, but appeared quite blind, running against any obstacle placed in its way, until it touched it with its sensitive nose: when it perceived its mistake, it uttered a sharp chatter and made off in another direction. I placed it in a rat-trap; but it soon pushed the wires aside with its strong fore paws, and forced its broad shoulders through. It has, as it were, a second upper lip, which forms over and protects the teeth, performing thus an office which the deep-cleft upper lip fails to do. Fur grey-black; chin, and breast, and under parts pale, washed on the first two with tawny. Some tawny-brown also occurs between the legs. This species does not appear to throw up hillocks like the European Moles do, but runs galleries close to the surface, casting up the earth over them in long, low, and loose lines, like those formed by the White Ants or Termites, only on a larger scale.

VESPERTILIONIDÆ.

The three or four species of this difficult family that I procured I must leave to the superior skill and learning of Mr. R. Tomes to distinguish. I wish merely to point out some facts regarding their natural economy which came under my observation. A species of *Kerivoula*, allied to *K. picta* and *K. formosa*, was brought to me by a

native. The body of the Bat was of an orange-brown, but the wings were painted with orange-yellow and black. It was caught, suspended head downwards, on a cluster of the round fruit of the Longan tree (*Nephelium longanum*). Now this tree is an evergreen; and all the year through some portion of its foliage is undergoing decay, the particular leaves being, in such a stage, partially orange and black. This Bat can, therefore, at all seasons suspend from its branches and elude its enemies by its resemblance to the leaf of the tree. It was in August when this specimen was brought to me. It had at that season found the fruit ripe and reddish yellow, and had tried to escape observation in the semblance of its own tints to those of the fruit. I suggested to Mr. Tomes that this group of Bats would appear to be frugivorous; and he replied that he had suspected, from the dentition of specimens he had dissected, that they were partially so.

The other fact is with regard to the group of Rat-tailed Bats (*Molossus*). One that I kept alive had a curious habit of pushing its eye almost out of the socket when disturbed, as if to get a better view of the cause of its annoyance. When tranquil again, the eye would sink right in and almost disappear. The skin of the tail in this genus slides up and down the tail-bone, by this means folding and unfolding the interfemoral membrane.

9. *SCIURUS ERYTHRÆUS*. Chinese, *Pong-bay-choo* (Puff-tailed Rat).

The larger Squirrel of Formosa is positively identical with the animal from Bootan, in the Himalayas, and markedly distinct from the *S. cinnamomeiventris* from China. This, at first sight, appears a curious fact; but I have little doubt in my mind that *S. erythræus* is also found in the hilly parts about Foochow, where many plants and birds have been procured identical with Himalayan forms. The cinnamon-bellied species is from the neighbourhood of Canton. Many years ago, a live specimen of *S. erythræus* was brought to me at Amoy, the person to whom it belonged not knowing whence it came; but, in all probability, it had been taken in some not distant locality. The young of this species is lighter on the head and shoulders than the adult, but darker in the hinder portions. Its under parts are a dingy pinkish brown; and its young-rat-like tail is black on the basal third, and light yellowish brown on the remaining portion.

10. *SCIURUS MACLELLANDI*. Chinese, *Buh-kwa-choo* (Citron-Rat).

In this small Squirrel we have another Himalayan type, not yet observed in China. I have compared my numerous examples with those in the British Museum, and I am inclined to think it identical; for its peculiarities are not constant. It is much darker in general colour; and in the majority of specimens the black longitudinal stripes are more or less indistinct, and the single yellow stripe along each side of the back in some is scarcely apparent; but I have some almost

identical with the Himalayan. The peculiar black-and-white-feathered tips to the ears are strongly marked in all.

11. *PTEROMYS GRANDIS*, n. sp. (Plate XLV.) Chinese, *Fei-shoo* (Flying Rat).

This magnificent species appears to be the largest of the group, its nearest allies being *P. melanotis* of Borneo, and *P. albiventris* of Nepal. From both these it is at once distinguishable by its long, black, bushy tail, its bright red chestnut upper parts, and its rufescent under parts. Many of the hairs of the upper parts are tipped with black. In the very young, the black obtains more generally, especially about the head, paws, and tail, the latter in the sucking-stage resembling that of a rat; while the entire under parts, with the exception of the throat and a soft silky line down the belly, are almost entirely denuded of hair. The length of an adult animal is about 2 feet in the body, and 2 feet in the tail; total, 4 feet. Teeth brown sienna.

The first specimens of this animal, a fine old female and a young suckling, were brought to me on the 16th March, and my hunter told me the following story of their capture. The camphor-distillers were cutting down a fine old camphor-tree, when they observed a large nest in its branches. As the tree fell, the nest shook out; and out sprung two large Flying Squirrels, and made off to an adjoining tree. The nest was composed of sticks and grass, and about two feet in diameter, with a large hole on one side. It was found to contain one live young one, which my hunter secured. The cries of the young one brought the old female near; and the woodmen, who always have loaded matchlocks at hand, for fear of attacks from the savages, fired at her, and with five wounds brought her to the ground. The male, seeing the fate of his mate, kept a long way aloof, and would not admit of near approach. The hunters pursued, but it was useless; the animal sprung and sailed from bough to bough, and finally disappeared in the forest. The body of the female was eaten by the Chinese with much relish; but as the common classes of the Chinese are not over-dainty in their palate, this would hardly be a criterion for the delicacy of the flesh. The suckling was produced to me out of the sleeve of the man as he told his tale. It squeaked exactly like a guinea-pig, so much so that, until I saw it, I was persuaded it could be no other than that animal. I had hopes at first of being able to rear it, for it sucked milk readily from a spoon. When handled, it uttered a suppressed moaning noise. It soon pined, and in a few days died, before its eyes were opened. It differs from the adult in having a good deal of black on the upper parts; the paws are black, instead of brown and red; and its rat-like tail is of a deep black; its breast and the central line down its belly is covered with short, silky hair, of a buff colour. Its under legs are very scantily covered with short hair. The wrists round the hind feet are hairy; and close to those of the fore feet there is a wart-like protuberance, with a few long hairs springing from it. The under membrane is quite naked and greyish. The muzzle and nose present

bare flesh, and the nails are flesh-brown. Length of body $6\frac{3}{4}$ inches ; tail $6\frac{2}{16}$.

I subsequently received a live adult, which I kept for some time in a cage, feeding it on bread and fruits. It was exceedingly fierce, darting at the hand that was thrust towards it, crouching in a corner and glaring savagely at the intruder. It uttered sharp and angry cries. In the dark its pupils, which were round, and not linear, emitted a hollow, greenish light, proving the animal to be nocturnal in its habits.

12. SCIUROPTERUS KALEËNSIS, n. sp.

This is one of the smaller group of *Sciuropteri*, with flat diverging tails. I have, unfortunately, only a pair of immature specimens, which I purchased from a savage who was fondling them in his bosom, and tried to keep alive without success. Young as my specimens are, they are much larger than the diminutive representative of this species in Japan. This species is most nearly connected, in the style and mottled appearance of its fur, with the *Sciuropterus albo-niger* of Nepal, but differs in colour. The Javan species (*S. horsfieldii*) differs from it in having a woollier fur, without any mottling. In ours the tail is about two-thirds of the length of the body ; I should say, therefore, that the mature animal would be about 16 inches long. Entire upper parts reddish buff, mottled with deep brown ; under parts pale buff, rosy on the flanks and under the legs. Teeth white.

Three species of Flying Squirrels are mentioned in the 'Fauna Japonica,' two as occurring in Japan—*Pteromys leucogenys* and *P. momoga*. The latter, it is said, is intermediate in form between the genus *Pteromys* and *Sciuropterus*, and we should therefore take it to be more nearly allied to our species *S. kaleënsis* ; but on reading Temminck's description, I find that the fur is mentioned as woolly. In ours it is silky, more as represented in his *P. setosus*, a very different species, however, from the Indian Archipelago.

Of the habits of our species I know nothing.

13. LEPUS SINENSIS. Chinese, *Swan-taw* (Hill-Rabbit).

The Hare found in the champaign as well as hilly country of both South-west and North-west Formosa is identical in species with that distributed throughout China, from Canton to Peking. I find in the Chinese as also in the Formosan animals, that the tints vary somewhat, and that in some the black on the cheeks and behind the ears is almost entirely wanting. The Formosan specimens are somewhat more brightly coloured, and the rufous on the hind neck is livelier ; whereas the North China Hares are greyer, especially in winter, and more distinctly marked with black. I have two small Leverets from South Formosa : these are of a strong olive hue, densely sprinkled with black hairs. These Hares, both in China and Formosa, retire to the hills in summer to breed, and return again to the plains in winter. They seek shelter in the holes of rocks or grave-mounds, and in these rear their young. They are said to burrow ; but this I am

rather inclined to doubt, as the kind of holes I have always found them in never showed signs of fresh-turned earth. I have met with them in no place so abundantly as on the plains near Peking in winter, where they sought shelter among the long grass and dried remains of the cotton-plants. When the great cold, as the Chinese term it, sets in, these poor brutes get terribly pinched, and may almost be trodden upon. They are then considered good eating, and much sought after. The matchlock daily thins their numbers; others are killed by heavy-loaded sticks, and some are struck in a more scientific manner by Hawks trained to the pursuit. The Peking and Tientsin markets, the winter through, teem with their carcasses, which are sold for a comparative trifle. At last nature steps to their rescue, and saves their race from annihilation by relaxing the rigour of the climate, and enabling them to return to the security of the hills. The species occurs in most parts of Formosa, but is nowhere abundant. The common mode of taking them there is with the noose.

The Hare found about the hills of Talién-wan is a much longer-eared animal, and most probably a distinct species; it is perhaps the *Lepus variabilis*, Pall.; whereas that of Japan (the *Lepus brachyotis*, Temm.) is different again, and remarkable for its short ears.

14. PORCULA TAIWANA, sp. nov.

I have it on the authority of the natives, that this little Mountain-Pig carries the stripes and spots of immaturity in its adult state, as in *Porcula sylvana*, Hodgs., of Nepal. Unfortunately I was not able to procure a full-grown animal.

I procured three sucking-pigs, and tried very hard to rear them, but succeeded in keeping them alive only a few weeks. I had them skinned as they died, and at the same time took care to preserve their bodies in spirits for the sake of the skeleton. One or more of these are now in the British Museum. I kept a pair of these little fellows some days in the house. They used to suck milk out of a bottle, and soon grew very tame, following me about like little dogs, grunting and squeaking in true swine fashion. The cow's milk, however, did not seem to afford them sufficient nutriment; for though they drank largely, they daily grew thinner, and soon succumbed. In this pair the canine teeth and lower incisors had appeared. Their noses and lips, as well as their toes, were flesh-coloured, merely tinged with black. Their irides were light yellowish brown. Their under parts and feet were white. The hair on the head, chin, shoulders, and thighs was light yellowish brown, that on the crown being abundantly tipped with black. The rest of the upper parts were striped longitudinally with black and light yellowish brown, the stripes on the sides becoming somewhat disconnected, and the yellowish appearing in large patches and spots.

Wild Pigs are found all over the hills on the north-west portion of the island; and so much depredation do they commit in the fields of sweet potato and other edible roots, that the colonists have gone to the trouble and expense of raising what they call *Te-loah*, or Pig-barricades, about the hills, to oppose the descent of these animals.

These consist of long stone walls, three or four feet high, with ditches on either side, running from ravine to ravine, midway up the higher hills, where these animals frequent. In places where the barricades are broken to admit of the passage of the ascending footpath, close gates are constructed, which are carefully shut every evening. The group of hills whence these pigs descend in greatest number reaches to the height of 3000 feet. I took the trouble to ascend this range in order to extend my acquaintance with those interesting animals; but though I found their beaten tracks all over the summits, fresh dung scattered about in all directions, the ground but lately rooted up in numerous places, and several lair-like spots under the rocks, I was not able to get a view of a single pig. I was told by the natives that they herd together in large numbers, and dwell in security during the day in caverns in the rocks, and in the twilight follow one another in single file down to their selected feeding-grounds; that they are uncommonly wary, and very difficult to shoot; that the boars especially are very dangerous, when wounded; and that the only chance they have of procuring them is by occasionally picking up a suckling that has strayed away from its mother.

I am inclined to think this Pig is a *Porcula*, and not the *Sus leucomystax*, Temm., of Japan, which is said to be the original stock of the Chinese Domestic Pig.

15. CERVULUS REEVESII. Chinese, *Kiang*.

I procured and brought away two females and a young one of this Munt-jac, as well as a skull. My specimens are identical with those from China. This species affects the lower ranges of hills which are covered with long coarse grass and tangled thicket. It is there usually found in small herds, basking in the sun, or lying in hidden lairs. They are very seldom approached near, except by stealth. The least noise startles them, and they dash away with bounds through the yielding grass, occasionally showing their rounded backs above the herbage. They have, however, their regular creeps and passes through the covert, near which the natives lie when stalking them, while others drive them. The little startled creatures hurry from danger along these beaten tracks, and are then picked off with the matchlock. In captivity they soon become very docile, even when taken in the adult state. The flesh of this animal is very tender and palatable. In China the species occurs in all the hilly country, from Canton to Ningpo; but I do not think its range extends much higher north.

16. CAPRICORNIS SWINHOII, Gray, P. Z. S. 1862, p. 263, Pl. XXXV.

This tawny species of Deer Goat, which Dr. Gray has done me the honour to name after me, differs in the shape of the skull, as well as in colour, from *C. crispata*, Temm., of Japan. It is of a much smaller stature than *C. bubalina*, Hodgs., of the Himalayas, but has its nearest ally in *C. sumatrensis* of the Eastern Archipelago. I brought home with me the skins and skulls of an adult pair, which are now deposited in the British Museum. In the northern range of higher mountains

they are said to occur in abundance; and small herds of them find their way to the lower ranges, 2000 feet and upwards in height. On nearly all the hills I ascended I found the prints of their feet, as well as dung; but they are so excessively shy that it is very difficult to get a glimpse of them. At a distance you may occasionally see them in small parties on some tangled grassy crag, whence they no sooner observe you than away they bound with short goat-like leaps, till a projecting rock snatches them from your vision. Their wildness is probably caused by the persecution they receive at the hands of the natives, who relish their flesh, which, however, I found tough and coarse. A supposed medicinal property in their blood, which is said to be efficacious in bad cases of *bronchitis*, tends, no doubt, to enhance the value of their capture.

A live adult male was brought to me, with one leg wounded by a ball. The animal was very ferocious, stamping its foot at me and snorting through his nostrils. It drank a great deal, but ate only sparingly of the green food I supplied it with. I might have succeeded in taming it; but it was in the hot season, and the wounded leg began to fester, and the poor animal seemed in such pain that I was obliged to have it killed. Its iris was yellowish chestnut; its pupil black, with a horizontal yellowish-brown line running right through it. I do not know the particular cause of this peculiar appearance in the eyes of animals; but I have observed it pretty generally in all Goats. The high mandarin of the town begged the blood of this animal of me, and esteemed the gift a great favour. He had it spread, in the air, in small cakes, dried, and powdered, and then stowed it carefully away in his medicine-chest.

The native name for this animal is *Swan Yun*, or *Shan Yang*, which may be taken to mean either *Wild* or *Hill-Sheep* or *Wild* or *Hill-Goat*. Hence my mistake in my first letters to the Secretary of this Society, when I stated that I was informed of the existence of a Wild Mountain-Sheep in the Island of Formosa.

17. *CERVUS TAIVANUS*, Blyth, J. A. S. B. xxix. p. 90; Sclater, P. Z. S. 1860, p. 376, et 1862, p. 152, Pl. XVI.

This species was established in 1858, by Mr. Blyth, from the skull of a buck that I sent him. The animal to which the skull had belonged had been kept, together with some others of the same breed, in a private menagerie at Amoy, whither Chinese junks from Formosa frequently bring these Deer for sale. I am not aware of any Spotted Deer occurring in the Province of Fuhkeen, to which Amoy belongs; and as the wealthier Chinese have a great partiality for Spotted Deer to adorn their parks, this species is the one most usually sought after in that district. Chinese poetry has frequent allusions to the "Red Deer with its snowy spots;" and Chinese pictures, in almost every well-to-do house, exhibit grotesque though somewhat truthful representations of the antlered brethren. Besides the value attached to Deer as an object of ornament, their price is increased by the medicinal properties attributed to their horns. These appendages, cut off when freshly sprouting, are much prized by the

Chinese for the nutriment they afford in cases of debility, just as they prize other gelatinous substances, such as birds' nests, nests of certain species of small Swifts (*Collocaliæ*), sharks' fins, fish-maws, &c. After the velvet is removed, the horn is dried, pared thin with an instrument like a nutmeg-grater, and boiled into a soup, in which state it is used. The velvet is not wasted, but is set aside to deal out in small quantities to matrons of the family to aid them in their convalescence after child-birth. The skin of the Deer is not thought much of, nor is the flesh much valued.

The central or higher range of mountains, which are in parts covered with perennial snow, are inhabited by the *Cervus taiwanus*. These heights abound with large masses of tangled forest, in which the gigantic *Laurus camphora* (the tree whence the drug of commerce, camphor, is distilled) forms no inconspicuous part. These heights are tenanted by tribes of half-clad Indians, of the Malay type, blood-thirsty and savage in the extreme, who keep up a constant warfare with the Chinese colonists of the plains, and resist with atrocity any inroads into their mountain territory. On the lower hills, however, that define the land of the colonist from that of the aboriginal, dealings on a friendly footing are carried on in bartering Chinese commodities for deers' horns, venison, and other results of the chase. To these aborigines, money has no value as a medium of exchange. They live on the flesh of deer and other wild animals, which they only partially broil before eating. They obtain, by barter, from the Chinese matchlocks and gunpowder, which they use to wound the deer, when approached within a few yards by creeping through the thicket. The wounded animal is then surrounded by a closing ring of half-naked savages, and, scared by their wild shouts, falls an easy prey to their metal-headed javelins. When powder fails them, they sometimes manage to intercept one from a herd, and driving him into more open country, scatter a loose and wide-spread ring of humanity round him; the ring rapidly closes in as before, and as the frightened beast attempts to leap or break it, spears are hurled into him from all sides, and he can rarely effect his escape. Other means of capture are also practised, but less successfully, the commonest of which, when the beast is required to be taken alive, are slip-nooses attached to a stake, and so adjusted as either to take him by the leg or by the horns. But the animal captured when full-grown rarely survives; and therefore the young are sought for the purpose of rearing. They are nurtured with great care till a year old, when the horns begin to form. They are then conveyed to the borders and bartered to the Chinese, by whom, as I before stated, they are much valued.

In the city of Taiwanfoo I procured two bucks and a doe of this species, and forwarded them, *via* Hongkong, to the Gardens of the Society; but unfortunately only one, a buck, reached England in safety. This was enough, however, to establish the species, which had hitherto been described only from the skull. Any one visiting the Gardens can now have an opportunity of making himself acquainted with this lovely animal as nature has moulded him; and as the Japanese species, *Cervus sika*, is confined there in an adjoining cage,

a fine opportunity is offered for comparison. The deep red colouring of its hind neck and its larger size distinguish it from that species, as well as the form of its horns, which are shown in the accompanying sketch. (See woodcut.) The white spots on the Formosan Deer are moreover lasting, and do not disappear in winter, as in most species.

This Deer is called by the Chinese *Lok*, or Stag.



18. *CERVUS SWINHOII*, Sclater, P. Z. S. 1862, p. 152, Pl. XVII.

It was not till my late visit to the City of Taiwanfoo, S.W. Formosa, that I came across this species. It struck me at once as a novelty, and I managed to procure two bucks, both of which have fortunately reached the Gardens of the Society in good health. On my visit to the Tamsuy district, N.W. Formosa, I again met the animal in a state of confinement in the hands of the Chinese, and secured a buck for the Acclimatization Society of Melbourne; but a live female I could not manage to procure. This species may at once be distinguished from the other by its total want of spots, by the absence of the white patch that adorns the parts about the tail, by its coarse reddish brown hair, appearing almost black in some lights, but, above all, by the occurrence of a large sac between the eye and nose. This curious organ, whatever its properties may be, it has the power of opening and shutting. It appears to be expanded most frequently when the beast is irritated. At a distance the deer looks as if he possessed four eyes, whence the Chinese definition of this species as "the four-eyed." It is, however, more generally known in Formosa as the "Cheeang." What the horns of this Deer are like we shall not be able to tell for some months, until the animals in the Gardens

reproduce those they have just shed ; but it strikes me the horns will only consist of short double-pronged antlers, as in the Hog Deer.

On the lower range of hills, varying from 1000 to 5000 feet, the *Cervus swinhoii* maintains its ground ; and as those hills chiefly occur in the northern portion of the island, its lot falls among another but closely allied race of savages. The Kwei-ying are a finer race than their brethren, the *Kalees* of the south, but they are equally savage. By them the same kind of barter is carried on with the Chinese colonists, and, as far as I could learn, the same mode of hunting deer. The country where this deer is found is also densely covered with bush, in which the savage lurks with his matchlock, jealous of every intruder on his hunting-haunts. Like all wild races, especially of the Malay type, he is very treacherous, and never to be depended on unless you can carry with you sufficient means to enforce freedom from molestation. One hour he will profess for you everlasting friendship, and the next, on some trifling caprice, aim a bullet at your head. The Chinese are very fearful of the aborigines, and can rarely be got to cross the boundary-line ; and the savages have such frequent feuds amongst themselves that, in travelling through their territory, friendship professed for one clan may cost you your life at the hands of the next you go amongst. One has on such journeys so much to do with diplomacy, intrigue, and bribery, that, apart from collecting, the incessant toil and expense make travelling in the wild mountainous interior of Formosa quite an arduous undertaking.

5. NOTES ON THE INCUBATION OF PYTHON SEBÆ, AS OBSERVED IN THE SOCIETY'S GARDENS. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

The fact of a specimen of the West African Python (*Python sebæ*) having deposited eggs and commenced incubation upon them, in the Society's Gardens, at the beginning of the present year, has been already mentioned at one of the Meetings of this Society by Dr. A. Günther* ; and many notices on the same subject have appeared in various newspapers and periodicals, scientific and unscientific. Yet I think that such an important event ought not to escape record in the Journal of the Society, and I have therefore drawn up the following short statement of the principal facts of the case for publication in the 'Proceedings.'

A pair of the West African Python (*Python sebæ*) have for some time occupied the large compartment in the middle of the northern side of the Reptile-house. The female was received by the Society in 1849, and has therefore been about thirteen years in the Gardens ; the male was purchased on the 18th of April, 1859, since which time he has been in company with the female. The female is one of the largest Pythons we have ever had, measuring about 22 feet in length. The male is of smaller dimensions, measuring about 14 feet in length.

* See *anteâ*, p. 1.

This pair of Pythons were several times observed *in copulá* by the keeper, in the month of June 1861. Towards the middle of December, 1861, the female was remarked to be much increased in size, the enlargement extending about 8 feet along the body. The keeper, knowing that she had not fed for many weeks, imagined this alteration of size to be the result of disease; and it was only a few days before the 13th of January that the true cause of her abnormal appearance was suspected. On the morning of the 13th of January the keeper found that in the course of the previous night this animal had deposited a large mass of eggs, and had taken up a position coiled completely round them, so as nearly to exclude them from view. The eggs, as we afterwards ascertained, were about 100 in number; they were nearly round in shape, but soft, and soon became much compressed, measuring each about 3 inches in diameter. They seemed to have been deposited in a circle, probably from the creature crawling round, and excluding them one after the other. They were not strung together by any membrane, but apparently completely separate when excluded, though afterwards fastened into one large conical mass, adhering by the viscid outer membrane, and pressed together by the weight of the superincumbent mother.

The Python retained her position coiled round and over the eggs more or less constantly until the eggs were eventually removed on the 4th of April. During this time she quitted them upon very few occasions, and then only temporarily, having passed altogether nearly thirty-three weeks without taking food.

On the 4th of March the Python showed symptoms of being about to cast her skin, and was then off her eggs from 9 P.M. until 7 A.M. on the following morning. During this interval the skin came off in shreds (always an unhealthy symptom in snakes), the process lasting about 10 hours instead of 3 or 4, as is usually the case with these large serpents.

Knowing the interesting nature of M. Valenciennes's experiments on the temperature of the Python which incubated in the Jardin des Plantes at Paris in 1841*, I was anxious to ascertain whether any similar increase of temperature was observable in the present case. The instruments first employed for this purpose were not sufficiently delicate to produce any very reliable results. I therefore applied to Messrs. Negretti and Zambra, the well-known optical instrument-makers, who provided thermometers expressly adapted for the purpose† and kindly attended themselves to assist in making the

* For an account of these, see 'Comptes Rendus,' 1841, xiii. p. 126.

† These thermometers are spoken of as follows in the 'London Review' for March 15th:—

"In testing the heat of the incubating Python and her eggs, it will be readily imagined that the most sensitive thermometers would be required to obtain reliable and satisfactory results, not only on account of the possible danger, through disturbing and irritating the snake, of her striking and giving the operator a lacerated wound with her pointed teeth, but from the desirability of obtaining as instantaneous results as possible to avoid the interference of cold drafts of air, alterations of the creature's position, and other circumstances which must produce interferent effect. To Messrs. Negretti and Zambra the highest praise is due for

necessary experiments. The compartment of the Reptile-house in which the Python is kept being warmed with hot-water pipes, and the temperature of snakes varying, as is well known, with that of the surrounding medium, it seemed to me that the only mode of obtaining reliable results was by comparison of the heat of the incubating female Python with the heat of the non-incubating male, in the same compartment of the Reptile-house. It appeared to me that any decided difference observable between these two animals, subject to exactly the same external conditions, could be only attributable to the incubation. Our first experiments with Negretti and Zambra's instruments were made on February 12th, and gave a difference of $2^{\circ}8$ of Fahrenheit's scale in favour of the female, when the temperatures were taken at the surface of the body. When the temperature was examined between the folds of the bodies of the respective animals, the difference was found to be increased to $6^{\circ}8$. The experiments were repeated on the 23rd of February, the 2nd of March, the 9th of March, and the 16th of March, with varying results, but always showing an increased temperature of greater or less amount in the case of the incubating female, as the following Table will show:—

Date.	Temperature of air in den.	Temperature of male.	Temperature of female.	Difference.
Feb. 12	58°·6	On surface .. 70°·2	On surface .. 73°·0	2°·8
		Between folds 74°·8	Between folds 81°·6	6°·8
Feb. 23	65°·4	On surface .. 71°·8	On surface .. 75°·4	3°·6
		Between folds 74°·0	Between folds 83°·2	9°·2
March 2	60°·0	On surface .. 71°·6	On surface .. 84°·0	12°·4
		Between folds 76°·0	Between folds 96°·0	20°·0
March 9	61°·0	On surface .. 72°·8	On surface .. 79°·5	6°·7
		Between folds*	Between folds 86°·5	
March 16	66°·0	On surface .. 72°·4	On surface .. 77°·6	5°·2
		Between folds 77°·6	Between folds 86°·0	8°·4

These observations were made on the different occasions by Mr. Bartlett, Mr. Negretti, Mr. Zambra, Mr. E. W. H. Holdsworth, F.Z.S., and myself.

On the 4th of April the eggs were evidently decomposing, and gave forth a very strong and nauseous odour. As the snake, which

having manufactured expressly for these experiments the most sensitive and most perfect thermometers ever constructed. In less than three seconds the quick-silver will rise or fall from one end of the scale-tube to the other; and although a longer time than this has always been allowed by the reptiles in the experiments made, it was most desirable to be provided with efficient means against any emergencies.

"The total length of the tube is 13 inches, and the bore, by actual measurement, was found to be less than the $\frac{1}{1000}$ th of an inch in diameter; in the experiments the motion of the mercury in it was watched with a powerful hand-lens or magnifier. The range of the scale is from 30° to 105° ; the length of the bulb, or reservoir for the mercury, $\frac{1}{2}$ inch, its diameter $\frac{1}{8}$ inch; it is made extremely thin, so as to insure the greatest sensitiveness by the quickest possible transmission of temperature."

* Not observed, the male being very restless.

had now sat upon them nearly ten weeks, was evidently suffering from the effects of a fast of thirty-two weeks, and there appeared to be no reasonable prospect of hatching the eggs, they were removed. On examination, we found about five or six with the embryos partially formed. In one of these the embryo was about 11 inches in length, the scaling and markings were shown, the colour was partially developed, and the animal was evidently nearly ready for exclusion. But the greater number of eggs contained only fatty matter in a state of decomposition, and bore no traces of having ever been impregnated.

A single egg removed from the mother fifteen days after incubation commenced, curiously enough, chanced to be a good one. The embryo contained in this was alive when it was opened, and measured about 6 inches in length.

About a month after the eggs were removed, the snake, which had been at first very restless, changed her skin, fed as usual, and has since remained in good health.

I think that the present case, taken in conjunction with that which happened in 1841 at Paris, and that of the Indian Python, kindly communicated to me by George O. Wray, Esq., and already noticed at a previous Meeting of this Society*, lead to the conclusion that it is the normal habit of these highly developed Ophidians, the *Pythones*, to incubate their eggs much as in the superior class of birds. But it would appear that the Boas of the New World do not follow the same practice; for Mr. Westerman informs me that the female *Boa constrictor*, which bred in the Zoological Gardens of Amsterdam in 1861, brought forth living young ones, though some eggs were produced at the same time.

6. ON SOME BIRDS TO BE ADDED TO THE AVI-FAUNA OF MEXICO. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XLVI.)

In a small collection of Mexican birds sent to me for examination by M. F. Parzudaki, of Paris, I recognize several species new to the fauna of Mexico, and not mentioned in my former communications to this Society on the subject of Mexican ornithology, and others requiring some few remarks. These are—

1. *DENDRECA SUPERCILIOSA* (Bodd.), Baird, B. N. A. p. 289.

This specimen differs from others in my collection from N. America and Jamaica in having the whole supercilia anterior to the eye bright yellow, like the breast. Yet it is obviously not in full plumage, being dull brownish grey above, and with the black markings hardly defined. Prof. Baird alludes (*l. c.*) to somewhat similar variations. At first I could hardly persuade myself that it was not of a different species.

See P. Z. S. 1862, p. 108.

2. *VIREO HYPOCHRYSEUS*, sp. nov. (Pl. XLVI.)

Flavicanti-olivaceus, alis fuscis dorsi colore extus marginatis: fronte, superciliis et toto corpore subtus flavis, hypochondriis paululum olivacescentibus: rostro corneo, pedibus fuscis.

Long. tota 5·0, alæ 2·5, caudæ 2·2, rostri a rictu 0·7, tarsi 0·8, rem. prim. spurii 0·95 poll. Angl. et dec.

This *Vireo* is very distinct in coloration from any other species known to me, and is also slightly abnormal in form. The wings are very short, only reaching $\frac{1}{2}$ an inch beyond the base of the tail. The longest primaries are about 0·3 inch longer than the secondaries. The first primary is unusually well developed, being only 0·75 inch shorter than the second. The bill is more elongated, and broader at the base than is usual in the genus, and nearly resembles that of a diminutive *Icteria*. The single specimen received from M. Parzudaki is the only example I have seen of this interesting bird.

3. *MELOSPIZA GOULDII*, Baird, B. N. A. p. 479 (?).

A skin of a *Melospiza*, received through M. Parzudaki, agrees with the Californian specimen which I have identified (Cat. Am. B. p. 113) with Baird's *Melospiza gouldii*. But I cannot pretend to say but what I am doubtful about the discrimination of the allied species of this group, and must remain so until I have the opportunity of comparing authentically determined specimens with those in my own collection.

4. *GLYPHORHYNCHUS MAJOR*, Sclater, Cat. Am. B. p. 161.

Mexican specimens of this northern form of *G. cuneatus* agree with Guatemalan examples obtained by Mr. O. Salvin.

5. *ELAINEA SUBPAGANA*, Sclater & Salv. 'Ibis,' 1860, p. 36.

Mexican examples of this northern form of *E. pagana*, do not seem to differ from the typical specimen from Guatemala in my collection.

6. *AGAMIA PICTA*, Reichb. Bp. Consp. p. 127. *Ardea agami*, Gm.

A bird in immature plumage appears to belong to this species, which, as far as I am aware, has not been previously noticed so far north.

7. *MICROPALAMA HIMANTOPUS*, Bp., Baird, N. A. B. p. 726; Coues, P. Acad. Sc. Philad. 1861, p. 174.

I am not aware that this Sandpiper has been previously noticed so far south, except in the one instance of Mr. Salvin's having obtained it in Guatemala, as recorded in the 'Ibis'*.

8. *ACTODROMAS BAIRDII*, Coues, Proc. Acad. Sc. Philad. 1861 p. 194.

Judging by Mr. Coues's descriptions, a Mexican Sandpiper received from M. Parzudaki, and labelled "*A. maculata?*," must be referred to this species, which is in fact a small *A. maculata*.

* Ibis, 1859, p. 229.

7. ON THE SPECIES OF MURICINÆ FOUND IN JAPAN.

BY ARTHUR ADAMS, F.L.S.

In the recent 'Mollusca Japonica' of Dunker three species of *Murex* only are enumerated, one of which belongs more properly to the purpuroid genus *Sistrum*. During my recent explorations in Japan I collected upwards of twenty-six species of the genus, taken in its Lamarckian sense, besides three species of *Typhis* and ten of *Trophon*. In the southern parts of the Sea of Japan we find a few examples of the long-beaked spiny *Murex* proper and the *Chicoreus* of Montfort, a group with frondose and branching varices. In the north these seem to give place to the winged *Muricinæ*, composing the groups named *Pteronotus* and *Phyllonotus* by Swainson; and further north still to the fusoid *Trophon* of Denys de Montfort, with lacinated varices. The *Muricidea* of Swainson, composed of small coronate forms, also comes into notice, as does also the monoceroid *Cerastoma* of Conrad, which, with a muriciform shell, has a purpuroid operculum like that of *Vitularia*.

1. MUREX, Linn.

1. MUREX TRIBULUS, Linn.

Murex tribulus, Linn. Syst. Nat. 12 ed. p. 1214; Reeve, Mon. Murex, sp. 82.

M. crassispina, Lam.

M. tenuispina, Kien., not Lam.

Hab. Simidsu.

2. MUREX TENUISPINUS, Lam.

Murex tenuispina, Lam. An. s. Vert. ix. p. 566; Reeve, sp. 85.

Hab. O-Sima.

3. MUREX ADUNCOSPINOSUS, Beck.

Murex ternispina, Sow.

M. aduncospinosus, Reeve, sp. 93.

Hab. Kuro-Sima.

4. MUREX SOBRINUS, A. Ad.

M. testa ovata, spira acuta; anfractibus 7, convexis, longitudinaliter nodoso-plicatis, transversim liratis, varicibus tribus, valde spinosis, spinis duabus uncinatis acutis; apertura vix circulari, canali recto, clauso, valde producto, ad basin spinoso, ad extremitatem rufo-fusco variegato: pallide fusca, fascia transversa lata rufo-fusca (in anfractu ultimo duabus) ornata.

Hab. Satanomosaki, 55 fathoms; Gotto, 48 fathoms; Kuro-Sima, 29 fathoms.

This *Murex* is very similar to several others in the same group, but cannot be correctly referred to any of the species already described. There are two red-brown bands on the last whorl, and the end of the long straight beak is variegated with the same colour.

2. CHICOREUS, Montf.

1. CHICOREUS SINENSIS, Reeve.

Murex sinensis, Reeve, Conch. Icon. sp. 25.

Murex elongatus, var., Sow. Conch. Illust. fig. 88.

Hab. Tatiyama; Mososeki.

2. CHICOREUS ADUSTUS, Lam.

Murex adustus, Lam. An. s. Vert. ix. p. 573; Reeve, Mon. Mur., Conch. Icon. sp. 29.

Hab. Tatiyama; Tsu-Sima.

3. PTERONOTUS, Swains.

1. PTERONOTUS TALIENWHANENSIS, Crosse.

Murex talienwhanensis, Crosse, Journ. de Conch. 1862, 3rd ser. t. ii. pl. 1. f. 9.

Hab. Tsaulian.

2. PTERONOTUS EURYPTERON, Reeve.

Murex eurypteron, Reeve, Conch. Icon. pl. 34. f. 176; Zool. Voy. Samarang, Moll. pl. 8. f. 1 a, b.

Hab. Mino-Sima, 63 fathoms.

3. PTERONOTUS BRACHYPTERON, A. Ad.

P. testa ovato-fusiforimi, tenui, pallide fusca, castaneo sparsim maculata, linea albida transversa in anfractu ultimo ornata, trifariam varicosa; anfractibus sex, convexis, longitudinaliter crebre laciniatis, transversim liratis, liris inæqualibus crenulatis; apertura ovata, labro margine fimbriato, canali mediocri, clauso, recurvato.

Hab. Uruga, 12 fathoms.

This is a thin, somewhat ventricose species, with the winged varices peculiar to the group shorter than in the allied forms. The whorls are variegated with deep chestnut-brown, and there is a faint white transverse line in the middle of the last whorl.

4. PTERONOTUS GOULDI, A. Ad.

P. testa ovato-fusiforimi, fusca, maculis castaneis sparsim ornata, trifariam varicosa; spira acuta; anfractibus 6, planis, postice subangulatis, transversim liratis, liris inæqualibus, confertis, varicibus breviter foliaceis, marginibus denticulatis, postice spina valida dentiformi instructis; apertura ovata, integra; labro margine late fimbriato, canali recto, clauso, producto.

Hab. Tsu-Sima.

In this species the varices are short, and furnished with a strong tooth-like spine at the hind part; and the straight, closed canal is more elongate than is usually the case in this group.

5. PTERONOTUS STIMPSONI, A. Ad.

P. testa ovato-fusiforimi, pallide fusca, trifariam varicosa; spira

acuta; anfractibus 7, planis, postice angulatis, transversim valde liratis, liris æqualibus, lævibus, interstitiis clathratis, varicibus late foliaceis, postice dilatatis et rotundis; apertura ovata, antice acuminata; labro margine late fimbriato, canali brevi, clauso, recto.

Hab. Uruga, 21 fathoms.

A very neatly sculptured species, with the foliate varices of the whorls posteriorly rounded.

4. PHYLLONOTUS, Swains.

1. PHYLLONOTUS FALCATUS, Sow.

Murex falcatus, Sow. Proc. Zool. Soc. 1840; Reeve, Conch. Icon. *Murex*, sp. 61.

Murex aduncus, Sow., var.

Hab. Satanomosaki; Tusaki; Tatiyama.

2. PHYLLONOTUS CORONATUS, A. Ad.

P. testa ovato-trigonalis, fusca, spira conica; anfractibus 6, planis, postice angulatis, liris quatuor, validis, transversis, interstitiis liris squamulosis confertis ornatis, varicibus septem, laciniatis, fimbriatis, postice late uncinatis; apertura oblonga, antice acuminata; labro margine postice angulato, extus fimbriato; canali aperto, brevi, vix recurvato.

Hab. Tsusaki, 35 fathoms.

A somewhat small, neat species, with the whorls very prettily coronate.

3. PHYLLONOTUS ACANTHOPHORUS, A. Ad.

P. testa ovato-fusiforimi, quinquefariam varicosa, solida, albida; anfractibus 5, in medio angulatis, superne planatis, transversim liratis, varicibus crassis, postice spina squamiformi triangulari armatis; apertura oblonga, antice acuminata; labro extus varicoso, crasso, fimbriato, intus valde crenato, canali clauso, antice recurvato, aperto.

Hab. Tsusaki, 37 fathoms.

A solid, triangular species, with a strong squamiform spine at the hind part of the thick prominent varices, which latter are composed of close-set crispate lamellæ. The operculum is purpuroid.

4. PHYLLONOTUS UNIFASCIATUS, A. Ad.

P. testa ovato-fusiforimi, subtrigonalis, quinquefariam varicosa, serotina, fascia transversa lata rufo-fusca in anfractu ultimo ornata; anfractibus 7, planis, postice angulatis, longitudinaliter crebre plicatis, plicis laciniatis crispatis, transversim valde liratis, liris inæqualibus, majoribus cum minoribus alternantibus, varicibus foliatis, brevibus, marginibus crenulatis, postice spina uncinata producta squamata instructis; apertura elongata, subtriangulari, canali aperto, subrecto.

Hab. Uruga, 12 fathoms.

A pale orange species, with a single broad red-brown band on the last whorl, and with the varices terminating posteriorly in a scale-like recurved spine.

5. CERASTOMA, Conrad.

1. CERASTOMA BURNETTII, Ad. & Reeve.

Murex burnettii, Ad. & Reeve, Moll. Voy. Sam. pl. 8. f. 4 *a, b*.
Hab. Hakodadi.

2. CERASTOMA EMARGINATUM, Sow.

Murex emarginatus, Sow. Conch. Illus. f. 98, 100.
Hab. Japan (teste Sow.).

3. CERASTOMA RORIFLUUM, Ad. & Reeve.

Murex rorifluus, Ad. & Reeve, Moll. Voy. Sam. pl. 8. f. 2 *a, b*.
Hab. Tsu-Sima.

4. CERASTOMA MONACHUS, Crosse.

Murex monachus, Crosse, Journ. de Conch. 1862, 3rd ser. t. ii. pl. 1. f. 9.
Hab. Tsaulian.

5. CERASTOMA FOURNIERI, Crosse.

Murex fournieri, Crosse, Journ. de Conch. 3rd ser. t. i. pl. 16. f. 7.
Hab. Sea of Japan (teste Crosse).

6. OCENEBRA, Leach.

1. OCENEBRA JAPONICA, Dunker.

Murex japonicus, Dkr. Moll. Japon. pl. 1. f. 14.
Hab. Japan (*Dunker*).

2. OCENEBRA LACTUCA, Eschsch.

Murex lactuca, Esch. Zool. Atlas. taf. 9. f. 3 *a, b*; Midd. Beitr. zu einer Malac. Rossica, taf. 7. f. 1, 2.
Hab. Aniwa Bay, Saghaleen.

7. MURICIDEA, Swains.

1. MURICIDEA DIADEMA, A. Ad.

Murex diadema, A. Ad. Proc. Zool. Soc. 1853, p. 70.
Hab. Satanomosaki, 48 fathoms.

2. MURICIDEA CIRROSA, Hinds.

Murex cirrosus, Hinds, Moll. Voy. Sulph. pl. 3. f. 17, 18.
Hab. Mino-Sima, 63 fathoms; Satanomosaki, 48 fathoms.

3. MURICIDEA PUTEOLA, A. Ad.

M. testa ovato-fusiforimi, spira elata, conica, pallide fusca; anfract. 5, in medio angulatis, liris transversis, validis, squamoso-

asperis, subdistantibus instructis, varicibus septem, transversim costato-spinosis et postice in spinas squamatas productis; apertura ovata, postice integra, canali brevi, aperto, recurvato.

Hab. Tsusaki.

A small species, with angular spinose whorls, and with a short, open, recurved canal.

8. TYPHIS, Montf.

1. TYPHIS MONTFORTII, A. Ad.

T. testa ovato-fusiformi, sordide carnicolore; spira producta; anfractibus 6, gradatis, planis, postice acute angulatis, lævibus, varicibus tribus crispatis, interstitiis tubulis productis, tubulo unico dorsali valde producto; apertura circulari, tubulosa, peritremate acuto, integro, producto, subreflexo, canali valde prolongato, recurvato, clauso; labro extus fimbriato.

Hab. Gotto, 48 fathoms; Okino-Sima, on the sands.

A beautiful little species, with an entire trumpet-like aperture, and with a single, long, tubular dorsal spine on the right side of the median varix.

2. TYPHIS JAPONICA, A. Ad.

T. testa oblongo-ovata, sublævigata, castanea, spira elata, apice mammillato, quinquefarium varicosa, varicibus rotundis, funiculatis, interstitiis tubulis pallidis, oblique truncatis, mediocribus instructis; apertura ovata, integra, canali brevi, clauso, subrecto.

Hab. Uruga, 21 fathoms.

This species is small, but very peculiar. It has rounded varices and rather short obliquely truncate tubes, which externally form pseudo-varices or rib-like ridges, extending down between the proper varices of the whorls.

9. TROPHON, Montf.

1. TROPHON CLATHRATUM, Linn.

Murex clathratus, L., Phil. Zeits. für Malak. 1845, p. 78.

Tritonium clathratum, Fabr.

Bucc. laciniatum, Martyn.

Murex lamellosus, Gm.

Fusus lamellosus, Gray.

Murex foliaceus minor, Chem.

Tritonium bamfii, Fabr.

Fusus bamffus, Donov.

Murex multicostatus, Eschsch.

Fusus scalariformis, Gould.

Hab. Aniwa Bay, Saghaleen; Olga Bay; Vladimir Bay.

2. TROPHON CRASSUM, A. Ad.

Murex crassus, A. Ad. Proc. Zool. Soc. 1851, p. 269.

Hab. Hakodadi.

3. TROPHON INCOMPTUM, Gould.

Trophon incomptus, Gould, Otia Conch. p. 125.

Hab. Hakodadi. Perhaps the same as *T. crassus*.

4. TROPHON LIRATUM, Couth.

Fusus liratus, Couth., Gould, Otia Conch. p. 64.

Hab. Castle Point, Manchuria, 20 fathoms.

5. TROPHON CRISPUM, Gould.

Fusus crispus, Gould, Proc. Bost. Soc. Nat. Hist. 1849, Exp. Shells, f. 279.

Hab. Rifunsiri, 37 fathoms; Sea of Okhotsk, 29 fathoms.

6. TROPHON ORPHEUS, Gould.

Fusus orpheus, Gould, Proc. Bost. Soc. Nat. Hist. 1849, Exp. Shells, p. 285.

Hab. Okosiri, 35 fathoms.

7. TROPHON CANDELABRUM, Ad. & Reeve.

Fusus candelabrum, Ad. & Reeve, Conch. Icon. sp. Mon. *Fusus*.

Hab. Tsusaki, 55 fathoms.

8. TROPHON FIMBRIATULUM, A. Ad.

T. testa ovato-fusiforimi, pallide fusca, spira producta; anfractibus 6, convexis, longitudinaliter subplicatis, transversim liratis, liris squamulosis, confertis, æqualibus; apertura ovata, integra; labro extus eleganter fimbriato, fimbria lata, margine laciniato, canali recto, clauso, producto.

Hab. Gotto, 48 fathoms; Kuro-Sima, 55 fathoms.

There are no varices on the whorls, except the broad fimbriate one which margins the outer lip. It is an elegantly formed species, with squamulose liræ crossing the very convex whorls.

9. TROPHON CONCINNUM, A. Ad.

T. testa ovato-fusiforimi, solida, cinerea, liris concentricis nodulosis et plicis tenuibus longitudinalibus decussata; anfractibus 5, in medio subangulatis; spira acuto-conica; anfractu ultimo in rostrum contortum subito contracto; apertura angusta, ovata, antice in canalem obducta; columella arcuata, lævi.

Hab. Rifunsiri, 35 fathoms.

This little neatly sculptured species resembles in some particulars *Fusus crispus* of Gould; but the transverse liræ are nodulous and crowded, and the longitudinal lacinated plicæ are close together, whereas in *T. crispus* the whorls are finely cancellated.

10. TROPHON TANTILLUM, A. Ad.

T. testa parva, ovato-fusiforimi, alba, nitida, lamellis laciniatis longitudinalibus lirisque crispatis transversis late cancellata; anfract. 6, in medio angulatis, rostro brevi vix recurvo; apertura

angusta, subovata; columella rectiuscula, laevi; labro margine incrassato, late reflexo, postice subsinuato.

Hab. Satanomosaki, 55 fathoms.

This is a beautiful little white cancellated species, with a dilated variced outer lip, and with the aperture produced anteriorly into a very short canal.

The following list of additions made to the Menagerie during the month of November was read to the Meeting:—

		Presented by
2 pairs of Italian Cattle ...	<i>Bos taurus</i> , var.	} His Majesty The King of Italy.
2 Chamois	<i>Rupicapra tragus</i>	
2 Ibex	<i>Capra ibex</i> , hybrid	
1 Alexandrine Parrakeet ...	<i>Palæornis alexandri</i>	Mrs. Roper.
1 Sea-Eagle	<i>Haliaëtus albicilla</i>	J. Sloman, Esq.
1 Bateleur Eagle, young ...	<i>Helotarsus ecaudatus</i> ...	— Monteiro, Esq.
1 young Herring Gull	<i>Larus argentatus</i>	Mrs. Thomas Page.
2 Iceland Falcons	<i>Falco islandicus</i>	S. L. Spencer, Esq.
1 Leopard.....	<i>Felis varius</i>	H.M. The King of Portugal.
6 Common Adders	<i>Pelias berus</i>	B. G. Dupper, Esq.
1 Malabar Squirrel	<i>Sciurus purpureus</i>	Sir Arthur Cotton.
1 Common Quail	<i>Coturnix dactylisonans</i> ...	Mrs. Jewitt.
1 Rhesus Monkey	<i>Macacus erythræus</i>	Dr. Clark.
8 Australian Porphyrios ...	<i>Porphyrio melanotus</i> ...	Dr. Mueller, C.M.
1 Eagle (Geneva).....	<i>Haliaëtus albicilla</i> ?	Thomas Kingscote, Esq.
1 Lizard	<i>Monitor gouldi</i>	} Purchased.
1 Egyptian Vulture	<i>Neophron percnopterus</i> ...	
1 Egyptian Cat	<i>Felis chaus</i>	
1 pair of Parrakeets	<i>Conurus holochlorus</i>	
1 Stock-Dove	<i>Columba ænas</i>	
1 Squirrel.....	<i>Sciurus dorsalis</i>	
1 Tree-Sparrow	<i>Passer montana</i>	
1 Gazelle (Algeria)	<i>Gazella cuvieri</i>	
3 Clapperton's Francolins ..	<i>Francolinus clappertonii</i>	
2 Hooper Swans	<i>Cygnus ferus</i>	

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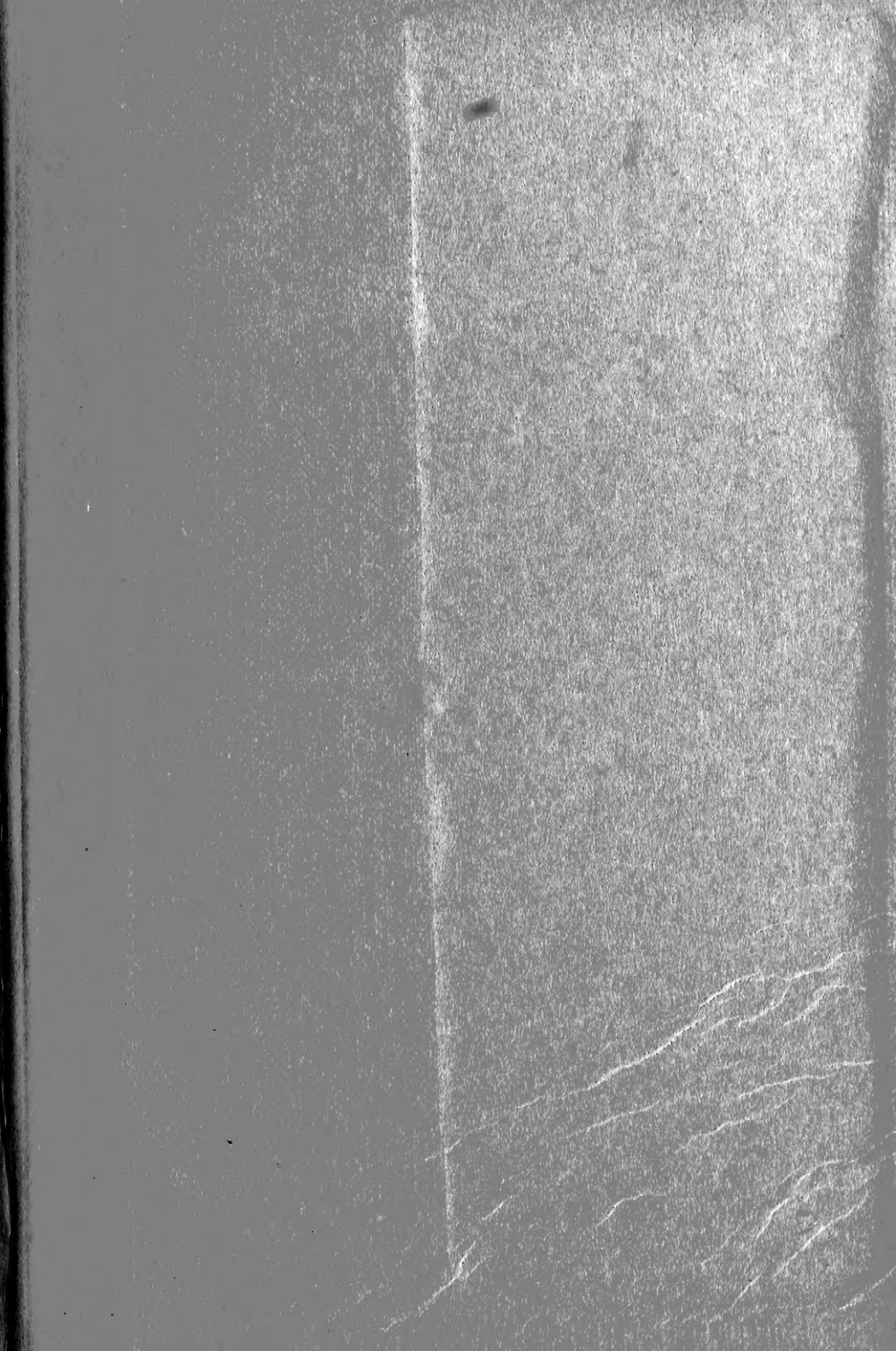
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