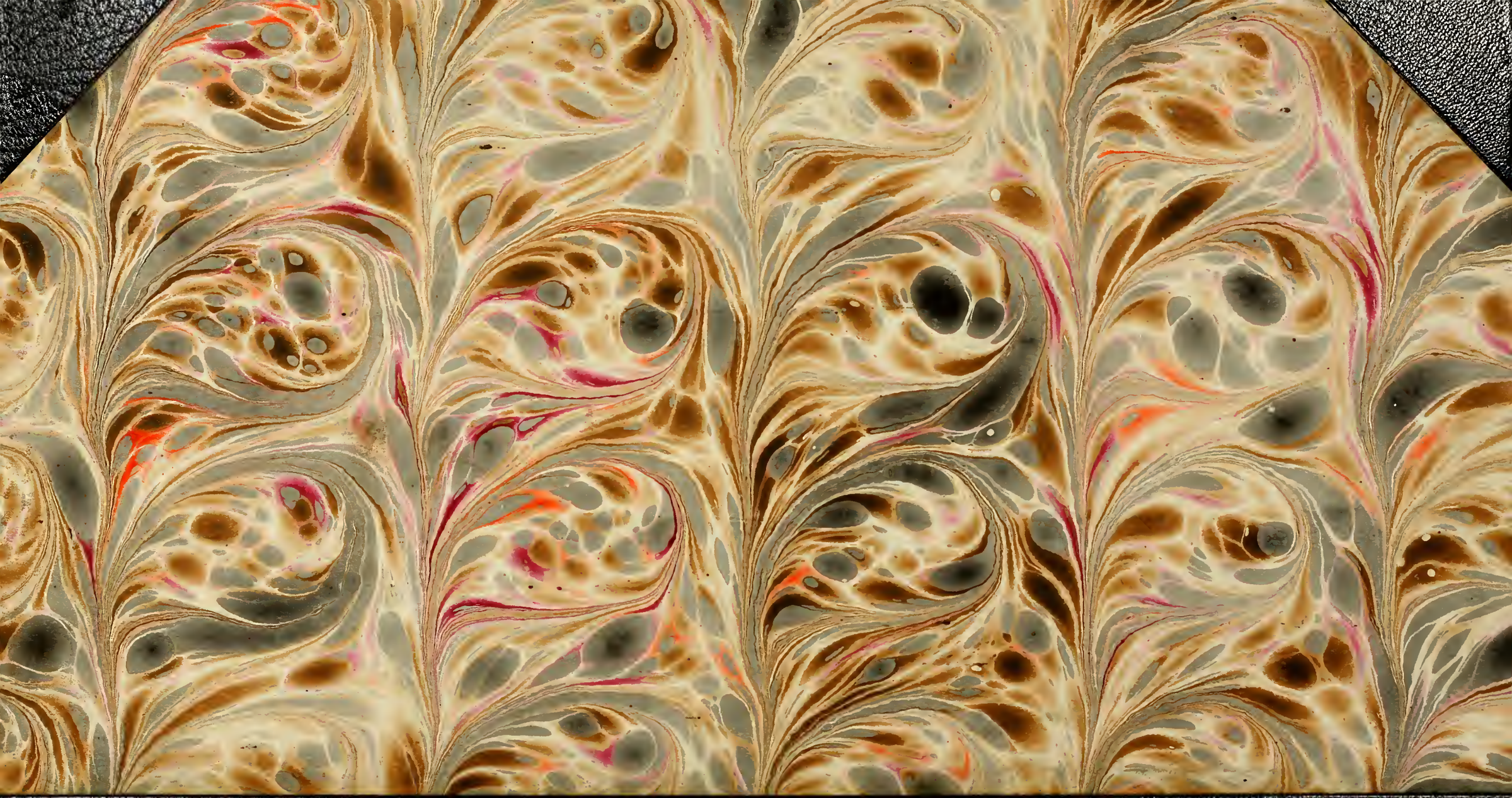

Walter Faxon.

Dec. 11, 1905.

Walter Taylor

Dec. 11, 1905

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CONDUCTED BY

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FEBRUARY, 1839.

ZOOLOGY.

ON THE FOOD OF BIRDS. BY J. C. BELLAMY, ESQ.

In Nature we everywhere discover a system of gradation. If we look upon objects generally, we observe a gradation of forms; and if we compare their parts, we find a gradation in the constitution of their organs. Since also there are relations and dependences established between various parts and organs of living beings, for the execution of more or less complex actions, and since these organs and apparatus are but the instruments of the actions of living bodies, a gradation is further discoverable in these also, whether of an internal or external nature.

The natural world has been so arranged, that the different beings hold various connections and relations of a complex character. We see but little of objects being accomplished by single agencies: a number of agents usually conspiring to effect a purpose; and though there may be one chief agent, others act subordinately in concert. We see the effect produced by causes acting on a system of gradation, that is to say, by causes which are less and less active and conspicuous, so far as that one object is concerned, but which, in the production of other objects, play a more decided and active part. In this way, the perfection of construction of the organs, apparatus, and parts employed to effect a given purpose, as observed in the principal agents, and their less and less perfection, and the gradual disappearance of the structure in the minor agents, is explained, in so far as an elucidation can be given of the primary laws of Nature.

Since the ordinations and intentions of Nature are effected by beings differing widely in general points of view, though certainly for the most part by beings of congenerous characters, the folly of endeavouring to trace out the links of a presumed chain of gradation in a simple, linear manner, from Man to the lowest form of vegetation, and the impropriety of framing a classification or arrangement of natural objects on this suppositious principle, need not be pointed out. The day also for classifying objects in Nature according to the structure of one organ or apparatus, is now, I believe, past. The discovery of the system on which Nature herself has planned the series of beings will supersede the necessity of inventing generalizations of this kind, and will, of course, demonstrate more forcibly than ever the suspicion at various times promulgated by another set of systematists who advocated the propriety of classifying natural objects by their aggregate conformation, that the organ or part, or particular formation of a part, apt to be selected as the standard for classifying a certain series of beings, often exhibits so many gradations, and passes so frequently into objects every way, except in this, totally, different in character, and probably themselves already classified and systematically arranged by another standard, that this method of classifying brought together subjects perfectly incongruous and heterogeneous.

In the case of Birds, any attempt to arrange them according as they are eaters of flesh, or grain, or fruits, or herbs, would, besides bringing together species of very different structures and habits, induce a belief in students that their appetites were in all instances limited, as implied in the name of the class under which they might rank; whereas not only would the species so ranked possess opposite or varying tendencies in respect of appetite, but also in many cases an individual species would exhibit altered habits and appetite according to the season of the year; and finally, individuals belonging to one species would be seen at one and the same time to affect different localities, and to feed differently. The names of *garnivorous*, *insectivorous*, *carnivorous*, &c., should be used merely as ordinary words, and by no means be employed as technicalities. In Temminck's classification of Birds, we have the orders *Insectivoræ*, *Granivoræ*, and *Omnivoræ*, so named, I presume, *par excellence*, for else the epithets are highly contradictory. Indeed, as it is, their impropriety is quite manifest from very many instances. Thus *Parus* occurs in *Granivoræ*, *Turdus* in *Insectivoræ*; not to mention very many other cases where the genera might as properly have been placed in one division as the other, or even in *Omnivoræ*. Dichotomous methods and classifications, which assume a particular organ or structure, as the standard of comparison, may be admissible on small scales, and are surely highly convenient, but a different method must be adopted in disposing of the whole series of beings, and in the determination of physiological points, our deductions are not to be overruled by existing ordinal or other names. Systematists have been unfortunate in searching for order and method in the wrong quarters; where the imagined order was to be found, there Nature displays the greatest tendency to vary; the order of Nature is discoverable in general results, in the completion of general objects and plans, and in the unity and harmony of the principles on which she seems to have planned the series of beings.

The bills of birds are manifestly chiefly employed to collect, and in part to comminute their food. A gradation of the various shapes and peculiarities they assume is well known to exist. The stomachs of birds are exclusively used for the digestion and preparation of the food collected, and in these also a gradation of structure, and various peculiarities exist, though not so extensive or appreciable. But both organs are subservient or secondary to the general character, organization, and habits of the respective possessors, and are accordingly unfit to be the groundwork of a classification of this tribe, even on this one account, not taking into consideration the weightier reasons before named.

But besides that it is improper to class birds under denominations indicative of exclusive habits of feeding so contradictory to truth, or to found a system on the varying structure of one particular organ, the bill or stomach for instance, individual birds are known to differ in habits from the rest of their kind, from local circumstances, or some occult peculiarities of situation, their instincts directing them, as it were, to avail themselves of their extended powers of digestion.

It is extremely important for all who are commencing the study of Nature to attach little or no importance to names. Thus, "insectivorous," "carnivorous," and "granivorous" birds they will in many cases find to vary their food. It will be found, however, on inquiry into the structure and digestive powers of their stomachs, that the food they partake of is in all cases agreeable to their organizations, and that their capacities of appropriation are ever adequate to the comminution and digestion of the food selected. If we reflect, also, for a moment, it must appear that often the number of resources must be enlarged, or the lives of birds sacrificed. Those, for instance, which live for the most part on fruits and seeds during summer, must have other resources during winter; and there are numerous instances where generally the individuals of a species will give

preference to some one kind of insect food during summer, but be obliged to resort to another sort in winter. Again, times of scarcity, even of staple supplies, to the feathered creation will occur, when, if the digestive powers and instinctive faculties of birds were of very limited operation, their races, so far as the dearth extended, must become exterminated. Very many kinds emigrate to other climes, and so escape these contingencies of our country; other species continue to feed on insects the year through, and by superior diligence, aided by a probable diminution of appetite, they manage to survive the rigours of our winters. Thus, the Gold-crest subsists exclusively on insects, in summer feeding on a variety of these, and in winter seemingly, at least with us, confining itself to minute coleoptera collected from the bark of trees, especially apple-trees. The Creeper, also, does not vary the nature of its food, but in winter searches out these same beetles and aureliæ, while in summer, the abundance of insect food of all kinds renders this extreme diligence superfluous. But with other birds the case is different. Certain of the smaller species which regale during summer on fruits and insects, must limit themselves much to the latter in the ungenial months; for example, the Blue Tit, Robin, and Blackbird. The Tit-lark feeds in summer on caterpillars and beetles, but in winter its subsistence must be precarious. Perhaps the Winter-Gnat forms great part of its food, as it does of several other birds, being indeed a most wonderful demonstration of care and provision for many kinds in the severe part of that season of want. The Linnet and Greenfinch also, which are principally granivorous, must, I apprehend, betake themselves to insect food in the depth of winter. The Rook is a bird which gives the preference to insect food, that is to say, worms and grubs, but when we are afflicted, as is often our lot, with a long-continued summer-drought, these birds will carry off potatoes newly planted, and in subsequent periods of want will do great damage to newly-sown corn land. Now, if birds could not, on the subsidence of their summer diet, or on the occurrence of emergencies, find resources in other food, and betake themselves to supplies different from their accustomed provender, they must inevitably perish.

With respect to the organization and forms of birds, as indicative of their food, but few results can be arrived at on that point from these sources. Let us first examine the bill. A hooked bill does not exclusively belong to rapacious birds, and some rapacious kinds have it not. Moreover, the association of a hooked bill and membranaceous stomach will not indicate a bird of prey, certainly not an exclusive feeder on live quarry, birds, quadrupeds, reptiles, or fish; for the Kestrel at times captures beetles, and the Shrikes subsist largely on those and other insects. By the same instances we see that a combination of a hooked bill, thin stomach, and strong curved claws, is likewise insufficient to indicate a predatory bird. A notched bill will not assist in discriminating a bird accustomed to tear flesh, for this structure descends from the Shrikes, which are partially carnivorous, to the Thrushes and Flycatchers, which are not so. The large, strong, sharp-edged bill of the Pies will not indicate an omnivorous appetite, for the Ox-eye is omnivorous, and has a short and very conical bill. The knobbed bill of the Bunting will not point out exclusive granivorous habits, nor will the strong conical bills of the Finches. These and the Larks subsist on seeds and insects, and yet how different are their bills! I question if there be an instance of an exclusively granivorous bird.

Let us now see how far the structure of stomachs characterizes the diet of birds. Membranaceous stomachs appear in the Accipitres; but they are also seen in the omnivorous species of Parus, in the Cormorants, and other birds. The stomach of the Pinnatipedes are nearly membranaceous. Thick muscular stomachs appear in the Finches, Gallinæ, some of the Palmipedes, the Land Rail, the Bearded Titmouse, and in a vast number of other birds. Thin muscular stomachs occur in the Pies, Grallæ, some of the Palmipedes, and others.

There are not a few birds which will betake themselves voraciously to two or more kinds of food, eating together with their more ordinary provender what one might imagine would constitute their reserve; a suspicion here naturally arising that their constitutions need this admixture at certain seasons. Thus, the Common Bunting will, at the height of summer, partake both of green corn and beetles. Thus also the Thrush, Blackbird, and Robin, will combine fruits and insects. Again, the Greater Tit or Ox-eye is an instance of an omnivorous appetite; he is a general consumer, one who can accommodate his palate to every dish set before him; he will swallow seeds, corn, snails, various insects, offal meat, and will also at times kill small birds, and feed on their bodies. The Flusher is not so indiscriminate a feeder as the Ox-eye, but yet it will devour small birds and insects. Birds whose strength of bill indicates their adaptation for eating seeds, or hard food, will partake largely also of insects. Thus, the Sparrow, Chaffinch, Reed Bunting, and Common Bunting, generally spoken of and ranked as "granivorous birds," yet eat largely of beetles and other insects. Those birds generally considered "insectivorous," having a soft flexible bill, are in numerous cases likewise fruit eaters. The Robin, for instance, the Fauvette, the Blackcap, and the Willow Wrens, though these last will never touch cherries, the true object of their visits to cherry trees being to procure the small insects found in abundance on them at the time of the ripening of the fruit. "Insectivorous" birds, however, are seldom granivorous, for whilst, on the one hand, the granivorous kind can, by extensive powers of comminution and digestion, easily assimilate food of a softer description, the insectivorous having usually stomachs suited only to soft and readily digestible food, cannot, it would seem, mollify and digest the hard structure of seeds. Yet this matter is not altogether cleared up, for the Ox-eye has a membranaceous stomach, and occasionally will swallow hard seeds and corn, to say nothing of garden peas, of which he devours large quantities, in which respect he resembles the "granivorous" birds. Perhaps the gastric juice in this species may have stronger solvent powers than usual, and the digestive powers of birds possessing similarly constructed stomachs vary greatly, as we have already exemplified above in "insectivorous" birds, part of which live exclusively on insects, while others eat fruit in addition. Sky Larks, which have gizzards, feed on grain, seeds of various kinds, other vegetable substances, and insects. The Nuthatch eats insects, particularly beetles, and kernels of nuts. By all which instances of unexpected combinations of dissimilar food, whether eaten at one and the same time, as is frequently the case, or partaken of in rotation, as is the habit of some species; and by the few instances, out of a very extensive list, given before, to show that the same kind of stomach occurs in birds dissimilar in general characters, and is not constant to all the species of one tribe in certain cases; it appears that some other less equivocal structure or agent than the bill or stomach, one having more decided and constant characters, must be sought for to explain facts of such anomalous natures.

Here, however, we judge rather by results, for the gastric juice, which I here allude to, gives but slight opportunities for investigation. Still this liquid must vary even with the species, as appears by statements above made, and it must alter in quality also, I presume, in some cases, according to the alteration in diet adopted by the birds; and more than this, it must differ in different individuals of one species at the same period, for a reason already explained. It seems, indeed, quite subservient to the immediate requirements of the bird. It is rational to conclude that the gastric juice is of a more active quality in membranous stomachs, and less in gizzards; but then we should recollect that flesh is more readily digested than other aliment, that caterpillars and other soft matters are consumed by birds with gizzards, and that the thickness of the walls of stomachs has no direct power in digesting, but only in comminuting. We certainly are quite incapable of explaining why this or that bird has a gizzard, and another not. The facts are frequently adverse to our preconceptions and theoretic calculations. The Bearded Tit lives on seeds, beetles, snails, and flies; but who would have concluded that it had a gizzard, and that provided with gravel? The young of many birds, whose powers of digestion and comminution are immature, feed differently from the parents. Sky Larks feed their young with worms, ants' eggs, grasshoppers, and caterpillars; so also do the Robin, Greenfinch, and Chaffinch.—(*To be continued.*)

BOJE'S CLASSIFICATION OF BIRDS.

In the Isis for 1826 is an arrangement of birds in outline, which, although possessing considerable merit, seems to have been almost entirely overlooked, until recently brought into notice by its having been referred to by the Prince of Musignano in his Comparative List of the Birds of Europe and North America. The number of primary sections or orders is five—*Raptores, Insessores, Rasores, Grallatores, Natatores.*

Order I. RAPTORES, *Vigors.*

Fam. I. Gypogeranidæ, *Vigors.*
Gypogeranus, *Illig.*—Serpentarius, *Cuv.*—Falco serpentarius, *Linn.*
Dicholophus, *Illig.*—D. cristatus, *Illig.* col. 237.

Fam. II. Vulturidæ, *Leach.*—Vultur, *Linn.*
Vultur, *Linn.*—V. cinereus, *Linn.*—V. angolensis, *Lath.*
Cathartes, *Illig.*—Neophron, *Savigny.*—Catharista, *Vieill.*—Monachus, *Temm.*
Sarcorhamphus, *Dumeril.*—V. Gryphus, *Linn.*—V. Papa, *Linn.*

Fam. III. Falconidæ, *Leach.*
Polyborus, *Vicill.*—F. brasiliensis, *Gmel.*
Gypaetus, *Storr.*—Phene, *Savigny.*—Falco barbatus, *Gm.*
Haliaetus, *Savigny.*—Falco leucocephalus, *Gm.*—F. Macei, *Cuv.*
Aquila, *Bechst.*—*F. armiger*, *Shaw.*
Pandion, *Savig.*—F. Haliaetus, *Linn.*
Circaetus, *Vieill.*—F. Gallicus, *Gm.*
Buteo, *Bechst.*—F. Tachardus, *Shaw.*
Pernis, *Cuv.*—F. apivorus, *Gm.*
Astur, *Bechst.*—Daedalion, *Savig.*—F. columbarius, *Gm.*
Morphnus, *Cuv.*—F. Guianensis, *Daud.*
Harpyia, *Cuv.*—F. cristatus, *Gm.*

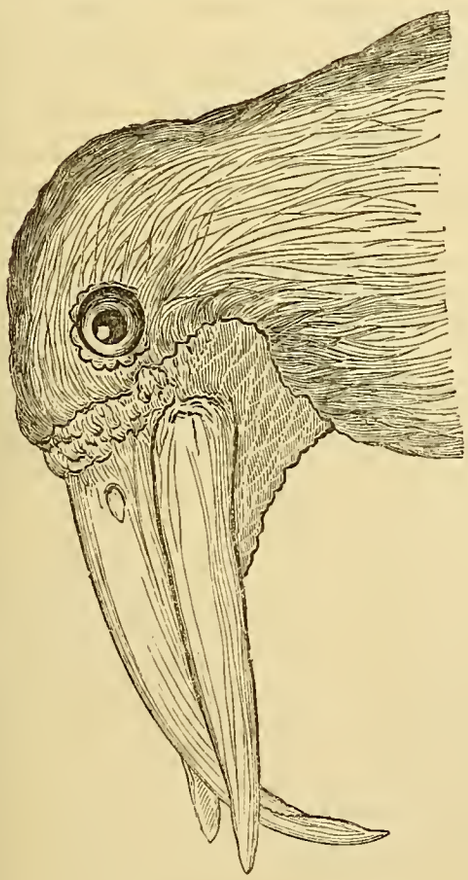
Nisus, *Cuv.*—F. Minullus, *Vaill.*
Cymindis, *Cuv.*—F. hamatus, *Illig.*
Cerchneis.—F. rupicola, *Licht.*
Hierofalco, *Cuv.*—F. Canarius, *Gm.*
Elanus, *Savig.*—F. Melanopterus, *Daud.*
Milvus, *Savig.*—F. Riocurii, *Vaill.*
Circus, *Bechst.*—F. ranivorus, *Shaw.*
Fam. IV. Strigidæ, *Leach.*—Strix, *Linn.*
Strix, *Linn.*—Strix brasiliensis, *Licht.*
Syrnium, *Savig.*—St. nebulosa, *Gmel.*
Bubo, *Cuv.*—St. Africana, *Temm.*
Scops, *Savig.*—St. pulchella, *Pall.*
Glaucidium.—St. nana, *Temm.*—St. passerina, *Linn.*
Athene.—St. nudipes, *Daud.*
Surnia, *Dumeril.*—St. choucon, *Vaill.*
Fam. V. Caprimulgidæ, *Vigors.*—Caprimulgus, *Linn.*
Podargus, *Cuv.*—P. javanicus, *Horsf.*—P. cornutus, *Temm.*
Caprimulgus, *Linn.*—C. europæus, *Linn.*

(*To be continued.*)

SINGULAR DEVELOPMENT OF A ROOK'S BILL.

There was killed on the morning of the 17th current, in the vicinity of Paisley, a Rook, the bill of which exhibited the extraordinary development delineated on the accompanying sketch. This singular conformation does not appear to have been the effect either of disease or of accident. It is rather to be accounted for from a tendency in the mandibles to grow beyond their natural limits. The points of these tending in opposite directions, it followed that the curvature of the upper proceeeding downward, and coming in contact with the lower mandible proceeding upward, caused the latter to divide, and to extend on each side of the upper mandible in the shape of two elastic processes in the manner delineated, which completes the singularity. The bird was in good condition, and as the frost was keen, it had been feeding on the roads, as the contents of the gizzard testified. The skin is in my possession.

Paisley, 1, *Stevenson Street*, William Drew.
19*th January* 1839.



SKETCH OF THE NATURAL HISTORY OF THE NEIGHBOURHOOD OF NORWICH.

BY J. M.

(*Abridged from a Paper read before the Cuvierian Society of Edinburgh.*)

Having had occasion to spend last summer and autumn in the city of Norwich, and a small village in its vicinity, I took the opportunity to devote the greater part of my spare time to making myself acquainted with the natural productions of that singularly interesting neighbourhood. Whether we consider its Geology, its Botany, or its Natural History in general, it holds out many inducements to the student of nature; and, to a stranger, as I then was, comparing it with the environs of Edinburgh, as the place best known to me, all was novelty.

The general aspect of the county of Norfolk is such as might be expected to be presented by most districts where chalk abounds, modified, however, by various circumstances, and by none more so than the high state of cultivation to which the land, otherwise unfertile, has been brought. The surface of the county presents little variety, being generally a level plain with few elevations, except in the neighbourhood of Norwich, the district more under consideration. The soil is generally a light sand, or sandy loam. Within a few miles of Norwich may be observed many diversities, however, of surface, not merely arable lands and pastures, but woods, or rather plantations, heaths, fens, and water in its different forms of lakes, rivers, and ponds. In the fenny districts especially, and even in Norwich itself, intermittent fevers are endemic, and usually attack strangers during the first week or two of their residence, on which occasion a person is quaintly said to be 'arrested by the bailiff of marsh land.' With respect to the climate, the summer is generally very hot, with frequent and violent storms, on account of its eastern exposure, and the winters are said to be usually severe. The county exhibits most of the signs of rural prosperity, but we do not view it in that light, but proceed to give a short account of its Geology.

The *chalk formation* is seen around Norwich, and, indeed, extends over the whole county, as well as the greater part of the south-east and eastern counties of England. In many places the chalk is of great thickness, with frequent layers of flints interposed. The *flint*, which may be procured in almost any quantity, is extensively employed for mending the roads, for which purpose it is admirably adapted, and although the masses of flint are in general of small size, yet from the want of any other stone, they are much used in building, and most of the churches, the Town Hall, and many other buildings, are in a great measure constructed of flint, forming objects of considerable interest to such as have been accustomed to the sight of more seemly structures. Many of the nodules contain fossils of different kinds, as spatangi, &c.

That interesting formation, known by the name of *Norfolk Crag*, is exposed in the neighbourhood of the city, from which it extends to the sea, a distance of eighteen miles. It is almost entirely composed of fossil organic remains, including extinct species of zoophytes, sponges, and alcyonites; crustacea and coprolites; along with myriads of marine shells, some allied to those found in the neighbouring seas, and others, again, which have no analogues either in recent species or in those of any other formation.

Numerous relics of large fossil mammalia have been found on the eastern coast of Norfolk: remains of the Elephant, Hippopotamus, and Rhinoceros. Mr Woodward has established the existence of two species of Mastodon, the grinder of one of which I had the pleasure of seeing in the Norwich Museum. This is the only part of the country where fossil remains of the Mastodon have hitherto been found, and some years ago an entire skeleton of the *M. latidens* was discovered, but only a single grinder was preserved, the rest having been burnt for lime.

From the high state of cultivation to which so much of the county of Norfolk has been brought, it may be supposed that the number of plants must be very limited. But it is otherwise. Along the rivers, and by the edges of the pools, there is a profuse vegetation, while the road-sides, and the numerous chalk pits interspersed over the country, have their peculiar species. The corn fields, themselves, the woods and heaths, afford habitats for many others much prized by the botanist.

In many places the beautiful *Nymphæa alba*, so often the theme of admiration, raises its large flowers above the water, or, covering with its broad leaves the surface of some still pool, presents a tapestry of green alternating with the purest white. *Nuphar lutea* is exceedingly abundant in all the rivers and ponds; and in more shallow water the *Sagittaria sagittifolia* grows plentifully. The larger ditches teem with a profusion of *Butomus umbellatus* and *Stratiotes aloides*, *Bidens tripartita* and *cernua*, *Helosciadum nodiflorum* and *repens*, while their surface is in some places covered with the interesting *Hottonia palustris* and *Hydrocharis Morsus Ranæ*, with abundance of *Lemna polyrrhiza*, and by the margin of one ditch near the city, I saw *Apium graveolens*, or wild celery. *Lythrum salicaria* is there a common, and, at the same time, a very showy plant. Different species of *Mentha*, among others *M. Piperita* and *viridis*, both undoubtedly wild, and *M. gentitis* and *rubra*, along with *Scutellaria galericulata*, *Lysimachia vulgaris*, *Cineraria palustris*, *Carex Pscudo-Cyperus*, are found in similar localities, and in one place I observed the rare *Scirpus carinatus* growing in abundance. That rare plant the *Acorus Calamus* was formerly abundant on the Yare below Norwich, and the roots, when dried, are used to give a peculiar flavour to gin, or at least to some kinds of that spirit. In moist meadows there is abundance of *Thalictrum flavum*, and in marshy ground *Lysimachia Nummularia* often covers a large extent of surface with its trailing shoots, loaded with a profusion of yellow blossoms, and I have seen associated with it the beautiful and

rare *Gentiana Pneumonanthe*. In dry ground, but always near water, *Pulicaria dysenterica* grows in extensive patches.

Almost peculiar to the county of Norfolk are several species of that singular genus *Orobanche*. The *O. minor* is found in most clover fields, often giving parts of them from its abundance a rusty brown colour when it begins to wither. The *O. cærulea*, *elatior*, and *ramosa*, all very local plants, are less common than the preceding, and the *O. major* I found in only one locality parasitical on the broom. *Verbena officinalis*, now ascertained not to be indigenous to Scotland, is abundant by the road-sides and in chalk pits, and *Acinos vulgaris*, which appears to be more widely distributed than was formerly supposed, grows in similar localities, as well as in the corn fields, where may also be found *Setaria viridis*, *Papaver hybridum*, *Antirrhinum Orontium*, *Ipecularia hybrida*, *Silene noctiflora*, and *conica*, *Calamintha Nepeta*, and *officinalis*, together with that interesting little plant the *Adonis autumnalis*.

In the lanes and margins of chalk pits are found growing in abundance *Reseda lutea*, *Potentilla argentea*, *Melilotus officinalis*, *Salvia verbenaca*, *Geranium rotundifolium*, *Pimpinella magna*, *Cichorium Intybus*, *Erigeron acris*, *Dipsacus Fullonum*, and less frequently *Lactuca Scariola* and *Saligna*, which appear to be rare in the district.

The different species of *Verbascum* have found in the neighbourhood of Norwich an apparently congenial soil. Those I observed were *V. Thapsus*, *pulverulentum*, *Nigrum* and *Lychnitis*. On the city walls *Antirrhinum majus* and *Teucrium Scordium* form frequent tufts, and the rare *Dianthus cæsius* is said to grow near one of the gates. In the hedges there is a profusion of *Clematis vitalba*, *Convolvulus sepium*, *Bryonia dioica*, *Galium erectum* and *Mollugo*, and now and then near houses *Saponaria officinalis* has its habitat. About the town, and among rubbish, are found *Mercurialis annua*, *Borago officinalis*, *Atropa Belladonna*, and *Datura Stramonium*, but more abundantly than any the *Solanum nigrum*, so rare in Scotland, if, indeed, truly indigenous to that country.

Ophrys aranifera I found in only one locality, namely, Costessey Park, along with the more common *O. apifera*, and on some cultivated plants of *Thymus Serpyllum*, there was an abundance of *Cuscuta Epithymum*, which also grows in the *Calluna vulgaris* on Mousehold Heath. In a wood opposite the cathedral, there were several plants of *Rhamnus catharticus*.

The above enumeration of species it is not expected is any thing like a complete list, as my time for botanizing was limited, and only such plants as I observed during my rambles in quest of other objects were noted down from memory, after the lapse of many months, and many of the above mentioned species, although interesting to the Scottish botanist, are by no means esteemed by an English one.

I shall now proceed with the Zoology, and begin with the Mammalia.

Although the number of quadrupeds found in the neighbourhood of Norwich is not great, yet several of the species are possessed of considerable interest.

Bats of several kinds are very plentiful, and several rare species have been observed. The Noctule, or Great Bat, *Vespertilio Noctula*, the largest found in this country, and approaching somewhat in dimensions to some of those found within the tropics, is rather frequent, and may be seen on wing long before its congeners have come abroad. It usually flies at a considerable elevation, and its flight is rapid, and not so versatile as that of the other British Bats I have seen. It has altogether a singular appearance, and may perhaps with some be associated with ideas of the far-famed Vampire, so much does it look like a creature of evil omen. The place where I observed it most plentiful was about the mill at Costessey, where two or three might be seen at once, affording an excellent opportunity for procuring specimens, which I availed myself of. In the shady lanes, and about pools and rivers, various other species may be seen flitting about on leathern wing. I am unable to state with precision the different species, as I had no book on the subject to refer to at the time, and the skulls I was preparing were unfortunately thrown away by accident, but I am certain that I killed three or four besides the Noctule and *Plecotus auritus*. I saw a specimen of the *Vespertilio pygmæus* in the hands of a gentleman in Norwich, taken in a hollow tree in Costessey Park. In a late number of a natural history periodical, mention is made of a very rare Bat, *V. Leisleri*, found near Norwich, but it is disputed whether or not they belong to the species just mentioned, as the matter is still *sub judice*.

In several ditches near Norwich, on a fine summer evening, besides the Water Rat, I have seen dozens of the beautiful little *Sorex remifer*, or Water Shrew, silently padling along, and when under the surface, appearing like a mass of crystal, so much air bubbles does this tiny creature carry along with it in its subaquatic perigrinations.

Among the less common quadrupeds are the Harvest Mouse, *Mus messorius*, and the Dormouse, *Myoxus Avellanaria;* these I saw but seldom. On one occasion I chanced to fall in with a Marten, *Mustela martes*, but failed in procuring it. There are said to be still remaining a few Otters, but it must be but seldom that the angler stumbles on one.

Rabbits are exceedingly abundant in many situations, well adapted to their wants by Nature and art, and appear to thrive amazingly.

MISCELLANEOUS.

Preservation of Animal Substances.—At a late meeting of the Medical and Chirurgical Society, a letter from Mr George Smith was read, which stated that he had obtained a patent for an improved process of embalming and preserving objects for anatomical purposes, for which M. Gannal, a French chemist, had also taken out one in Paris. Several birds, a Dorking Fowl, a Pheasant, and a Pigeon, were shown, which had been subjected to the process, and which, at the end of more than two months, were found in an extraordinary state of preservation, the flesh being perfectly soft and elastic. The fellows were also invited to view the body of a man who died on the 5th, and was embalmed on the 9th of November. It was stated that in about half an hour a great change came over the body; that parts which had been previously soft and relaxed became firm and hard; and that the whole body resembled wax in appearance, and was nearly as firm. No perceptible change took place in the following three days, excepting that some green marks on the neck and abdomen gradually disappeared. Several of the members who had seen it, and examined the birds, were of opinion that the discovery deserved the immediate attention of the Faculty.

M. Gannal's Mode of Embalming.—In a late number of "The Lancet," there is reported, from a meeting of a medical society in London, an account of a process contrived by a M. Gannal, which, according to him, entirely prevents the ordinary effects of putrefaction in animal bodies after death.

During a recent visit of M. Gannal to London, this plan of his was tested in the presence of several witnesses belonging to the medical profession, and the subject of experiment was the body of a man thirty-three years of age, who had died of epilepsy four days before. His mode of procedure was as follows:—Having exposed the common carotid artery of one side, and secured its upper end by means of a ligature, he injected slowly towards the heart four or five pints of fluid, and secured the vessel. In about half an hour, the surface of the body became somewhat of the consistence and colour of wax. On the 12th of November, three days after, he proceeded to complete the process of embalming, by placing in contact with the body, linen moistened with spirit of rosemary, then a layer of oiled silk, and over all a coat of thin sheet lead, the whole completely enveloped in bandages, about two hundred yards being used. Glass eyes were introduced, and some lint soaked in oil of cloves placed in the nostrils, and the face and hands, which had been left exposed, were covered with a thin coating of wax, applied with a brush. The body was then soldered down in a leaden coffin, a small quantity of powdered quicklime placed under the pillow, and two windows were left, corresponding to the hands and face. The body is still to be seen at the Theatre of Anatomy in Little Windmill Street, London; and, although several months have elapsed since this experiment was tried, no traces of change are visible externally.

The composition of the fluid used by M. Gannal is not stated; it contains, in all probability, some powerful antisceptic, such as creosote.

Method of Preserving Fruits, &c.—Dr Christison, the well known Professor of Materia Medica in this University, has, for several years, made use of a *saturated solution of common salt* for preserving the specimens of fruits, as well as succulent and other plants in general, which adorn his Museum. This cheap substitute for the more expensive spirits of wine, is not so generally known as it ought to be, although he made it the subject of a communication to the Botanical Society of Edinburgh, in the course of last winter. In general it is preferable to spirits, though in a few cases the latter are necessary. The top of the jar is secured in the usual way by bladder and tinfoil, or sheet lead.

Crab common to China and Europe.—Among a collection of Chinese Crustacea sent from Canton a few years ago, which came into the hands of the writer, there are two specimens of a Crab, the *Gonoplax bispinosa* of Leach, found also on the coast of England and France. It is a singular fact, that this crustaceous animal should have so wide a range, and be found in countries so dissimilar. Indeed, I was at first very sceptical on the subject, and although the descriptions given by different authors of the *G. bispinosa* agreed with my Chinese specimens, I was not satisfied as to their identity until I had an opportunity of seeing authentic specimens in the British Museum, collected, I presume, by Dr Leach on the Devonshire coast. Although I am not aware of any British Insects found in countries so far remote as China or Hindostan, yet it is well known that several species of Birds are common to both Britain and India, many specimens of which are preserved in the Edinburgh Museum.—J. M.

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ZOOLOGY.

BRITISH BIRDS.—THE WREN.

The Common Wren, *Anorthura Troglodytes*, is one of the most familiarly known of our small birds, being rendered remarkable by its peculiar form, not less than by the liveliness of its motions. Next to the Robin, it is perhaps the least liable to molestation from boys and idle people; and for this security it is indebted partly to its small size, and partly to its cheerfulness and innocence. Next to the Kinglets, the Creeper, the Chiff-chaff, and the smaller Tits, it is the least of our native birds. Its flight is effected by a rapid and continuous motion of the wings, and therefore is not undulated, but direct; nor is it sustained, for the bird merely flits from one bush to another, or from stone to stone. It is most frequently met with along stone walls, among fragments of rocks, in thickets of whins, and by hedges, where it attracts notice by the quickness of its motions, and frequently by its loud chirring noise. When standing, it keeps its tail nearly erect, and jerks its whole body smartly; then hops about with great alacrity, using its wings at the same time, and continually enunciating its rapid chit. In spring and summer, the male has a very pleasing, full, rich, and mellow song, which it repeats at short intervals; and even in autumn, and on fine days in winter, it may occasionally be heard hurrying over its ditty, the loudness and clearness of which, as proceeding from so diminutive a creature, is apt to strike one with surprise even after it has long been familiar to him.

During the breeding season, Wrens keep in pairs often in unfrequented parts, such as bushy dells, mossy woods, the banks of streams, and stony places overgrown with brambles, sloes, and other shrubs; but towards the end of autumn they approach the habitation of man, and although never decidedly gregarious, sometimes appear in small straggling parties. They are not, properly speaking, shy, as they conceive themselves secure at the distance of twenty or thirty yards, but, on the approach of a person, conceal themselves in holes among stones, or among the roots of bushes. In liveliness and activity the Wren rivals the Kinglets, Tits, and Creeper, as might be expected from its diminutive size, birds as well as quadrupeds being generally more slow in their motions the larger their bulk.

A pleasant little fable, of which the Wren is the hero, is told by the Hebridians. At an assembly of the birds, the Eagle was boasting of his strength, asserting that he could mount higher in the air than any of earth's inhabitants, when up starts the little Wren, and flatly contradicts the tyrant, challenging him to a trial of speed. The Eagle regarded his puny rival with contempt, but accepting the challenge, or desirous of displaying his powers, spread out his huge wings, and launched into the air. Up rose the royal bird in majestic gyrations, over the assembled tribes, up beyond the mountain tops, up beyond the streaks of grey vapour, up beyond the specks and lines of the white cirri and cirrocumuli that floated in the blue ocean of ether, up until he seemed but a point in the eye of the Goshawk and Peregrine, who watched his progress with more envy than admiration, and of the Raven, who thought he could mount as high himself; still up until he vanished entirely from the sight of most of the other birds, who were not accustomed to look so far into the sky. But where was the little Wren all this time? Had he crept with shame into some hole, or been unwittingly trampled to death by the broad foot of some gazing Gander, or the still broader foot of the pillar-legged Pelican? At length the Eagle stopped, gasping for breath, with swollen eyes and palpitating heart, unable to ascend a foot farther, and spreading wide his wings and tail, floated in the dazzling light. The little vain-glorious thing that had defied him, he knows has been left at least a mile behind. But lo! up again starts the Wren, who had nimbly perched on the Eagle's back, and kept himself concealed among the feathers. With a hop, and a jerk of his tail, and a glance of pride, up springs the little Wren into the region of vacuity, and, fluttering there for a moment, sings his song of triumph. The Eagle cast a glance of mortified pride upon him, which he heeded not, but seizing a feather of his rival's neck, descended in safety to the ground, to receive the prize impartially adjudged by the astonished conclave. The moral of the fable is, that cunning may supply the lack of power.

I know not a more pleasant object to look at than the Wren, it is always so smart and cheerful. In gloomy weather, other birds often seem melancholy, and in rain the Sparrows and Finches stand silent on the twigs with drooping wings and clotted plumage. But to the Wren all weathers are alike. The big drops of the thunder-shower no more wet it than the drizzle of a Scotch mist; and as it peeps from beneath the bramble, or glances from a hole in the wall, it seems as snug as a kitten frisking on the rug.

It is amusing to watch the motions of a young family of Wrens just come abroad; but this we must defer until the month of June, when the juniper and whin bushes of the Pentland Hills will afford them the necessary shelter.

BOJE'S CLASSIFICATION OF BIRDS.

(*Continued.*)

Melizophilus, *Leach.*—Sylvia provincialis.
Vireo, *Vieill.*—Muscicapa viridis, *Linn.*—M. noveboracensis, *Linn.*
Fam. VII. Merulidæ, *Vigors.*
Merula.—Turdus Merula, *Linn.*
Turdus, *Linn.*—T. viscivorus, *Linn.*
Cinclus, *Bechst.*—C. aquaticus, *Bechst.*
Grallina, *Vieill.*—Tanypus, *Oppel.*—G. melanoleuca, *Vieill.*
Dandalus.—Motacilla Rubecula, *Linn.*
Petrocossyphus.—Turdus saxatilis, *Linn.*
Mimus, *Briss.*—Turdus polyglottus, *Linn.*
Myioturdus.—Turdus rex, *Linn.*
Pitta, *Vieill.*—P. erythrogastra, *Cuv.*
Myiophoneus, *Temm.*—Pitta glaucina, *Temm.*
Rupicola, *Briss.*—R. peruviana, *Briss.*
Fam. VIII. Motacillidæ.—Motacilla, *Linn.*
Motacilla, *Linn.*—M. alba, *Linn.*
Budytes, *Cuv.*—Motacilla flava, *Linn.*
Enicurus, *Temm.*—E. velatus, *Temm.* col. 160.
Vitiflora, *Briss.*—Turdus leucurus.
Saxicola, *Bechst.*—Sylvia Rubetra, *Lath.*
Fam. IX.—Myiotheridæ.
Pomatorhynchus, *Horsf.*—Le Tochagra, *Vaill.* Afr. pl. 70.
Lalage.—Turdus orientalis, *Gmel.*
Pycnonotus, *Kuhl.*—Turdus capensis, *Linn.*
Timalia, *Horsf.*—Pitta thoracica, *Temm.*
Laniarius, *Vieill.*—Turdus ceylonus, *Gmel.*
Pelicinius.—Lanius barbarus, *Gm.*
Dryoscopus.—Lanius Cubla, *Vaill.* Afr. pl. 72.
Myagrus.—Turdus auritus, *Lath.*
Myiothera, *Illig.*—M. fulginosa, *Illig.*
Fam. X. Muscicapidæ, *Vigors.*—Muscicapa, *Linn.*
Butalis.—Muscicapa Grisola, *Linn.*
Hypothemis.—Musc. cærulea, *Vaill.* Afr. pl. 153.

Tyrannus, *Cuv.*—Musc. audax, *Gm.*
Platyrhynchus, *Desmar.*—Todus cancroma, *Lath.*
Muscipeta, *Cuv.*—Muscicapa paradisi, *Linn.*
Dicrurus, *Vieill.*—Edolius, *Cuv.*—E. retifer, *Temm.*
Ceblepyris, *Cuv.*—Muscicapa cana, *Gmel.*

ORDER II.—INSESSORES, *Vigors.*

Fam. I. Hirundinæ, *Vigors.*
Cypselus, *Illig.*—Hirundo leucorrhoa, *Shaw.*
Acanthylis.—Hirundo spinicauda, *Temm.* col. 726, fig. 1.
Chelidon.—Hir. viridis, *Wils.* pl. 38, f. 3.
Cotyle.—Hir. fucata, *Azz. Temm.* col. 161.—H. rupestris, *Gm.*—H. riparia, *Linn.*
Progne.—Hir. purpurea, *Gm.*—*Wils.* pl. 39, fig. 2.
Cecropis.—Hir. capensis, *Gm.*—H. rustica, *Gm.*
Fam. II. Pipridæ, *Vigors.*
Ampelis, *Linn.*—Pipra, *Linn.*
Phibalura, *Vieill.*—Ph. flavirostris, *Vieill.* col. 118.
Procnias, *Illig.*—P. ventralis, *Illig.*
Ampelis, *Linn.*—A. Pompadora, *Linn.*
Bombycilla, *Briss.*—B. japonica, *Liebold.*
Casmarhynchus, *Temm.*—Ampelis nudicollis, *Gm.*
Coracina, *Vieill.*—Coracias scutata, *Lath.*
Pipra, *Linn.*—P. pareola, *Linn.*
Pythis, *Vieill.*—Pipra leucocilla, *Gm.*
Fam. III. Meropidæ, *Vigors.*—Merops, *Linn.*
Merops, *Linn.*
Fam. IV. Trochilidæ, *Vigors.*—Trochilus, *Linn.*
Trochilus, *Linn.*
Fam. V. Nectariniadæ, *Vigors.*—Certhia, *Linn.*
Cynnyris, *Cuv.*—Certhia violacea, *Gm.*
Nectarinia, *Illig.*—Certhia caffra, *Linn.*
Cœreba, *Briss.*—Certhia spiza, *Gm.*
Arachnothera, *Temm.*—A. longirostris, *Temm.*
Fam. VI. Sylviadæ, *Vigors.*
Ficedula, *Cuv.*—Motaciella Phœnicurus, *Linn.*
Curruca, *Cuv.*—Mot. Luscinia, *Linn.*
Ædon.—Sylvia galactodes, *Temm.*
Pericrocotus.—Muscicapa miniata, *Temm.* col. 156.
Chloris.—Sylvia americana, *Lath.*
Hylophilus, *Temm.*—Sylvia vermivora, *Lath.*
Calamoherpe.—Sylvia arundinacea, *Lath.*
Dicœum, *Cuv.*—Certhia cruentata, *Gm.*
Accentor, *Bechst.*—Motacilla Calliope, *Pall.*
Phylloscopus.—Sylvia Trochilus, *Lath.*
Brachypteryx, *Horsf.*—B. montana, B. sepiaria, *Horsf.*

PIGEONS IN PETERSBURGH.—The following notice is extracted from a paper on the Natural History of the vicinity of St Petersburgh, by Charles Drosier, published in the Naturalist for February of the present year. The Common Dovecot Pigeon swarms in the city and the country; it is esteemed sacred, and called God's Bird by the Russians, from the circumstance of the Holy Spirit assuming that form when it descended upon our Saviour. To kill and eat it is considered an act of profanation. It is so tame and incautious in the city, that vehicles have been known to pass over it while engaged in picking up the scattered corn which falls in abundance from the carts. I have touched the back of one with a walking switch from a drosky (a peculiar vehicle used in St Petersburgh), and could have killed it had I been so disposed. This bird is certainly a nuisance in the city; it perches upon the architraves and projections of buildings, marring their beauty, and loads the places where it rests with immense collections of dung, and by its flight overhead it may happen that the symmetry and polish of a pedestrian exquisite's coat, or the bonnet, parasol, or cloak of some fashionable belle, may meet with the same fate that the out-spread banquet of Æneas received from the Harpies on "the shores of the Sophiades." The English and Germans eat the Pigeon; and for their tables they are preserved and sold in the market by the less scrupulous Russians. I had one day an opportunity of observing, myself, how the respect for the Pigeon prevails amongst the lower orders. I shot six, away from the village, at one shot, and brought them home (with the intention of obtaining that master-achievement of modern cookery, a Pigeon-pie, which I have often thought must be the nearest approach to "Ambrosia" we poor sons of Earth have discovered); when I threw them on the table, a Russian servant who was near, after several ejaculations against my impiety and cruelty (for they do not understand the respect with which the English treat their superiors in station), snatched up one of the dead birds, and bursting into tears commenced kissing and fondling it; yet a few days afterwards she plucked them without displaying the least uneasiness, a thing characteristic of the people, who for the most part act from impulse.

ROUGH-WINGED SWALLOW.—In the fourth volume of his Ornithological Biography, Mr Audubon has published an account of a small Swallow recently discovered in North America, but which had been confounded with the Bank Swallow, *Hirundo riparia*. In its general appearance, including proportions as well as colour, the Rough-winged Swallow is extremely similar to the Bank Swallow. It differs, however, in having the bill considerably longer, more attenuated toward the end, with the point of the upper mandible more decurved. The tail is shorter and but slightly emarginate, the lateral exceeding the middle feathers by only two-twelfths of an inch, whereas in the other species they exceed them by five-twelfths, or even six; the feathers are also broader and more rounded at the end. The wings are longer, and extend half an inch beyond the tail. The tarsi and toes are somewhat longer and more slender, and there are no feathers on the hind part of the tarsus as in the common species; the claws are much more slender. The bill is black, the tarsi, toes, and claws, dusky. The upper parts are of the same greyish-brown or Mouse-colour as those of the Bank Swallow. The lower are of a very light greyish-brown, gradually paler on the hind parts, the abdomen and lower tail-coverts being white. Length to end of tail, $5\frac{3}{4}$ inches, extent of wings, $12\frac{1}{2}$. If the Bank Swallow of America be the same as ours, it is not improbable that this new Rough-winged Swallow may occur in Britain. It is readily distinguished by drawing the finger along the outer edge of the first quill, when the strong decurved and projecting tips of the filaments become singularly harsh to the touch. A specimen of this Swallow, presented by Mr Audubon, is in my collection, which contains about a thousand species; and in which there is also another obtained in a small parcel from Canada. The Editors of the Annals of Natural History, who "dare scarcely venture an opinion" on Mr Audubon's new species "without having the birds before them," may inspect many of them, if they choose, by calling at No. 1. Wharton Place, notwithstanding the pains they have taken to show that the proprietor of the collection there is an "affected" imitator of Isaac Walton and John James Audubon,—a charge which must appear extremely ludicrous to the American Ornithologist.—W. M'G.

MONSTROSITY IN AN INSECT.—A specimen of *Necrophorus Humator*, or the common Burying Beetle, in possession of the writer, exhibits a somewhat curious monstrosity. It has, in fact, an additional foot, for the anterior leg of the right side has two tarsi, both well formed, and each composed of five pieces as usual. Although almost every cabinet of Insects contains some abnormal specimens, yet this kind of monstrosity does not seem to have been noticed by any one, and must, therefore, be regarded as occurring seldom, if not of extreme rarity, and consequently not altogether devoid of interest to entomologists.—J. M.

NATURAL HISTORY OF THE NEIGHBOURHOOD OF NORWICH.

(*Continued.*)

OWING to the change in the aspect of the country consequent on the improved state of agriculture, the cutting down of woods, but above all, the draining of the fens, the myriads of waterfowl and other birds, which formerly abounded in Norfolk, have nearly all disappeared, retiring to some more unmolested spot to rear their young, though in the fens of Lincolnshire a few are yet to be found. The immense flocks of Ruffs, Plovers, and Sand-pipers, which formerly bred in these marshes, will ere long be extinct, and spoken of as things that have passed away. Though the number of birds about Norwich is on the whole smaller than at Edinburgh, yet the county is abundantly supplied with game, many of the proprietors being noted sportsmen.

Certainly the most interesting British bird is the Great Bustard, which formerly roamed the mid-land counties in small flocks, but now probably the few that remain appear to have made choice of Norfolk as a resting place for the short period that will elapse till the race is extinct. I saw in the possession of a bird-stuffer in Norwich a magnificent specimen which had been shot in the neighbourhood a short time before my arrival.

The Grasshopper Warbler is of rather frequent occurrence, and so perfect is the resemblance between its note and the sound produced by a large Grasshopper, that although I knew of the occurrence of the bird in that part of the country, yet I was deceived by the little creature, and it was some time before I found out the deception, having anticipated the capture of some large, and to me unknown, insect.

I saw a specimen of the great Shrike, *Lanius Excubitor*, not very far from Norwich, and the Red-backed Shrike, *L. Collurio*, appears to be not uncommon, and one may see humble bees impaled on the thorns in the hedges, the work of this bird.

Picus viridis, and *Sitta europæa*, are pretty common, and often enter the gardens in and about the city.

The river Yare and its tributaries, together with the pools and ponds scattered over the country, are tenanted by incredible numbers of fish, and the angler may here pursue with unwonted success his silent avocation. The *Cyprinidæ*, which delight in sluggish rivers and ponds, here supplant the *Salmonidæ* which in Scotland occupy such a prominent feature in the Icthyology of the country,

That fierce monarch of the pool, the Pike, is here abundant, and often attains a large size. When about a foot or so in length, it is often beautifully variegated in a manner not presented by the fish when of larger size, and its colours are seen to much advantage in a bright sun-shine. The Gudgeon, a fish nearly allied to the Pike, is every where common, lying near the bottom where there is mud. Eels are also numerous, and by the process of "bobbing" I have seen a man in a fair way to fill a small fishing coble with them. The larger ones are caught by means of a long spear like a trident, which the fisher thrusts down into the mud.

The Perch is very common, but still more so is the Roach, which may be sometimes seen in shoals of many hundreds. Though a very insipid fish, it is much sought for, especially by juvenile anglers. The Dace is also common, and in my opinion resembles much in its habits the common Trout. It is generally found in clear water, and in shallows, especially where there is a sandy bottom. Besides these mentioned, various other kinds of fish are met with, especially the Bream, which is found in great plenty on some of the broads upon the Yare. Some of the largest are nearly as deep as long, and an angler of my acquaintance insists on their similarity to a pair of bellows.

The neighbourhood of Norwich is peculiarly rich in Entomological treasures, and affords to the Insect-hunter an abundant supply wherewith to gratify his love of collecting.

The splendid *Calosoma Sycophanta* has been repeatedly taken in the neighbourhood, and I believe no where else in Britain. *Carabus Monilis* is very common about gardens, &c. I mention it as being very rare in Scotland. *Odacantha melanura*, a rare insect, is not unfrequently met with in Norfolk. The numerous pools and marshes, as well as the sluggish streams with which the country abounds, give birth to a vast number of species of water beetles, especially *Dytiscidæ*. *Hydrous piceus*, one of our largest coleoptera, is found in the ditches about the city. *Acilius canaliculatus* is common.

A large species of *Prionus* was found last summer in Lord Stafford's garden at Costessay by the gardener, who showed it to me. The very first insect I took in Norfolk was at once the rarest and most valuable of my captures there. It is the Blistering-fly, *Cantharis vesicatoria*, so common in the South of France, and so rare in this country. I found it under an ash-tree. I also got several specimens of *Leptura quadrifasciata*, and *Saperda cylindrica*.

The roses in the hedges and lanes have their blossoms almost covered with a profusion of the *Phyllopertha horticola*; and a species of Cockchaffer, *Melolontha solstitialis*, is extremely abundant, flying about in the evening.

Among the Neuroptera, many species of *Libellulidæ*, or Dragon-flies, are very common, and among others I may mention *Libellula depressa* and *quadrimaculata*.

Dipterous insects are exceedingly plentiful, and I collected upwards of a hundred species. As I am not much conversant with this department of Entomology, I shall not mention any names, with the exception of *Oestrus Equi*.

Of Hymenoptera, I shall allude only to *Sirex Juvencus*, and four species of *Ammophila*.

The Purple Emperor, *Apatura Iris*, I observed in a wood near the city flying at a great height, and meandering among the top branches of a lofty oak. The beautiful, though common, Peacock Butterfly, and the Red Admiral, are both of frequent occurrence. The Skippers or *Hesperidæ* are pretty common about Norwich, on sunny banks and in woodland glades, along with *Melitæa Euphrosyne* and *Argynnis Aglaia*. The *Hesperidæ* taken are four in number.

I also found *Ino Statices*, *Sphinx Ligustri*, and *Imerinthus ocellatus*, the two latter in the larva state. The *I. ligustri*, or Privet Moth, is common in its Caterpillar state, in gardens about Norwich, feeding on the Lilac, *Syringa vulgaris*. I have also seen it on the Asparagus.

The Dobchick, *Podiceps minor*, Waterhen, *Gallinula Chloropus*, together with the Coot, *Fulica atra*, and perhaps two or three others, inhabit those lonely meres—

> Where water-lilies lie afloat,
> Each anchored like a fairy boat
> Amid some fabled elfin lake:

and the Reed Warbler, *Salicaria arundinacea*, together with its fellow the Sedge Warbler, are to be seen wherever there is a piece of water fringed with alders and sedges, and it is indeed pleasant to see them

> flit to and fro
> Along the dark green reedy edge.

The whole family of the *Sylviadæ*, or Warblers, is very abundant about Norwich, and among others the Lesser White-throat, one of which I caught in an Insect net. The Nightingale is said to be occasionally found in a wood belonging to Mrs Martineau near the city, a spot which affords a delightful retreat to many of the smaller birds.

Two species of Sand-piper, the Pectoral and Broad-billed, have been added to the British Fauna of late years from Yarmouth, near Norwich, and not long ago there was procured in the same vicinity a specimen of the Western Duck, now in a state of beautiful preservation in the Norwich Museum, where I saw it.

The above sketch must necessarily be very defective, especially as regards the Botanical and Entomological part, as a residence of many years is required to enable a person to form anything like a complete local fauna, but as such I do not consider it; and in conclusion I may state, that if it has served to give a general idea of the productions of a county in every way so interesting, my object has been attained.—J. M.

BOTANY.

Flora of London.—From a Paper read to the Botanical Society of London, by Mr Daniel Cooper, being "Remarks on the Distribution of Plants in the Vicinity of London," it appears, that of the 104 natural orders, 536 genera, and 1452 species, mentioned in Dr Lindley's Synopsis of the British Flora, there have been found 82 natural orders, 351 genera, 804 species,—a number greater than recorded in any other local Flora of Great Britain, which is attributed to the great diversity of soil in the neighbourhood of the metropolis.

Cotton.—At a meeting of the Asiatic Society on the 5th January, Professor Royle read a letter from the Horticultural Society of Bengal, which accompanied a small bale of Cotton, the growth of India, from American seed, requesting the opinion of competent judges in England as to its staple and price, compared with Indian and American Cottons. It stated, that although the culture of American Cotton had not been established in India on an extensive scale, it was hoped that the natives would be induced, by the steady perseverance of the society, and the example of several influential persons, to spread it extensively over all the districts favourable to the growth of Cotton. Dr Royle also read a letter from Mr Malcolmson, on the Cotton grown near Pæstum, in the kingdom of Naples, a small quantity of the seed of which he had forwarded, with a request that it should be sent to the Horticultural Society of Bengal. It was stated that two kinds of Cotton were cultivated in the kingdom of Naples, the best of which was grown at Castellamare. Dr Royle stated that he had received a note from the Hon. Fox Strangways, containing an extract from a paper of Professor Tenore, on the Cotton spoken of by Mr Malcolmson. It showed that the usual Cotton grown in the kingdom was the *Gossypium herbaccum*; but that the Cotton of Castellamare, which had been cultivated from time immemorial in Calabria, was very probably the same as the American Cotton described in the Orto Romano. For the cultivation of this Cotton in Castellamare, they were indebted to the French, who had brought it from Calabria. Dr Royle observed that it was most probably *Gossypium hirsutum*, or upland Georgia Cotton.

Viola Lactea.—John Nicholson, Esq., of Lincoln, has found a very remarkable state of *Viola lactea* at Boulthane Lane, in the neighbourhood of that city. Except at the base, the stems are quite erect, and many of the specimens from a foot to eighteen inches tall, with the leaves and peduncles very remote from each other, and many of the flowers apetalous. —*Annals of Nat. Hist.*

GEOLOGY.

Earthquakes in Chile. — A number of observations relative to the earthquakes of Chile have been collected by M. Dumoulin, an engineer, and transmitted by him to M. Arago. From them it appears, that, contrary to the general opinion, they do not occur more frequently in one season than another. There can be no doubt as to their elevating the surface. The little river Tabul, which, at 22 or 23 leagues from Talcapuano, was navigable for brigs in 1834, became fordable after the earthquake of 1835, and throughout the neighbourhood the beds of the streams were elevated. In one year, Captain Costa, master of a whaler, found the bottom of the sea, at the Island of St Mary, raised nine feet, and rocks which were not uncovered even at low tide, were entirely out of water, and not even covered by the sea when it was highest.

ON THE MEANS OF PREVENTING THE INJURIOUS EFFECTS OF LIGHTNING. BY M. ARAGO.

In an Essay on Lightning, published in the *Annuaire du Bureau des Longitudes*, and of part of which a translation appears in the last number of the Edinburgh Philosophical Journal, M. Arago gives an account of the facts recorded relative to this meteor, and of the inferences that may be legitimately deduced from them. His section on the dangers arising from lightning, and the means of obviating them, is here abridged.

Is the danger of being struck by lightning so great, that we ought reasonably to attach importance to the means of guarding against it? In the

centre of the large towns of Europe, people, it would appear, are very little exposed. Lichtenberg says that during half a century, five men only were seriously struck with lightning in the town of Gottingen, and of these only three died. In Halle a single individual only had been killed by lightning between 1609 and 1825, or in more than two centuries. In Paris there had not been a single death by lightning notified for a great number of years. But, on the other hand, instances are not wanting of persons having been killed in towns. Thus, on the night between the 26th and 27th of July 1759, a flash of lightning struck the theatre of the town of Feltra. It killed a great number of those present, and more or less wounded all the others. On the 18th of February 1770, a single thunderbolt threw to the ground all the inhabitants of Keverne in Cornwall who were assembled in the parish church. In 1808, lightning fell twice in rapid succession on the inn of the town of Capelle in Breisgau, and killed four persons, and wounded a great many more. On the 20th of March 1784, the lightning struck the theatre at Mantua, killed two and wounded ten of four hundred persons present.

Yet, says M. Arago, no one will doubt me when I affirm that to each of the inhabitants of Paris, or any other city, the danger of being struck with lightning is less than that of being killed in the street by the fall of a workman from a roof, or of a chimney-can, or flower-pot. There is no one, I believe, who, in starting in the morning, dwells upon the idea that a workman, or chimney, or flower-pot, will fall on his head. If, then, fear reasoned, we should not be more uneasy during a thunder-storm which lasted for a whole day. For the acquittal of our understandings, however, it ought to be added, that the vivid and sudden flashes which announce the lightning and its resounding thunders, produce involuntary nervous effects, which the strongest frames cannot always resist. It ought also to be stated, that if the descent of true thunderbolts is but rare, the total number of strokes of lightning of one kind and another throughout the year is, on the contrary, very great; that nothing distinguishes the harmless flashes from the others; and that, however insignificant, in reality, the danger may be, it seems to be increased by the great number of its apparent renewals. This consideration will appear clearer if, returning to our term of comparison, I suppose that at the moment when a workman, or chimney, or flower-pot, was about to fall from a roof or a window, a very loud detonation were to announce the event throughout the whole extent of the city, every one might then conceive, many times a day, that he was precisely in the street where the accident was to happen, and his alarm, without being at all better founded, would become conceivable.

Were we to rely upon general belief, there is much greater danger in villages than in large towns, and theoretical considerations would tend to confirm this opinion; but on this subject facts are wanting. But if few persons perish from thunder-storms in the heart of our towns, the number of houses that are struck and seriously injured is great. During the single night of the 14th and 15th April 1718, the lightning struck twenty-four steeples in the space comprehended between Landernau and St Pol-de-Leon, along the coast of Brittany. On the night of the 25th and 26th of April 1760, the lightning fell three times, in the short interval of twenty minutes, upon the chapel and other buildings of the Abbey of the Notre-Dame-de-Ham. On the morning of the 17th of September 1772, it injured four different buildings in Padua. In December 1773, the lightning over London, nearly at the same moment, struck the steeple of St Michael's, the obelisk in St George's Fields, the New Bridewell, a house in Lambeth, another house near Vauxhall, and a great number of other places very distant from each other, not omitting a Dutch vessel near the Tower. A learned German found in the year 1783, that within the space of thirty-three years, lightning had struck 386 steeples, and had killed 121 ringers. On the 11th of January 1815, during a thunder-storm which embraced the space comprehended between the Northern Ocean and the Rhenish Provinces, the lightning fell upon twelve steeples dispersed over this great extent of country, set fire to many, and greatly injured others.

The necessity there is for protecting buildings against lightning should be measured by the number of those which are annually struck by it, and also by the extent and importance of the damage which it carries in its train. In 1817, lightning set fire to the woodwork which terminated the steeple of St Mark at Venice, and the whole was consumed. This pyramid was rebuilt, but another thunder-storm reduced it to ashes on the 12th of August 1489. On the 20th of May 1711, a single thunderbolt greatly damaged the principal tower of the town of Berne, and devastated nine houses. On the 23d of April 1745, the pyramid of St Mark, which on this occasion was built of stone, received a violent stroke of lightning. On the night of the 25th and 26th April 1760, three strokes of lightning set fire to the church of Notre-Dame of Ham, and completely destroyed it. On the morning of the 18th of August 1769, lightning fell upon the Tower of St Nazaire at Brescia, which stood upon a magazine containing 2,076,000 pounds of gunpowder. This vast mass ignited in a moment, in consequence of which the sixth part of the buildings in that city were overturned, the rest much shaken, and 3000 persons killed. Damage to an immense extent has also been committed on shipping. For example, in fifteen months in 1829 and 1830, five ships of the British Royal Navy were struck in the Mediterranean, and suffered greatly in the rigging. The British ship Resistance, of forty-four guns, and the Lynx, entirely disappeared during a severe thunder-storm, in a convoy of which they formed a part. The Logan of New York, of 420 tons, and L.20,000 value, was entirely consumed, and the Hannibal of Boston shared the same fate in 1824.

The ancients believed that lightning never penetrates farther into the earth than five feet. Hence the majority of caverns were considered by them as secure asylums, and the Emperor Augustus, when a thunder-storm was anticipated, used to retire to a low and vaulted retreat. But no one, even at the present day, knows at what depth there is perfect security from descending lightning, and still less from ascending. In former times also it was generally thought that persons who ensconced themselves in their beds had nothing to fear from lightning; but this opinion is refuted by facts. The Romans considered the skin of the seal a preservative against lightning; the people of the Cevennes collected the cast skins of snakes for the same purpose. But although these may be useless, it appears that the choice of clothing is not altogether a matter of indifference, for numerous instances might be adduced in which it would seem that some individuals appear to have been preserved, and others struck, according as they wore particular garments, manufactured of particular materials; and wax-cloths, and silk and woollen stuffs, have been considered as less permeable to lightning than linen. It even appears that animals may be more or less severely injured in different parts of the body, according to the colour of their hair. Thus in an Ox and a Horse struck by lightning, the hair was destroyed on the white parts only. It has been supposed that some trees, as the laurel, are not liable to be struck by lightning, but this opinion also has been found to be incorrect.

Many persons have been struck in the open country, but the danger is still greater under trees. It has been generally admitted, that lightning always respects glass, but there are facts which disprove this also. Numberless examples show that lightning never strikes individuals, without more particularly attacking any metals which they may have about them. It may therefore be admitted that such objects increase the danger of being struck; and none will deny this conclusion, if the question refers to a large mass of metal, but the opinion is attended with more difficulty in reference to those trifling metallic articles which often form a part of our common dress. On the whole, however, it is preferable during a thunder-storm to have no metal about one. But it may be asked, is it of the slightest consequence to regard the increase of danger which a watch, or buckles, or the money in one's purse, or which the wires, chains, and pins in a lady's dress, produce? To this question no general answer can be given; for every one will regard it through his own prepossessions, and will more or less be determined by the apprehensions with which the meteor inspires him.

(*To be continued.*)

The White Birch.—The beautiful laminæ of the silken bark were used by the ancients as a papyrus for writing tablets before the invention of paper; and, according to Pliny and Plutarch, the works composed by Numa were discovered in the tomb in a legible state four hundred years after his interment. If a hole be bored in the tree when the sap rises in the spring, a sweet liquor distils from it, which, properly fermented, with the addition of sugar, makes a pleasant wine. This process is performed in March, and four or five punctures may be made in a large tree, which has been ascertained to yield nearly its weight of sap, and that without material injury. When the weather changes from warm to cold, Birch trees cease to bleed, and on returning warmth begin again. In Northumberland, fishermen put the bituminous bark into a cleft stick, and, lighting it, use it for fishing in the night, and spear the fish attracted by the light. The portable canoes of the North American Indians are commonly constructed with this material, and on the banks of the lakes of the north of Europe are produced those enormous Birch trees, the bark of a single one of which is sufficient to form a large canoe. The economical uses of the different parts of this tree are almost endless, and to the inhabitants of the northern climes it is invaluable.—*T. B. Hall, in the Naturalist.*

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ZOOLOGY.

OXEN.—BUFFALOES.—BOS BUBALUS.

Although much has recently been done to illustrate what has been called the Bovine tribe of animals, more familiarly known as Oxen, yet much still remains to be effected. The whole group is, by most Naturalists, following Baron Cuvier, classed as one genus, namely, that of *Bos*, and all the associate animals are considered merely as so many species and varieties. This renders the genus very extensive, almost too much so for convenient study; and, besides, so many and such marked differences abound, that it seems expedient to carry the subdivision somewhat further. This, accordingly, has been done by some eminent Zoologists; and hence, in addition to the *ovibus* genus of M. de Blainville, at present composed, we believe, of the Musk-Ox alone, three sub-genera have been proposed, viz. the *Bos* or genuine Oxen, with their innumerable varieties, in almost every part of the world; the *Bison*, including the American Bison, and several other animals; and, thirdly, the *Bubalus* or Buffalo group, some of which are familiar domesticated animals, whilst others are wild. It should here be observed that this term *Wild*, as applied to cattle, is used in widely different senses. As is well known, the domestic Spanish breed was transported to South America soon after its discovery. There they found a most congenial climate and soil, and the race soon exceeded the requirements of the settlers, and ranged in innumerable thousands over the fertile Pampas. These cattle, far removed from the haunts of man, soon became estranged from him, acquired new tastes and habits, and in many respects exhibited a perfect contrast to their still domesticated relatives. Nor is this to be considered as a solitary occurrence. Under such circumstances the cattle are denominated *wild cattle*, and they acquire many claims to the appellation. But though their habits are changed, their nature, it appears, is not; and experience has shown that by a little trouble, and patient management, even the adult animals may, in a few weeks, be afresh brought under the control of man. Very different, however, is it with some other varieties distinguished as wild cattle, such, for example, as the African Buffalo, which it would appear is as little susceptible of subjugation and domestication as the Jaguar or the Tiger. This common appellation, applied in a two-fold sense, together with the fact that certain changes are usually superinduced on the external appearance, greatly augments the difficulty of arriving at positive conclusions concerning the specific distinctions of many of the animals that are subjected to our examination.

Some of the animals in the Buffalo group are still considerably obscured by the circumstance above alluded to, whilst others again have characters so distinctly marked as to enable us at once to classify them with tame animals, or with wild beasts. Upon the whole, the Buffaloes, like the more familiar oxen, are usually of a large stature, low in proportion to their bulk, and supported upon strong and heavy limbs. The head too is large; the forehead, though narrow, is remarkably strong and convex; the chaffron is straight and flat, and terminated by a broad muzzle; the horns are flat, bend laterally, and somewhat backwards, and are not, therefore, very fit for goring; the ears are large, and never erect; the eyes too are large. They have no hump on the shoulders, and the dewlap is small; the back is rather straight, the hide more or less covered with hair, and the tail long and slender. They avoid hills, and prefer the neighbourhood of water; they swim well, and pass the broadest rivers without hesitation. Their gait is commonly heavy and unwieldy; and being principally guided by the sense of smell, they carry their head low. In their combats they butt with their foreheads, try to toss their foe, and crush him under their knees.

Passing by all the more doubtful varieties, we shall now give a short description of the Common Tame Buffalo, and the Wild African one. The *Tame Buffalo* (*Bos bubalus*, Linn.) seems originally to have been a native of Eastern Asia, and its Archipelago. It is well known in China and Cochin-China; it is the great beast of burden in Sumatra and Java, and is the common animal food. In Ceylon, it is found wild as well as tame. It abounds in the Malabar, in Hindostan, and Coromandel; also in Persia and the Crimea. It seems to have been introduced into Europe about the seventh century, and was unknown to the Ancients, whilst it is now common and abundant in Egypt, Greece, Italy, and the other south-eastern parts of Europe. The Lombard historian Warnefried informs us that their first appearance in Italy excited the greatest surprise, whereas they now graze, almost unobserved, in numerous herds. Their milk is excellent; their hide very strong, and their flesh but slightly esteemed. The forehead of this animal is convex and bulging, and higher than broad. In its habits it is almost amphibious, and it is peculiarly fond of the long rank herbage which springs up in moist and undrained countries. Hence its love of the Pontine marshes, where, according to Scaliger, it will be for hours submerged almost to the muzzle,—a habit which, according to M. Quoy, it equally exhibits in the Island of Timor in the Southern Ocean. Its stature varies according to the circumstances of food and climate. The Hungarian and Italian breeds are almost eight and a half feet long, and five feet high at the shoulders; the hair is scattered, loose, and black; and the tail long, terminated by a tuft. The hide is of a purplish black hue; in India, almost naked; in Egypt, sometimes totally without hair; and in the Indian Archipelago, the anterior half is occasionally covered with long hair, and the posterior is bare. It varies also to rufous, and white occurs in some breeds. The Buffalo is at all times of a somewhat doubtful docility. It is possessed of great strength for burden and the plough, two, it is alleged, being equal to four Horses. Their milk, in most warm countries, is indifferent, and their flesh worse. In India, they furnish the milk from which the liquid butter named *Ghee* is prepared. In that country the native herdsmen have very much subdued them, and they ride on their favourites, and spend the nights with them in the midst of jungles and forests without dread of the surrounding wild beasts, which are terrified for them. When driven along, the herds keep close together, so that the driver, if necessary, walks from the back of one to another without much inconvenience. In Italy and Hungary they are managed by means of a ring passed through the cartilage of the nose; in India it is a mere rope. A dwarf variety is described by Pennant, but it seems to be of the same species. The character and formidable powers even of these tame animals is admirably illustrated by the following incident, related by Mr D. Johnson. Two carriers were driving a loaded string of these Buffaloes from Palamow to Chittrah. When within a few miles of the latter place, a Tiger seized the man in the rear. This was seen by a herdsman who was watching his Buffaloes grazing; and he immediately ran to the man's assistance, and cut the Tiger very severely with his sword; upon which it dropped the carrier and attacked the herdsman. The Buffaloes immediately observed this; in their turn they attacked the Tiger, and rescued the herdsman; they tossed it from one to another, and to the best of my recollection killed it. Both the wounded men were brought to me; the carrier recovered, the noble herdsman died.—(*See Griffiths' Cuvier.*)

The *Cape Buffalo* (*Bos Caffer*, Sparman) has sometimes been mistaken

for the preceding species, but is very different both in appearance and disposition. It has never been domesticated nor tamed to labour. Its horns are very remarkable, not for their extraordinary length, but for their roots and base, rugged and uneven, being so unusually broad as to cover the whole forehead, and to impart to it, says Burchell, the appearance of a mass of rock. The expression of the animal is savage and malevolent. Its bulk exceeds that of the Ox; for though its height is not much greater, it is more robust and strongly built. Its muzzle, when young, is but thinly covered with hair, the withers are high, the tail short. This Buffalo is found in abundance, or rather, used to be found, in Southern Africa, and thence stretches into the interior along the east coast as far as has hitherto been explored; and this is its only known locality. All travellers are agreed it is dangerous to intrude incautiously into the haunts of the Buffalo, as it is easily irritated, and rushes with blind fury against the object of offence, bearing all before it. In its native regions it is killed in pitfalls, like many of the larger game, by the natives, but the European makes use of the rifle alone. The following account of a Buffalo hunt is very characteristic of the animal. A party of boors had gone out to hunt a herd of Buffaloes, which were grazing on a piece of marshy ground. As they could not conveniently get within shot of the game without crossing a part of the marsh, which did not afford a safe passage for Horses, they agreed to leave their steeds in charge of their Hottentots, and to advance on foot, thinking that if any of the Buffaloes should turn upon them, it would be easy to escape by retreating across the quagmire, which, though passable for man, would not support the weight of a heavy quadruped. They advanced accordingly, and under covert of the bushes, approached the game with such advantage, that the first volley brought down three of the fattest of the herd, and so severely wounded the great Bull leader, that he dropped on his knees, bellowing furiously. Thinking him mortally wounded, the foremost of the huntsmen issued from the covert, and began reloading his musket as he advanced to give him a finishing shot; but no sooner did the infuriated animal see his foe in front of him, than he sprang up and rushed headlong upon him. The man throwing down his heavy gun, fled towards the quagmire; but the beast was so close upon him, that he despaired of escaping in that direction, and turning suddenly round a clump of copsewood, began to climb an old mimosa tree which stood at the one side of it. The raging beast, however, was too quick for him, bounding forward with a roar, which my informant described as being one of the most frightful sounds he ever heard, he caught the unfortunate man with his horns, just as he had nearly escaped his reach, and tossed him into the air with such force, that the body fell dreadfully mangled into a cleft of the tree. The Buffalo ran round the tree once or twice, apparently looking for the man, until weakened with loss of blood, he again sunk on his knees. The rest of the party recovering from their confusion, then came up and despatched it, though too late to save their comrade, whose body was hanging in the tree quite dead. —(*Pringle's African Sketches*, p. 271.)

AZARA'S ACCOUNT OF THE "LITTLE MARTIN" OF SOUTH AMERICA.

We take the following short extract from M. Walckenaer's Edition of the celebrated and unfortunate Azara's "Voyages" to South America, and hope ere long to introduce the celebrated Naturalist in a more formal manner to the intimate acquaintance of our readers: we are sure it will be to their profit and delight. "I have often observed the *Little Martin* in the woods of Paraguay. It there always flies above the highest trees; and if, in the plain, it sometimes approaches within thirty or forty feet of the ground, it instantly remounts to its accustomed elevation, so that I have never been able to shoot one. It does not migrate, and is very wild. It scarcely lights either on trees or the ground, but ever is skimming along like the Swallow, sometimes, in passing, catching the spiders hanging from the trees. It is not very unlike the Common Martin in appearance, and is sometimes called the *Bat*-Swallow from its resemblance to that creature, both in colour and uncertain flight; it is, however, more rapid in flight than any other of its race. On the wing it executes every kind of movement; sometimes merely fluttering, then spreading wide its wings, now mounting high, and then darting off in a straight line or obliquely. It threads the branches with the greatest address, and is so peculiarly destined for flying, that it sometimes does not repose for an instant the whole day.

"From his able and zealous assistant Noseda, Don Azara obtained the following particulars: I have often pursued these birds, and have never got a shot at one; not only on account of the rapidity of their flight, but also on account of their great shyness, which prevents them from ever coming within gun-shot, and at the same time they are very cunning. Tired of so much useless fatigue, I ordered an Indian to examine if these Martins never perched upon the trees during the hottest part of the day, and also to discover the places where they spent the night. This Indian spent a whole week in the wood, and remarked that these birds never rested during the day, and that they often mounted quite out of sight. At last, however, he discovered a tree of extraordinary dimensions, and very bushy, whence he perceived many Martins sallied forth at break of day. He examined this hole; and having noticed that a current of air issued from it, he concluded that there might be a second opening, which he discovered near the ground. I so placed myself, that I could see birds enter this domicile. They arrived at sunset in small troops (I counted sixty-two), but so rapidly, they could scarcely be distinguished. I heard their wings striking against the margin of the entrance, and which was so small that they could not obtain admittance with extended wing, although the interior was large enough to permit them to pass two abreast. During the night, I closed both openings, and heard the birds flying about in the interior. Next morning the tree was cut down, and forty Martins were taken, the others having escaped. I examined the interior, and found it was only suited for creepers. Some of the birds I put into a cage, and allowed the others to fly about the house. I perceived they could not stand; and that their crooked, nails, very strong and sharp, afford them many facilities in climbing.' After this follows a very minute noting, after his fashion, of specific characters, which, however, we shall not inflict upon our readers.

The Common Fowl a Mouse-eater.—If the following incident is not of frequent occurrence, it may be interesting to your readers. The other day, in going along a road near a farm yard, my attention was arrested by a large flock of Hens pursuing with great avidity a Common Field Mouse. Every now and then, as opportunity offered, they made a peck at it, but this produced little impression upon the object of their pursuit, and it at length succeeded in getting into a crevice, behind a post gate, where its vigilant pursuers stood around anxious to renew the attack. A person who was present drove the Mouse from its retreat, when the Hens again commenced the chase; but as they seemed to make cruel work of it, the Mouse was killed for them, when they all surrounded it, and began to make a meal of its flesh. It was amusing to see the Chickens in this hunt, who, although they joined the party, were evidently quite afraid of their victim, for if it accidentally turned round between their legs, they jumped up and ran away backwards, apparently in a great state of agitation. Mr John Jennings, Jun., of Campsall, to whom the Hens belong, assured me that this was not an uncommon scene, and that the Hens always ate the Mice when they succeeded in killing them.—Edwin Lankerter, *Campsall, Yorkshire, March* 20, 1839.—(*From the Naturalist of April.*)

A Talking Canary.—Such a marvel is now exhibiting in the *Cosmorama Rooms*, in Regent Street, London. The loquacious Canary articulates with singular neatness and fluency, and with as much ease and volubility as he warbles, though his vocabulary, of course, is very limited. In the middle of a snatch of a song, you hear him pronounce these words, —"Sweet pretty little Dicky," "Pretty Queen," "Dicky dear," and other fond appellations bestowed upon him by his Mistress; he also makes a chirping imitation of a bell ringing, and calls "Mary."—(*Spectator.*)

ECCALEOBION, OR THE ARTIFICIAL HATCHING OF CHICKENS.

A curious exhibition under the name of "Eccaleobion" is about to be opened in London. It is a machine heated by steam, and divided into various compartments for the hatching of birds by artificial heat. There is also another machine, in which eggs of every date, from the time of their being laid, until twenty-one days old, are so placed that by means of a strong artificial light they are rendered transparent, so that the spectator can observe the progress of hatching, from the origin of life in the chicken until its complete formation. One side of the large room in which the exhibition is placed is set apart for the chickens when hatched, and bears the appearance of a miniature poultry yard. The contrivance is an improvement on the Egyptian mode of artificial heating in ovens, and is well worth the visit of the Naturalist and the curious.—(*Newspaper paragraph.*)

Shooting Wolves in Russia.—Two or three sportsmen place themselves, well armed, in a sledge, and are driven through the roads and tracks in the woods. As they go along, they pull the ears of a young Pig which they take with them, and make it squeel, while behind the sledge trails a long rope, with a wisp of straw at the end of it. The Wolf hears the Pig squeel, and seeing the bundle of straw dancing along over the snow in the moonlight, makes a dart at it, mistaking it for his prey, and thus presents a fair mark to the guns in the sledge, This sport, like all others, has its vicissitudes; sometimes the disappointment is incurred of a blank night, and sometimes, on the other hand, too much game is started, and the amusement becomes somewhat dangerous. If the sportsmen have not time to pick up the Wolves they kill, the others tear the bodies of their dead companions, and becoming furious, will attack the sledges. A gentleman who lives near this, and who we often see, met with an adventure of this kind sometime ago; for after making his pig squeel for some time in vain, he at length unexpectedly attracted such a troop of Wolves that he was obliged to fly for safety, and trust to his horse's heels, and he was pursued by 12 or 14 of the ravenous creatures even into the village.—(*Venables' Domestic Scenes in Russia.*)

NATURAL PHILOSOPHY.

A FEW ELEMENTARY TRUTHS REGARDING ELECTRICITY.

There is no department of science which, at the present day, is extending its boundaries more rapidly and widely than Electricity, and that to the astonishment and delight of all who are watching its progress. Some particulars regarding it are somewhat obscure and difficult of apprehension, but the great majority are quite level to common capacities, and excite the liveliest attention to their results, at once familiar, and, many of them, beyond conception, remarkable and grand. We hope frequently to bring some of these nuvelties under the attention of our readers; and as we would "begin with the beginning," we shall endeavour on the present occasion to propound some of the elemental truths of the science, in a manner that will be level nearly to every capacity. Our motive will, we are confident, command the forhearance of the more accomplished student.

If a smooth glass tube, or a stick of sealing-wax, be rubbed on the sleeve of the coat, or with a piece of dry flannel, it will be found to have acquired from this friction a new property, which will be exhibited by holding the newly rubbed body over small shreds of paper, or any other light article placed on the table, which will be immediately affected. This property was originally named electricity, from being first observed in amber, the *electron* of the Greeks. About a hundred years ago, it was discovered that there were two different kinds of electricity, occasioned by the different methods in which it was excited. When produced by glass, hair, wool, and many other bodies, it was called vitreous or *positive;* when produced by resinous substances, such as wax, and by amber, silk, &c., it was called resinous or *negative;* and the distinguishing character of these two electricities is, that a body with *positive* electricity repels all bodies with *positive* electricity; and a body with *negative* electricity repels all bodies with *negative* electricity; while, at the same time, each mutually attracts the other. Hence, two electrified silk threads repel each other, as do also two electrified woollen threads, but an electrified silk will attract an electrified woollen thread. Intimately connected with this property of *attraction and repulsion* is another not less interesting, namely, that of exciting light, not unfrequently in the form of sparks, as is often seen in separating certain silk and woollen stockings which have been worn. A variety of suitable instruments, known under the name of electrical machines, were speedily invented for exciting this agent in large quantities, and from these the *electric spark* may be procured in great brilliancy. Ere long, another apparatus was devised, not for exciting the spark, but for retaining and accumulating the electricity when formed. The most celebrated of these is the *Leyden phial*, or electric jar, whose retaining property depends upon the fact that certain substances are non-conductors; for when a body highly electrified is touched with a piece of glass, its peculiar property suffers no change, but if touched with a piece of metal, it is instantly deprived of all its electricity; hence the glass and the metal possess different properties, the former being incapable, and the latter capable, of carrying off electricity; and hence the metal is said to be a *conductor*, and the glass a *non-conductor* of electricity. Many other substances belong to each of these classes; and, accordingly, the electricity of a body, speedily dissipated in the open air, may, by simple contrivances, be long retained in the Leyden jar; and a number of these jars being collected, and combined together in suitable arrangement, form the *electric battery*, in which numerous sparks may be collected, and powerful shocks may be communicated. It is long since the phenomena of this electricity were compared and identified with those exhibited by that of the atmosphere when serene, and when they appear with new splendour in the terrific grandeur of thunder and lightning. Mr Dalebard, at the instigation of Count Buffon, erected near Paris an iron rod upon three long poles, insulated by glass feet and silken threads, whence on the 10th of May 1752 sparks were elicited by many astonished observers with a crackling noise. It was in June of the same year that the celebrated Franklin obtained similar results from his silken kite, by its means drawing the lightning down from the clouds; and immediately afterwards the same effects were every where procured. Under arrangements made with a kite by Romas, flashes of fire a foot long, and three inches wide, were received with a noise audible at the distance of 500 feet, and straws three feet from the conductor were made to dance upon the ground.

At the same time it is not to be forgotten that there are many other excitants of electricity besides friction, of which we shall enumerate a few. One of these is heat (Thermo-electricity), the effects of which are strikingly exhibited in many minerals and salts, and in metallic bodies, as by raising the temperature of one end of a plate of silver, while the other is retained at the temperature of the surrounding air: Another is galvanism (Voltaic electricity); and a third magnetism (Magnetic electricity). On these we must not dwell. But, moreover, even *simple pressure* induces electricity, as when a piece of cork is pressed against a piece of Indian rubber; so does a *change of form*, as in the melting and cooling of resinous bodies; as likewise do the common processes of *evaporation* and *combustion*, and especially that peculiar *chemical action* which occurs in every instance of chemical union and decomposition. From all this it cannot but follow as a necessary consequence that electricity is produced abundantly in the complicated processes which are ever going forward in animated nature. The recent experiments of M. Pouillet have clearly demonstrated this in *vegetation*, and led to the conclusion that a vegetating surface of 100 square yards in extent produces in a day more electricity (negative) than would be sufficient to charge the strongest battery; and electricity resulting from *animal* life, may with all safety be inferred to be still more copious and powerful.

The phenomena of attraction and repulsion, proceeding from bodies in different states of electricity, is admirably exhibited by stockings after they have been worn in a very common fashion, which long ago was well described by Mr Symmer. This gentleman found the electricity most powerful when a silk and worsted stocking had been worn on the same leg; and was best exhibited by putting the hand between the leg and the stockings, and pulling them off together. The one stocking being thus drawn out of the other, they appeared more or less inflated. Mr Symmer's first trials were accidentally made with *black* silk stockings, and he was surprised to find that white ones produced no electricity. Two white silk stockings, or two black ones, when put on the same leg and taken off, gave no electrical indications. When a black and a white stocking were put on the same leg, and at the end of ten minutes taken off, they were so much inflated when pulled asunder, that each of them showed the entire shape of the leg, and at the distance of a foot and a half they rushed to meet each other. With worsted stockings, also, nothing but the combination of black and white produced electricity. When an excited white and black stocking are presented to each other, they attract one another, inclining to each other at the distance of three feet, catching hold of each other within two feet, and at a less distance rushing together with surprising violence, becoming as flat as so many folds of silk when they are joined. But what appears most extraordinary is, that when they are separated, and removed to a sufficient distance from each other, their electricity does not seem to have been in the least impaired by the shock they had in meeting. They are again inflated, again attract and repel, and are ready to rush together as before. When this experiment is performed with two black stockings in one hand, and two white in the other, it exhibits a very curious spectacle; the repulsion of those of the same colour, and the attraction of those of different colours, throws them into an agitation which is not unentertaining, and makes them catch each at that of its opposite colour, at a greater distance than one would expect. When allowed to come together, they all unite in one mass. When separated they resume their former appearance, and admit of the repetition of the experiment as often as you please, till their electricity, gradually wasting, stands in need of being recruited. In the course of his experiments Mr Symmer accidentally threw a stocking out of his hands, and some time afterwards he found it sticking to the paper hangings of the room. They stuck also to the painted pannelling, and often continued for a whole hour suspended upon the hangings.

HYDROGRAPHY.

INTERMITTENT BRINE SPRINGS, NEAR KISSINGEN, IN BAVARIA.

The following is a summary of an able paper read to the Royal Society of Edinburgh by that most indefatigable cultivator of Science, Professor Forbes. We extract it from the published "Proceedings" of the Society. The Memoir is published in full in the April Number of the Edinburgh New Philosophical Journal, and is, of course, still more interesting than the Summary.

The watering-place of Kissingen is situated about 60 English miles east of Frankfort. Long before it was frequented for medical purposes, its salt springs were turned to profitable account. Of these there are several, but the one recently enlarged by boring, known under the name of the *Runde Brunnen*, is much more remarkable than the others, on account of its Copiousness, its Temperature, its discharge of Carbonic Acid Gas in vast quantity, and its extraordinary phenomenon of Intermission.

The spring rises through the new red sandstone, of which the valleys in the neighbourhood of Kissingen are composed, on the left bank of the river Saal, whose course is marked for many miles by the occurrence of mineral springs, and by the discharge of carbonic acid gas. The author supposes its direction to be connected with a line of fissure, and the gas to have its origin in the neighbouring extinct volcanic focus of the Rhongebirge.

The present spring was bored for in 1822, and the 4-inch shaft was carried to a depth of 323 Bavarian feet from the surface; but at the top it expands into a well eight feet in diameter. At a depth of 156 feet, the water ebbed for the first time, and it has done so since with more or less regularity; but what is particularly strange is, that this regularity appears to depend in a not very conceivable way upon the action of the pumps which are employed to raise the brine from the shaft for the purpose of

evaporation. Whilst the pumping machinery works, the ebb and flow of the spring are very regular; when it stops, the regularity nearly ceases. When the spring is in full flow, its appearance is very striking. The great shaft of eight feet in diameter is filled with water, agitated in the most violent manner by the torrents of gas which it discharges. Whilst its turbulence is at a maximum, the gas abruptly ceases to flow, and in a few seconds the surface of the water in the shaft is perfectly tranquil. The water descends, and continues to do so, at first rapidly, then more slowly, until it has subsided nine or ten feet, which occurs in about fifteen minutes. This point has been but just reached, or for a very short time, when a sudden swelling up of the water first, and then of the gas, is observed in the bottom; the shaft fills very slowly,—the flow of water and of gas continue for a long time progressively to increase, not apparently attaining their maximum until the water is at its full height, which requires from thirty to forty minutes after the first return of the stream. It remains in a state of violent agitation for two hours, or somewhat more, when the preceding cycle of phenomena is repeated. This description applies to the ordinary state of the spring, when five or six pumps are in action; if these are fewer the periods are longer; if more, the reverse. This Mr Forbes clearly made out, from registers of observations frequently verified by himself. Of the natural state of the spring, when no pumps work, he had not the same means of satisfying himself. There can be no doubt, however, that, in that case, the periods are longer and more uncertain, those of flow amounting to three, four, or five hours, and of ebb to one, two, or three. Several of the neighbouring springs appear to partake of the intermittent character, especially as regards the carbonic acid gas which they discharge.

The temperature of the spring, many times observed during its various phases, was 65° Fahr. very nearly, and it seemed perfectly stationary. Now, it appears from direct observations, that the mean temperature of the air at Kissingen is about 51°, or 14° lower. The author made many observations upon the temperature of springs in the neighbourhood, both pure and mineral, which he finds to indicate a mean temperature rather lower than the above. Thus the great brine spring, in addition to its other remarkable characteristics, is distinctly a hot spring, or *thermal*. Nor can this be ascribed to the depth of the bore through which it issues, for the spring which rose in the same spot before that bore was made had the same temperature half a century ago, and it did not increase during the operation of boring. A neighbouring spring, also intermittent and saline, called the Schonborn Quelle, rising through a bore 550 feet deep, has a temperature of only 52°.

Lastly, the author gives some account of the products of the spring. Thirty and a half cubic inches of almost pure carbonic acid gas are combined with one pound of water; but this gives no conception of the vast streams of that substance disengaged by the spring during its period of activity, and of which it is difficult to obtain the roughest measurement. It is collected and applied medicinally to different parts of the body, in baths suitably arranged. The water of the spring is discharged at the rate of from thirty-five to forty Bavarian cubic feet per minute during its full action. Its specific gravity is about 1.0157. The solid matter it contains amounts to 22.37 grains in 1000 of water, and consists, according to the analysis of Kastner, of 14 grains chloride of sodium, 3.2 muriate of magnesia, 0.5 muriate of lime, 3.3 sulphate of soda, 1.0 carbonates of magnesia and lime, together with several other substances in small quantity. It closely resembles the composition of sea-water. The brine is concentrated from 2½ to 17 per cent. by spontaneous evaporation in dropping through stacks of black thorn; and in this process at least 180 millions of pounds of water are annually carried off in the invisible form by the atmosphere. The quantity of pure salt obtained from this spring alone amounts to about 28,000 hundred weight (Bavarian Centner) yearly.

REVIEWS.

Tales about Animals.—By Peter Parley. 7th Edition. London, Thomas Tegg and Son. 1838.

Of the books on Natural History, lying upon our table, we take up the one not of highest scientific pretensions, but one which we regard as eminently qualified to promote the great object we have in this Journal, namely, to spread abroad a taste for the science, and to impart amusement to young and old. We allude to the seventh and last edition of Peter Parley's "Tales about Animals." We have not the honour of knowing Mr Peter Parley, nor his publishers; but both highly merit public support, and we have little doubt have received it. This is really a beautiful volume, in 18mo (we believe), extending to between 600 and 700 pages, and containing, we should suppose, not fewer small wood-cuts, generally exceedingly well executed. The arrangement adopted is not that of any of our systematic works, though we should opine Mr Peter is no stranger to these. The able author seems to have aimed at introducing his subjects according to the interest they are found generally to produce, and their economic importance. Thus, the first portion is devoted to the *Felines*, from the Lion down to the Hyæna and Cat; then we have the *Ruminants*—Oxen, Camels, Giraffs, Sheep; the *Solipeds*—the Horse, the Zebra, &c.; then Elephants, Rhinoceroses, Bears, Hares, Rats, Squirrels, Monkeys, Beavers, Hedgehogs, Bats, &c., &c. These occupy nearly half the volume. Then come the *Birds*, arranged on somewhat the same principle, occupying nearly 200 pages. Then we have *Fishes*, from the Whales (about whose station we will not quarrel), the mighty monarchs of the deep, down to the Gold-fish, swimming on the drawing-room table; not forgetting the Sharks, and Electrical Fishes, and the Cod, and Turbot, and Salmon, and Trout to boot. Then come the *Reptilia*—the Insects, occupying about 30 pages; the whole concluded with a very slight notice of the *Annelides*, *Zoophytes*, and *Polypi*—Worms, Star-fish, Corals, &c. The object evidently is to afford combined amusement and information, and that object has been most happily, and we may add elegantly, obtained. Many an interesting fact will be recalled to the recollection of the Naturalist; and for children, and even infants (attracted by the wood-cuts), we know, from observation, it is an entertaining and quieting, as well as quiet companion, beguiling many of what would be otherwise tedious hours. Regarding the seventh edition we learn, that the number of articles is nearly doubled; the quantity of letter-press is more than doubled; and no less than two hundred and twenty wood-cuts are added. Care has also been taken to make the volume accord as much as possible with its title of Tales about Animals, and to give it a tendency to inspire in the minds of the young a spirit of mercy and kindness towards the brute creation. As a specimen, we quote a single page (91-2), in no way superior in interest to the other 640.

The endearing affection of Dogs for their masters is well known. In the year 1827, there was a Dog constantly to be seen in St Bride's Church-yard, Fleet Street, which for two years had refused to leave the place where his master was buried. He did not appear miserable; he evidently recollected their old companionship, and seemed to imagine that their friendship would again be renewed. The inhabitants of the neighbouring houses daily fed the poor creature, and the sexton built him a little kennel. But he would never quit the spot; and there he died.—The stories of attachment between Lions and Dogs are well authenticated; and in several instances the stronger animal has afforded a protection to his trembling victim, which has ripened into friendship. In a well regulated travelling menagerie, belonging to a person named Aikins, there was in the Autumn of 1828 a Spaniel bitch, affording sustenance to a young Tiger that was sick, and not expected to live, and which she evidently tended with affectionate solicitude.—There is a most interesting account of the rescue of a child from death, by one of the St Bernard Dogs, which is sweetly put into verse by Mrs Sigourney.

'Twas night in good St Bernard's hall,
And winter held his sway,
And round their fire the Monks recall
The perils of the day.

Their fruitless search 'mid storm and blast,
Some traveller to befriend;
And with the tale of perils past,
A hymn of praise to blend.

When loud at their monastic gate
The Dog was heard to moan.
Why doth he wander forth so late,
Unguided and alone?

Long on the dreariest Alpine height
Inured to bold pursuit,
His shaggy coat with frost wak-white,
In rushed the lordly brute.

And crouching at his master's feet
A burden strange he laid,
A beauteous babe, with aspect sweet,
Close wrapp'd in silken plaid.

A Professorship, which promises to realize the most important results as regards the advancement of science, is about to be established in the Durham University, namely, a Professorship of Mining, an endowment which has long been a desideratum in this country; and from the peculiarly favourable position of Durham, in the heart of the great mining districts in England, the students will at all times have the advantage of bringing their theoretical instruction to the test of actual experiment.

Edinburgh: Published for the Proprietor, at the Office, No. 13, Hill Street. London: Smith, Elder, and Co., 65, Cornhill. Glasgow and the West of Scotland: John Smith and Son; and John Macleod. Dublin: George Young. Paris: J. B. Bailliere, Rue de l'Ecole de Médecine, No. 13 bis.

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ZOOLOGY.

AZARA'S ACCOUNT OF THE DOGS OF PARAGUAY.

The Dogs found in Paraguay may be conveniently divided into the domestic and tame kinds. The former are of all sizes, and generally of crossed races, no care being taken to preserve them pure. I do not remember to have ever seen either the Common Hound or the Greyhound. Except those which are reared in the houses of the *pueblos*, none of them will eat bread, or aught else than raw flesh, which is every where abundant.

Among the domestic varieties those called *Ovejeros*, or Sheep-Dogs, are particularly deserving of notice, because in this country, where there are no shepherds as in Europe, they act in their place, and take charge of the flocks. These Dogs, early in the morning, drive the flock from the fold, they conduct it to the plain, accompany it the whole day, keep it united; and if they are numerous, they place themselves round about it, defending it from Birds of Prey, from wild Dogs, from Man, and from every other enemy. At sunset they conduct the Sheep back again to the fold, and sleep and pass the night along with them. If any of the very young and feeble Lambs lag behind, they carefully take them up in their mouths, and carry them awhile, returning for them again and again, till none remain. These Dogs are a large race, differing somewhat from the Mastiff. They are very carefully reared and trained by the natives, who remove them as soon as they are whelped, and consign them to the care of the Ewes to suckle them, keeping them constantly in the fold, till they are able to follow the flock to the plain. As while young they have a great tendency to amuse themselves with the Sheep, and seriously to alarm them, a collar of long cross sticks is put upon their necks, which prevents them from freely exercising their limbs. They are abundantly supplied with food and drink every morning; and sometimes a portion of flesh, which, however, is neither mutton nor kid, is tied round their necks that they may eat when inclined. The females are never so reared; and the Dogs are invariably emasculated. These Dogs are held in the highest possible estimation, and are usually sold at from twenty to twenty-five dollars, whilst a Sheep is not worth more than from twopence to fourpence.

Besides this wonderful breed, there is another variety which is scarcely less singular. These can scarcely be said to be of any determinate breed, but proceed from the middling and larger kinds generally. Although the offspring of the domestic Dogs in the country huts, they are ever ready to follow, obey, and show marks of attachment to any passing traveller. This attachment, however, is alike fitful and short-lived; for whenever it strikes their fancy, they, without the slightest reason, at the end of a few days, or even of the first, will part company, and remain at a hut, or even on the plain, there waiting to join the next traveller who appears. In short, these Dogs, which are tolerably abundant, seem perfectly devoid of all partiality for any person, or any dwelling-place.

The *Wild Dogs* are the offspring of the domestic ones, and have acquired their liberty, not, perhaps, so much from choice, or from a wish to leave home, as from necessity; for multiplying prodigiously, they become a nuisance, and from want of food, and mutual strife, they are compelled to sally forth into the plains; others assume this character from being left behind by travellers, overcome by fatigue. As these Wild Dogs cannot subsist upon the smaller kinds of prey, having neither the cunning nor the nocturnal vision of the Fox, they live chiefly upon Calves and Colts. In hunting these they always go in companies, attacking the herds of Cattle and Horses, and scaring them away, so that they may seize and devour the young ones which are left behind. Their common wants, which thus combine them for the purpose of hunting, do not confer upon them the privilege of eating in common; for the most powerful satisfy their appetites first, leaving the remains only of their repasts to the others. As vigour is essentially requisite for this kind of hunting, they are all large and powerful Dogs, very much resembling the kind which Buffon designates the Great Danish Dog; at the same time they have a rougher coat, a longer and sharper muzzle, larger ears, and a thicker neck, than the domestic animals of the same breed. They carry their ears very erect, and their tails usually hang down. They rear their young in caves, which they excavate in the earth, or appropriate those which have been formed by some other animal. They are not subject to hydrophobia, which is unknown in this country. They bark a great deal, and howl at times like the domestic Dog; they usually flee from Man. In colour they are generally reddish-bay, dark chestnut, and black, though some are spotted of all colours. Throughout the whole Pampas of Buenos Ayres they are exceedingly numerous, and their total extinction would be of infinite benefit to the country, on account of the great havoc they make, and the destruction they occasion amongst the Cows and Sheep. The inhabitants go out every now and then to hunt them, some mounted on horseback, killing them with spears, rifles, and the lasso; but this mode of destroying them is very laborious and insufficient withal. A more easy and efficacious method would be to poison them with the fruit called *malaca*, which sprinkled on flesh laid in their way would inevitably kill them.

After his description of these varieties, Azara expresses his astonishment that Buffon should carry to the length it is well known he did, his opinion as to the influence of climate in modifying the peculiarities of one and the same species. The Spanish Naturalist combats at length Buffon's error, and probably goes quite as far on the other side. Instead, however, of at all entering upon this difficult controversy, we shall here subjoin one of the "additional notes" which the translator has appended to the recent English edition of this work, and which throws more light upon the point than most abstract arguments. A male and female of the Hare-Indian Dog (variety *Lagopus*) were brought over by Dr Richardson and Sir John Franklin from the neighbourhood of the Great Bear Lake, and the Mackenzie River in the Arctic regions, of which it is a native, to this country, and being presented to the Zoological Society, was placed in their gardens, where puppies were produced. These Dogs in their native country *never bark*—a characteristic which continued to distinguish the old individuals in their new land of abode; the young, however, we are told, "have learned to imitate the language of their fellows." —*Abridged from Mr Hunter's translation of d'Azara's Nat. Hist. of the Quadrupeds of Paraguay.*

A NEW SPECIES OF ANTELOPE, ÆGOCERUS NIGER.—THE SABLE ANTELOPE.

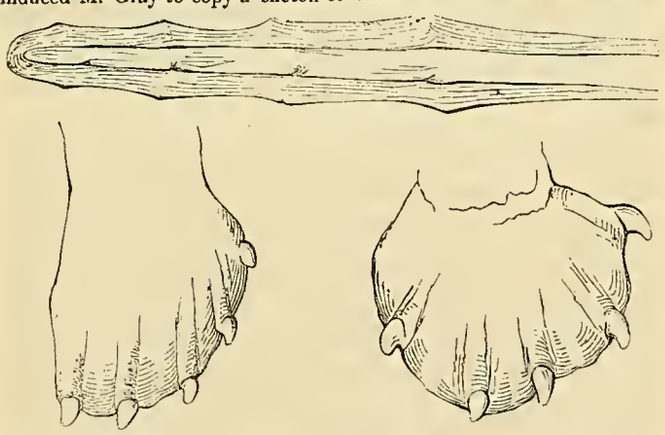
A stuffed specimen of the above very large and beautiful species of Antelope, hitherto unknown, was last year brought to this country from the Cape of Good Hope, and the following communication concerning it, from Captain W. C. Harris, Bombay Engineers, was read to the Zoological Society of London:—"I beg the favour of your presenting to the Zoological Society the accompanying drawing and description of an entirely new and very interesting species of Antelope, which I discovered in the course of an expedition to the interior of Africa, from which I have lately returned. It would appear to belong to the sub-genus *Aigo-*

cerus, and in form, as well as in other respects, bears remote resemblance to the *Aigocerus Equina* (Roan Antelope, or Bastard Gemsbok), with which it has been confounded by many persons imperfectly acquainted with the subject, to whom it has been exhibited. A comparison of the two animals will, however, render the existing difference between them too obvious to demand any observation from me.

"During nearly three months that I hunted over the country lying between the 24th and 26th parallels of S. latitude, within 28° and 30° E. longitude, I only once met with the Antelope in question. On the northern side of the Cashan range of mountains, about a degree and a half south of the tropic of Capricorn, I found a herd, consisting of nine does and two bucks, and followed them till I captured the specimen already referred to. None of the natives of the country were familiar with the appearance of the animal when first interrogated on the subject, although after conferring among themselves, they agreed that it was Kōōkāme (*Oryx Capensis*) the Gemsbok; and, of the many individuals to whom it has been shown, a trader named Robert Scoon, is the only one by whom it has been recognized. He declares that he saw a herd of them some years ago near the very spot I have described, but could not succeed in killing one. It is, doubtless, very rare; and, judging from the formation of the foot, entirely confined to the mountains. The females are somewhat smaller than the males, are provided with shorter and slighter, but similarly shaped horns, and are similarly marked; a deep chestnut-brown, verging upon black, taking the place of the glossy black coat of the male. I did not obtain a female specimen; but while riding down the buck, I had abundant opportunities of narrowly observing them within the distance of a few yards, and am therefore positive as to the correctness of the description here given. The adult male stands four feet six inches high at the shoulder, and is nearly nine feet in extreme length; the horns are twenty-seven inches over the curve. The carcase is robust; withers elevated; neck broad and flat; hoofs black; hair close and smooth; general colour glossy black, with an occasional cast of deep chestnut; a copious standing black mane; belly, buttocks, and inside of thighs, pure white; tail black."

A NEW OTTER FROM DEMERARA.

In a late number of the Magazine of Natural History (New Series, vol. i. p. 589), Mr Gray, of the British Museum, gave a description of what he considered a new genus of Otter from Demerara, which is intermediate between the *Lutra* and *Enhydra*, differing in both from the size of the tail, which is expanded into a slight fin, and in the large size of the feet. In a late communication, Professor Wiegman (Archiv. Part IV. 1838), has expressed a doubt if the genus is distinct from Enhydra, which has induced Mr Gray to copy a sketch of the animal, which Mr Gould took



from the original specimen at the meeting of the British Association at Liverpool. This, Mr Gray thinks, will at once dispel Professor Wiegman's doubts, because the tail is much longer and more slender, the fore feet are much larger, and the hind ones smaller, than the Sea-Otter.—(*Annals of Nat. Hist.* Vol. ii. p. 286).

MYCETES SENICULUS.—ROYAL HOWLER.—(*Red Monkey of Demerara.*)

NOTHING can sound more dreadful than the nocturnal howlings of the great Red Monkey of Demerara. While lying in your hammock, in these gloomy and immeasurable wilds, you hear him howling at intervals, from eleven o'clock at night till daybreak. You would suppose that half the wild beasts of the forest were collecting for the work of carnage. Now, it is the tremendous roar of the Jaguar as he springs on his prey. Now, it changes to his terrible and deep-toned growlings, as he is pressed on all sides by superior force; and now you hear his last dying moan beneath a mortal wound. * * * * His flesh is good food; but when skinned, his appearance is so like that of a young one of our own species, that a delicate stomach might possibly revolt at the idea of putting a knife and fork into it. However, I can affirm, from experience, that after a long and dreary march through these remote forests, the flesh of this Monkey is not to be sneezed at, when boiled in Cayenne pepper, or roasted on a stick over a good fire. A young one tastes not unlike a Kid, and the old ones have somewhat the flavour of the He-Goat.—*Waterton's Wanderings.*

THE HABITS OF THE KING OF THE VULTURES.—(*Sarcorrhamphus Papa.*)

An interesting communication on the King of the Vultures having lately been received from Mr Schomburgh, the scientific and adventurous naturalist, now travelling in Guiana, we shall here give a condensed view of his principal statements. Mr Schomburgh remarks, that this is undoubtedly the most beautiful of the Vulture family. It inhabits South America, and abounds in Guiana. In size, it equals that of a full-grown Turkey-Cock. Its bill is two inches in length, and its depth amounts to almost the same measure. The upper mandible is covered by the cere, is straight near its origin, and hooked near its point; the lower mandible is straight, rounded, and scarcely inflated. The nostrils, within the cere, are lateral, and situate close to the ridge of the upper mandible. The cere is of a bright orange colour, and continues towards the cheeks, where it assumes a bluish hue. The beak is first black, and then red to the point. The ridge of the upper mandible is surmounted by a fleshy caruncle of a red colour, which the bird can elevate at will. From the base of the lower mandible arises a naked skin, of an orange colour, stretching downwards and backwards, and covered with black hairs; as the crown is almost bare, the head might be compared to the tonsure of a monk. The eyes are surrounded with a red skin. Below the nape, the neck is encircled by a ruff of long soft feathers of a deep ash colour, which partly covers the breast. The interscapular regions, the scapular, and coverts, are cream-coloured with a roseate hue; the other wing feathers, the rump, and the tail, are deep black; the breast, belly, and thighs, white. The wings reach nearly to the end of the tail; the second and third quills are the longest; the tail is round at its extremity. The legs are robust; there are three toes before, and one behind; the bent talons are an inch long. The female is somewhat larger than the male, and of a uniform black, with the exception of the feathers under the wing, which are white.

In appearance, the King of the Vultures is one of the most magnificent birds among the feathered tribe; however, its character corresponds little with its showy nature, for it is voracious, unclean, and indolent. Its sense of smell is uncommonly acute, but it is only used to scent carrion; and while the Eagle devours nothing but what his talons and beak have deprived of life, and does not stoop to feed upon carcases, the odour of putrefaction possesses every allurement for the Vulture; and it gorges itself to such a degree, that after a full meal it cannot rise upon its wings for a considerable time. The bird has then a most disagreeable smell, which becomes almost insupportable if it be skinned; at other periods, and when it has been pressed hard for food, it does not emit that unpleasant odour. The females appear to be more numerous than the males; but their number has been much exaggerated, they having been frequently confounded with the Common Carrion Crow (*Cathartes aura*), with which they feed; indeed, the latter may be considered as their scouts; and the common report is well-founded, that the Carrion Crow does not touch the carcases until their majesties and spouses, of which there are frequently several present at the entertainment, have satisfied themselves to repletion: during that time they are silent and covetous spectators, and keep a proper distance, but scarcely have the others done when they fall to with voracious appetite.

Their skill in preparing skeletons is astonishing; they not only scrape off the flesh with the greatest nicety, but likewise the ligaments and periosteum, without subjecting them previously to maceration; indeed, they are perfect masters in their art, and vie with the best anatomical instructor. When we ascended the river Berbice, a Cayman or Alligator was shot and dragged on shore, to leave the Vultures and Carrion Crows the trouble of cleaning the bones. On our return a month after, they had performed the operation to our entire satisfaction, and we concluded, from the whiteness and dryness of the bones, that a fortnight might have elapsed since they finished. At a later period I ascertained the fact that the Carrion Crows do not touch the carcase until the Vultures have satisfied themselves. I was at a Mr Sander's on the upper river Berbice; on the opposite shore the carcase of a cow which had died the previous day had attracted a numerous assembly of Carrion Crows; they were perched on the dry branches of some trees that commanded a view of the carcase; there they sat silent and mournful, their attitude not upright but stooping, their wings partly hanging down. There they remained the whole morning; none touched the carcase, nor did they change their position. In the afternoon our attention was attracted by the cry of the Negroes "They come, they come!" We went out, and looking towards the opposite shore, we observed four male Vultures and several females flying in circles over the space where the Cow was lying; the circles became narrower and narrower, and at last they lighted upon some trees in the neighbourhood; this circumstance was hailed by the sable crew, they extended their wings, and

became unruly, but the former silence was soon restored. The Vultures did not immediately attack the dead animal; they drew their neck from the ruff, and remained ogling it for some time. "Tem be the judghes, and tem sit in court now to hold judshement o'er em," observed the Negroes who were standing around us; and the remark was so adapted and striking that we could not help smiling at it. After half an hour had elapsed one of the male Vultures commenced the entertainment, and his example was soon followed by the others. Towards evening the Vultures had satisfied their appetite, and the Carrion Crows commenced their feast; where harmony, however, did not appear to be presiding, and scuffles and quarrels took place when it concerned a favourite morsel.

These beautiful birds soar uncommonly high, and possess great powers of flight. Like the Eagles they hover over one and the same spot for a length of time, poise their wings, and please themselves in aërial evolutions, until their sharp scent and sight combine to show them the direction where their appetite may be satisfied, when they descend in gyratory motions. They do not decline animal food of any description, provided it does not possess life, as they are not known to kill. They are cowardly birds, and do not oppose, in single combat, one animal which offers resistance. They rise with heavy wings and a great noise. I have not been able to ascertain where they build their nests; very likely in the most retired places. The young males are in their first year black; they become black and white spotted during the second, and are only in full plumage during the third year. They are easily tamed if taken young. Mr Glen in Demerara had a female bird, which was so tame that it would lay itself before its master's feet. I saw a full-grown male bird which was brought from Surinam to Demerara; it was perfectly tame, and was ultimately sold to the master of an English merchantman for the enormous price of twenty pounds.—(*Annals of Natural History for December* 1838.)

On the Nature of Sponge.—A series of papers have lately been read to the Linnæan and Royal Societies, by John Hogg, Esq., upon the *Spongilla fluviatilis*, to which we would more earnestly invite attention, as it must be known to many of our readers that Naturalists are not agreed as to the true nature and history of Sponge; some supposing it belongs to the animal kingdom, and others to the vegetable. These opposite conclusions are the result not of mere theories, but of the most careful microscopic observation, demonstrating the great difficulty of the subject, and the still remaining imperfections of science, which, however, are the less to be regretted as they stimulate the lover of truth to renewed investigation. Mr Hogg is an advocate for the vegetable nature of River Sponge, and he supplies additional observations in confirmation of his views, derived from a more accurate observation of the seed-like bodies, which are found adhering to the walls of the cells or cavities of the Sponge, and also frequently free, and endowed with the faculty of locomotion; and which have been regarded by some authors as the Ova of *Spongilla*, and by others as those of the *Plumatella*. Mr Hogg has determined the identity of these bodies, having succeeded in raising young *Spongilla* from both kinds; and he has also ascertained that they are destitute of cilia, being merely studded with minute granular papillæ. The motions of the unattached bodies resemble those observed by Unger in the Sporules of *Ectospora Clavata*, and Mr Hogg considers the currents to be due to the same causes which affect the circulation of the fluids in the cells of vegetables.

Megatherium.—In a memoir presented to the French Academy of Sciences, M. de Blainville states, that neither the head, the shoulder, the limbs, the feet, nor the dentition of the Megatherium, in any manner resembles those of the Sloth, to which tribe the late Baron Cuvier referred this gigantic animal. M. de Blainville places it among the Armadilloes, where he conceives it ought to form a particular division, because it probably had four toes in front, and five behind; and the teeth are not only tetragonal, contrary to those of the Armadillo tribe, but there are only four in each jaw, which is also an anomaly.

BOTANY.

Caoutchouc or Indian Rubber.—The increasingly important substance Caoutchouc is a widely disseminated constituent of vegetable fluids. It has hitherto been found only in plants with milky juice, although its presence in all these fluids remains to be proved. The presence of Caoutchouc in silk has been attributed to the nature of the fluids of the plants on which the caterpillars feed; but this, though applicable to the mulberry plants, can scarcely hold good with the various species of *Tetranthera*, on which the Moonga feeds, or with the Castor-oil plant, the chief food of the Eria, which in Assam does not appear to yield milk. Milky juice is usually characteristic of certain families, but often not; its presence is frequently of importance, as it affords valuable indications of affinity. It is remarkable that it is almost unknown in the grand division of Monocotyledonous plants. The families in which its presence may be said to be universal are *Apocquea*, *Asclepiadea*, *Campanulacea*, *Sobeliacea*, and the great division of *Compositæ*, *Chicoracea*, of which the lettuce is a familiar example. It is of common occurrence in *Euphorbiacea*, and *Tulicea*, which orders may be looked upon as the grand sources of Caoutchouc. Thus, in addition to the East Indian plants, the American Caoutchouc is supposed to be produced by *Cecropia-peltata*, which belongs to *Urticea*; and the ule tree of Papantla, from which the Caoutchouc of that country is obtained, is supposed to belong to the same orders. It must, however, be observed that Baron Humboldt objects to the supposition of *Cecropia peltata* yielding the American Caoutchouc, as its juice inspissates with difficulty. The order *Euphorbiacea* would likewise appear to supply a large quantity. Dr Lindley informs us that true Caoutchouc is furnished by *Siphonia elastica*, *Hevia quiancusis* of Aublet, a Surinam and Brazilian tree; and it is from a tree of this order that a substance resembling Caoutchouc is procured in Sierra Leone. Some *Apoqueæ* are also reported to produce good Caoutchouc; thus *Aricola elastica*, produces the Caoutchouc of Sumatra; and it is from this plant that Caoutchouc has been produced in Penang and exported to England. Roxburgh says that that produced from *Willughbeia edulis*, an Indian plant, is of indifferent quality, a criticism which will not be passed on that obtained from *Nerium grandiflorum* of Roxburgh. It is probably equally abundant in *Asclepiadea*; one plant of which order, *Cynanchum albiflorum*, has been stated to yield it of excellant quality in Penang.

Caoutchouc, we need scarcely add, is that substance now so much employed in the manufacture of waterproof cloths, and of tubes, cylinders, &c. most useful in the arts. It owes much of its value to its being insoluble in water, spirits, acids, alkalis, and in most liquids; its appropriate solvents are Ether, which, however, requires to be free from all admixture, and volatile oils, the cheapest of which is the volatile oil of Coal-tar, now known by the name of *Naphtha*. When pure, in its native state, it is white; and becomes of a brownish and blackish colour from the juice, which is generally collected in a mould, being subsequently dried in the sun's rays, and then exposed to smoke; successive layers being put on till it is of the requisite thickness. In all the different methods of collecting it the extraneous soluble matters contained in the sap are apt to be mixed up with the Caoutchouc, and continue incorporated with it when solidified; hence, its strength and solidity, and, of course, its value, are considerably diminished. In some kinds these impurities are more considerable than in others, and the imperfect adhesion between the layers which compose the Indian-rubber bottles are attributable to a very thin layer of these impurities. Mr E. Solly lately read a paper on these points to the Asiatic Society, detailing experiments he himself had made, and considering how far improvements could be effected in its preparation.—(*See Journal of the Asiatic Society of Bengal, Mr Griffith's Report; Dr Lindley's Works on Botany, &c.*)

The Tea Plant.—The vast economic and commercial importance of Tea, and the combined selfishness and arrogance which pervades the Celestial Empire, upon which we have hitherto been dependent for the supply of that necessary commodity, confers the highest interest upon every effort which is being made for the more extended cultivation of this invaluable plant. In the year 1812 it was first introduced into the Brazils. Its success there has been very promising, and more especially since 1825 the progress made has been rapid, so that the growers are already able to supply a large portion of the Tea required for the home market. It is extensively cultivated in Ouro-Preto, and in the province of St Paul; is extending into the province of Minas, and has been attempted on a large scale in the Botanic Garden at Rio de Janeiro. At a much more recent date the Tea plant having been observed to be indigenous in Assam, that province of our Eastern empire which on the north-east most approximates to China, public attention was excited to its careful cultivation and manufacture. An experimental company has been formed for the furtherance of this object, which has obtained the encouragement of the Directors in Leadenhall Street, of the Board of Control, together with the approbation of the Board of Trade. It was through the agency of these bodies, that the chests already received in this country, samples of which afforded such peculiar satisfaction, have been widely distributed throughout the kingdom. Our active and intelligent neighbours, the French, seem determined not to be behind hand in deriving benefit from this source. Not many months ago the French government despatched M. Guillemin, one of the Curators of the *Jardin des Plants*, to the Brazils, for the purpose of studying the culture of the Tea plant, the methods of preparing the Tea for market, and of collecting seeds and plants, that an attempt may be made to introduce its culture into France. M. Guillemin arrived at Rio in October last, and has been most kindly received by the authorities and naturalists of Brazil, who have shown every inclination to promote his wishes. M. G., after examining into all the details, is sanguine in his hopes of success; and the mere attempt, made in our day, to introduce both Tea and Sugar as home-grown

commodities into France, manifests the ingenious enterprise of this active people. The attempts now making in India are of the last importance to the British dominions. It is opening up a new channel of trade, creating fresh demands on our productive industry, and establishing additional markets in a quarter from whence our wrought goods will ultimately penetrate into the very heart of China itself. It will also prove in many ways conducive to the benefit of India, and the melioration of its vast native population. It will introduce into a neglected portion of the country British capital and enterprise, and a class of persons who will develop its latent resources, and, in all probability, civilize its people. It will place at the disposal of the Indian government a portion of the revenue which now accrues to the Chinese government on the shipment of Tea from Canton, and which England will not object to pay, provided it be applied to the remission of the land revenue, and those other burdens with which the natives of India are so sorely oppressed. And as the climate, where cleared, is declared to be congenial to the European constitution, it will supply that *desideratum* long anxiously looked for—a site for colonization unincumbered by population, and the establishment of *Sanataria* for our pensioned English soldier, with employment suited to his health, strength, and capacity, the cultivation of Tea being no more laborious than the care of gooseberry bushes, and entirely conducted in the shade. Additional information regarding the prospects of the cultivation in India will be found in the Oriental Herald.

REVIEWS.

The Natural History of the Quadrupeds of Paraguay and the River La Plata ; from the Spanish of Don Felix de Azara, &c. By R. W. Perceval Hunter, Esq., F. G. S., Z. S., &c. A. & C. Black, Edinburgh. Longman, &c., London. 1838, 8vo. Vol. I.

We need scarcely commence our short notice of this English edition of Azara's work on the Quadrupeds of Paraguay with the statement that it was greatly desiderated. The French translation of St Mery, published nearly half a century ago, was prepared from an imperfect manuscript which the author meant should never see the light. Of the original work in Spanish, published at Madrid in the year 1802. two of the five volumes being devoted to quadrupeds, and the remaining three to birds, it is impossible to procure a copy out of Spain, and even in that country it is not often met with, while St Mery's work has long been out of print. The best known production of the celebrated Spanish Naturalist, his "*Voyages dans L'Amerique Meridionale*, &c.," published under the superintendence of the well-known naturalist Walckenaer, contains only a very short abridgment of the treatise now before us ; and is principally occupied by his geographical and political descriptions of Paraguay and the neighbouring provinces, of their conquest, and their indigenous inhabitants ; the ornithological portion having obtained full consideration, and even amplification, from the pen of the celebrated Sonnini of Monancour. Except then for this translation, Azara's work on quadrupeds would be unprocurable and unknown, and hence our obligations to the spirited translator are too conspicuous to require remark. This is not the place to enter into the particulars of Azara's eventful life. The short dedication of this work, however, throws so much light upon his history as a Naturalist, upon his peculiar advantages, and his drawbacks, that we quote it. It is addressed to his brother, Don Joseph Nicolas de Azara.—"Dear Nicolas—We had scarcely seen the light, when our parents separated us; nor have we, during the whole course of our lives, ever met, or had any communication with each other, save in Barcelona, for the short space of two days, and that by accident. Equally separated has been our path through life. You have lived in the great world ; and by the important offices you have filled, your talents, deeds, and virtues, have become famous in Spain and out of it. Whilst I, without obtaining any ostensible employment, and without any opportunity of making myself known to you or any other person, have spent the best twenty years of my life in one of the remotest corners of the earth, forgotten even by my friends, without books or rational intercourse, travelling continually through deserts, and immense and frightful woods, holding communication only with the birds and the wild beasts. Of these, then, have I written the history, which I send and dedicate to you, in order that you may by it know me, or at least become acquainted with the nature of my labours."

Azara's Notes, as he modestly styles this particular treatise, contain an account of seventy-seven species of native Mammalia, and seven species of Reptiles, with numerous details respecting the European animals, introduced by the Spanish conquerors, which are now found in numerous herds in a wild state on the Pampas of Buenos Ayres and Paraguay. The volume now before us, and one only is yet published, in arrangement differs somewhat from the original, and contains first Azara's account of the imported European animals, and then of nearly thirty of the native Mammalia, accompanied with numerous notes. Azara's memoir upon each animal is divided into three parts ; 1st, An account, from close and continued observation, of its habits, including its habitat, food, number of its young, disposition, habits in confinement, enemies, and its domestic uses, if any ; 2d, A minute and detailed description of its external character, from the living animals, or from specimens recently killed ; and, 3dly, A severe critical examination of the account given by Buffon, and other previous authors. This last part forms by far the largest portion of the whole, and, though frequently too circumstantial and prolix, yet, in Mr Hunter's estimation, "it furnishes much valuable information which could not have been altered or curtailed without considerable loss to the value of the work." Of the non-indigenous animals we have an account of the Wild Horse, the Ass, Mule, Wild Cows, Sheep, Goats, and Wild Dogs : of the native Quadrupeds described, we have the Tapir, two kinds of Peccaries, four species of Deer, two species of Ant-Eaters, nine of Felinæ, including two species of Jaguars and the Puma, two kinds of Weazel, the Skunk, the Red Wolf, the Grey Fox, the Racoon, the Coatimondi, and the South American Otter. On a previous page we have given a short analysis of the information supplied respecting the South American Dogs. Of his account of the native animals we shall quote a single paragraph, which will afford a fair specimen of the translator's style : it shall be respecting the Otter. "I have not met with any one acquainted with the Guaranese name of this animal, known vulgarly as the River Wolf ; but, as it is not a Wolf, I have called it *nutria*, or Otter, for it belongs to the same family as the European Otter, although of a different species. It inhabits the lakes, rivers, and rivulets of Paraguay : I believe it does not enter salt water, and that its geographical range does not extend beyond the river La Plata : It lives in troops, which, sometimes ascending to the surface of the water, raise their heads about the boats, and bark like hoarse dogs, using angry gesticulations, and menacing snappings, although they never harm voyagers or swimmers. Each family appears to possess a separate domain. It is truly an amphibious animal, for it spends almost as much time in water as upon the land, and both elements are equally suited to its nature and habits : it sometimes rises from the bottom with a fish in its mouth, to eat it on land, and rears its young in holes, which it excavates on the banks. The Payaguas Indians, who are continually sailing up and down the river Paraguay, and are better acquainted with this animal than others, tell me that it brings forth two at a birth, covered with hair, and that many females bring forth and rear their young at the same time, and in the same place, their usual resort throughout the year. They do not eat its flesh, considering it very bad. This Otter smells differently from the marine animal ; it moves slowly, dragging, as it were, its belly and muzzle along the ground ; and, although it can run, it does so with little agility. Its movements in biting and walking are much more tardy than those of the Dog ; so that, even when irritated, we can seize it by the back. and carry it off without its screaming, or making any sensible opposition."—(p. 326.)

The Notes are numerous, taken from the writings of the most able and popular Naturalists, as Cuvier, Desmarest, Pennant, Horsfield, Richardson, Swainson, Bennett, Audubon, Sir F. Head, and others, and unquestionably greatly enliven and illustrate the volume, though in a few instances they are more piquant than relevant. Of the faithfulness of the translation we entertain no doubt ; whilst the style partakes somewhat of the peculiarities of a foreign idiom, owing to what we regard a too great scrupulosity of the translator to supply every minute turn of the author's thoughts ; it is, however, generally quite clear and racy. This volume is illustrated by a beautiful copy, by Gardner, of Azara's valuable map of what were the Spanish South American Provinces, supplied at great expense. Upon the whole, we trust that Naturalists will so far appreciate Mr Hunter's praise-worthy zeal and liberality, as to encourage him to complete the work he has so meritoriously begun, and thus to bring within the sphere of all a store of useful knowledge, which has hitherto been very much confined to the examination of a few.

MISCELLANIES.

Scotch Sugar.—Beet-root Sugar.—"*The Aberdeen Constitutional*" states, that one of its correspondents has sent a sample of sugar, made at Macduff, from Beet-root grown in Banffshire. It is retailed in London at 8d. a pound. The quantity is about a ton ; but the manufacturer says that next season he will be able to supply any quantity. The Sugar is well granulated, very dry, free from smell, particularly white, and tastes like sugarcandy.

New Parchment.—M. Pelouze states, that if a piece of paper, or of cotton or linen, be plunged into aquafortis (nitric-acid), at the density of 1. 5, and left in it sufficient time to be saturated, say two or three minutes, a species of parchment will be produced, which is impervious to damp, and extremely combustible.

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DESCRIPTION OF THE COLLECTION

FORMING FOR THE

EDINBURGH ZOOLOGICAL GARDENS ASSOCIATION.

(Contributed by a Member.)

(I. & II.) DROMÆUS NOVÆ HOLLANDIÆ.

NEW HOLLAND EMU.

Classification.—Order Rasores. Family Struthionidæ. Genera Struthio, Rhea, Casuarius, Dromæus, Apteryx.

Synonyms and Figures.—New Holland Cassowary. White's Journal of a Voyage to New South Wales, pl. 1 (very indifferent), copied in Shaw's Naturalist's Miscellany, pl. 99. Casuarius Novæ Hollandiæ, Latham, Ind. Orn. 665. Casoar de la Nouvelle Hollande, Péron, Voy. aux Terres Australes, pl. 66 (indifferent). Dromaius Ater, L'Emu noir, Vieillot, Galérie des Ois, pl. 226 (tolerable). The Emeu Dromaius Novæ Hollandiæ, Gardens and Menagerie of the Zoological Society delineated, Vol. II. p. 193 (wood-cut excellent).

Description.—The Bill straight, depressed on the sides, slightly keeled above, rounded at the point, dull black. The Nostrils large, opening upwards, placed in the middle of the bill. The Head feathered, without a bony crest. The Throat blueish, naked, and without wattles. The Feathers brown mottled with grey above, dirty grey beneath, the barbs loose and separate, resembling hair at a distance; feathers arising in pairs from the same shaft. The Wings very short. No Quill Feathers either in the wings or tail. The Legs powerful, fleshy, and feathered to the joint. The Tarsus or Shank blackish, naked, deeply indented. Three Toes nearly of equal length, directed forwards, and furnished with blunt nails.

The Male is above five feet in height; the Female resembles the male, but is somewhat less. The Eggs, from six to thirteen in number, are large, of a rich dark green. The Young are greyish-white, with two broad black stripes along the back, and two on each side continuing to the neck; a narrow middle line of white between each; the head marked with irregular spots, dark bands along the fore-part of the neck and breast, a broad band on each side across the thighs.

History.—The Emu, peculiar to New Holland and the adjacent islands, was first described in the year 1789, in Governor Phillip's Voyage to Botany Bay. It was then very abundant in the neighbourhood of that colony, but has now been driven by the settlers into the remote plains of the interior. The skin is particularly valued for its oil, a full-grown bird yielding six or seven quarts of a beautiful bright colour. This oil produces no disagreeable smell, and is excellent for burning, and as a liniment for sprains or bruises in the Cattle. The flesh is eaten by Europeans; the rump part is said to be delicate like fowl, the legs coarse like beef, but still tender. The natives regard the flesh with its oily skin as a highly delicate treat, and the *fibula* bone of the leg is occasionally passed through the cartilage of the nostril as an ornament.

The remarkable peculiarity in the structure of its feathers deserves a more particular notice. Two slender shafts, extremely flaccid, arise from one small quill. The feather resembles a dried plant in texture, is soft, close, and flossy at the base, but widens gradually, and grows harder towards the tip. Its colour is brownish-grey, becoming gradually white towards the quill. Incapable alike of resisting water or containing air, it seems to be adapted only for a bird which depends for safety on its swiftness of foot.

The young of quadrupeds are generally covered with a light or spotted livery, which gradually assumes the sombre tints of the adult, while the female most commonly resembles the male. In Birds, on the contrary, we find the females and young with plumage of sombre hue, while the young males gradually acquire the brilliant tints peculiar to the adult male. In these respects, the Emus bear resemblance to the mammiferous animals. They crop grass like an herbivorous quadruped, are swift of foot, and possess great keenness of vision. They are hunted most readily early in the morning: after a sharp run the Dogs overtake them, when they are easily thrown down and destroyed. The kick of the Emu, like that of the Ostrich, is very powerful, sufficient to break a Man's leg. The Dogs, trained to this kind of coursing, avoid these dangerous kicks by running abreast of the game, and springing at its neck.

The Emu, originally savage, soon becomes domesticated. When resting, it squats down like a Hen, its neck curved like an S, and the head reposing on the naked neck. Frequently it stands in a grotesque attitude upon the tarsi and feet jointly.

The nest of the wild birds is formed in the following manner:—A retired situation in a scrub among the hills is scraped, similar to those formed by the Common Hen; sticks and leaves are laid round the cleared place, and the eggs are deposited without regard to regularity. These eggs are usually from nine to thirteen in number, and the male assists the female in the duties of incubation. Immense quantities of the eggs are devoured by the natives during the breeding season. The Emu has often bred in captivity, but the eggs seldom exceed seven in number.—(*See Bennett's Wanderings in New South Wales, &c.*)

Anatomy.—The Emu, in respect to its internal organs, bears a great analogy to the Ostrich. A large membranous pouch, formed by the dilatation of the œsophagus, opens into a very small gizzard,—so small that White asserted that the Emu had no gizzard. The liver is likewise very small, the gall-bladder very large. The crop is usually filled with several pounds of grass, flowers, seeds, and berries. The intestinal canal is at least six yards long, very wide, and of a very cylindrical shape. The windpipe is very long, and opens into a large muscular pouch, the use of which is doubtful. We shall here, however, supply the words of its able discoverer. "It may here be stated, that in this bird the rings of the windpipe are complete, from their commencement at the upper larynx to about the fifty-second, when the next rings suddenly open by a wide aperture into a strong muscular bag, as large as the human head, closely attached to the sides of the trachea, and expanded rings. This bag is situated in the neck, immediately above the bone called the merry-thought; it was seen by me in the female, though it is probable that the male also possesses it. It is quite peculiar to the bird, no such appendage having been ever seen attached to the trachea of any of the feathered creation; nor do I know of any thing analogous to it in any other animal, excepting in the Cameleon, to the upper portion of whose trachea there is appended a comparatively large membranous bag." Dr Knox believes that this extraordinary bag performs the important function of enabling the bird to swim, and to preserve life amidst the extensive marshes composing central New Holland, and to escape also from those sudden inundations to

which Australasia is generally exposed. The muscular pouch may also be useful to the bird in running. The cloaca appears to serve only as a urinary reservoir, the rectum opening into it by a comparatively small orifice. The bones of the carpus are wanting in the Emu, and the metacarpus is immediately supported by the bones of the fore-arm.—(*See Dr Knox's Obs. on the New Holland Cassowary, Edin. Phil. Jour.* p. 132, Vol. X. 1824.

Note.—The individuals (male and female) in the Collection of the Association were presented by John S. Lyon, Esq., of Kirkmichael.

(*To be continued.*)

FERÆ NATURÆ.—WILD ANIMALS WHICH INHABIT SOUTHERN AFRICA.

HAVING taken occasion to peruse Captain W. C. Harris' "Narrative of an Expedition into Southern Africa during the years 1836–7," we believe we cannot more appropriately gratify our readers than by supplying them with some extracts from this interesting source. Captain H. penetrated within the tropics, along with a companion, chiefly through the favour of the native king Moselekatsé, whom he propitiated with presents. His relish for the delights of the chase on a great scale has seldom or ever been exceeded, and the field he obtained for its gratification was all but unbounded; even his fellow-men in all their social interests and moral phases receiving a very secondary consideration. The book is very amusing, and throughout written in the style of a genuine *Nimrod;* its motto, from Mr Pringle's well known work, seems as if it had been written expressly for this adventure.

Afar in the Desert I love to ride
With the silent Bush-boy alone by my side;
Away—away from the dwellings of men
By the Antelope's haunt, and the Buffalo's glen;
By valleys remote where the Ourebi plays,
Where the Gnoo, the Sassayby, and Hartebeest graze;
And the Eland and Gemsbok unhunted recline,
By the skirts of grey forests o'erhung with wild vine;
Where the Elephant browses at peace in his wood,
And the River-Horse gambols unscared in the flood,
And the mighty Rhinoceros wallows at will
In the pool where the Wild-Ass is drinking his fill;
Where the Zebra wantonly tosses his mane,
As he scours with his troop o'er the desolate plain;
And the stately Koodoo exultingly bounds,
Undisturbed by the bay of the hunter's hounds;
Where the timorous Quagga's wild whistling neigh
Is heard by the fountain at fall of day;
And the fleet-footed Ostrich over the waste,
Speeds like a horseman who travels in haste,
Hying away to the home of her rest,
Where she and her mate have scooped their nest,
Far hid from the pitiless plunderer's view,
In the pathless wilds of the parched Karroo.

The following, according to Captain Harris, is a catalogue of the Feræ Naturæ which inhabit Southern Africa; it appears to embrace the *Game* or larger Quadrupeds only.

1. Felis Leo. The Lion. Inhabits variously; usually found amongst reeds in open plains. Gregarious, and very common.
2. Felis Leopardus. The Leopard. Inhabits thick coverts. Monogamous or solitary.
3. Felis jubata. The Hunting Leopard. Inhabits open places. Not common.
4. Hyæna crocuta. The Spotted Hyæna. Very common everywhere.
5. Hyæna fusca. The Fuscous Hyæna. Less abundant than the preceding, but common.
6. Hyæna venatica. The Wild Dog. Hunts in large organised packs.
7. Elephas Africanus. The African Elephant. Solitary or gregarious in large troops. Common in the extensive plains and forests of the interior.
8. Hippopotamus amphibius. The Hippopotamus. Amphibious. Inhabits the rivers and lakes of the interior.
9. Sus larvatus. The Wild Hog. Gregarious. Inhabits the plains and forests.
10. Phacochœrus Africanus. The African Boar. Gregarious. Inhabits the plains and forests.
11. Rhinoceros Africanus. The African Rhinoceros. Very common in the interior.
12. Rhinoceros simus. The White Rhinoceros. Very common in the interior after passing Kurrichane.
13. Equus Zebra. The Zebra. Gregarious, found within the Cape colony. Inhabits the mountainous regions only.
14. Equus Burchellii. Burchell's Zebra. Inhabits the plains of the interior beyond the Gareep in immense herds.
15. Equus Quagga. The Quagga. Still found within the Cape colony. Inhabits the open plains south of the Vaal River in immense herds.
16. Camelopardalis Giraffa. The Giraffe. Gregarious in small troops. Inhabits the great plains of the interior.
17. Bubulus Caffer. The Cape Buffalo. Still found within the colony. Inhabits the plains and forests of the interior in large herds.
18. Catoblepas Gnoo. The Gnoo. Very gregarious. Abundant on the plains south of the Vaal River.
19. Catoblepas Gorgon. The Brinded Gnoo. Gregarious. Inhabits the plains beyond the Orange River in vast herds.
20. Boselaphus Oreas. The Impoofo. Gregarious. Inhabits the open plains of the interior in vast herds.
21. Strepsiceros Koodoo. The Koodoo. Gregarious. Still found within the colony. Inhabits thickets and wooded hills.
22. Acronotus Caama. The Caama. Inhabits the plains of the interior beyond the Orange River in immense herds.
23. Acronotus lunatus. The Sassayby. Gregarious. Inhabits the country of the Bechuana in considerable herds.
24. Ægocerus Harrisii. The Sable Antelope. Very rare. Gregarious in small families. Inhabits the great mountain range which threads the eastern portion of the Matabili country.
25. Ægocerus equina. The Roan Antelope. Gregarious in small families or herds, but rare. Inhabits the elevated ridges near the source of the Vaal River.
26. Ægocerus ellipsiprymnus. The Water Buck. Gregarious. Found only on the banks of rivers near the Tropic, the Limpopo and Mariqua especially.
27. Oryx Capensis. The South African Oryx. Gregarious. Principally found in the Karroo, or in the open plains of Mamaqueland.
28. Gazella Euchore. The Spring Buck. Scattered over the plains in countless herds.
29. Gazella albifrons. The White-faced Antelope. Very gregarious. Inhabits the plains south of the Vaal River in immense herds.
30. Gazella pygarga. The Pied Antelope. Gregarious. Still found in Zoetendal's V'ley near Cape l'Agulhar. Common in the interior.
31. Antelope Melampus. The Pallah. Gregarious in small families or herds. Inhabits the banks of rivers chiefly in the Bechuana country.
32. Tragellaphus sylvatica. The Bush Buck. Monogamous or solitary. Inhabits the forests on the sea coast.
33. Redunca Eleotragus. The Reit Buck. Gregarious in small families, or solitary. Resides variously, principally among reeds.
34. Redunca Lalandii. The Nagor. Found amongst rocks in small troops.
35. Redunca Capreolus. The Rheebuck. Found within the colony, in small troops amongst hills and rocks.
36. Redunca scoparia. The Ourebi. Found in grassy plains, usually in pairs.
37. Oreotragus Saltatrix. The Klipspringer. Common in the colony. Inhabits rocks and precipices in pairs.
38. Tragulus rupestris. The Steenbuck. Monogamous or solitary. Inhabits the bushes of high ground. Common in the colony. *Note.*—The Plackte Steenbok (Tragulus rufescens), and the Bleekbok (T. Pedrotragus), appear to be merely varieties of this Antelope, and not distinct species.
39. Tragulus melanotis. The Grysbok. Monogamous or solitary. Common in the colony, among the wooded tracts along the sea-coast.
40. Cephalopus mergens. The Duïker. Solitary or Monogamous. Common in the colony, especially along the coast, among bushes. *Note.*—C. Burchellii would appear to be a variety only of this species, of which no two specimens are exactly alike.
41. Cephalopus cæruleus. The Slate-coloured Antelope. Solitary. Inhabits the forests along the sea-coast.

On the present occasion, we have room only for one additional extract, which, however, will afford a very good specimen of the whole. On future occasions we hope to enliven our pages with a few brief quotations from this amusing author.

HUNTING THE GIRAFFE (*Camelopardalis Giraffa*).

"To the sportsman the most thrilling passage in my adventures is now to be recounted. In my own breast, it awakens a renewal of past impressions, more lively than any written description can render intelligible. Three hundred gigantic Elephants, browsing in majestic tranquillity amidst the wild magnificence of an African landscape, and a wide stretching plain,

darkened as far as the eye can reach, with a moving phalanx of Gnoos and Quaggas, whose numbers literally baffle computation, are sights but rarely to be witnessed; but who amongst our brother Nimrods shall hear of riding familiarly by the side of a troop of colossal Giraffes, and not feel his spirit stirred within him? He that would behold so marvellous a sight must leave the haunts of Man, and dive, as we did, into pathless wilds, traversed only by the brute creation—into wide wastes, where the grim Lion prowls, monarch of all he surveys, and where the gaunt Hyæna and Wild Dog fearlessly pursue their prey.

"On the morning of the 19th, from the back of *Breslar*, my most trusty steed, with a firm wooded plain before me, I counted thirty-two of these animals, industriously stretching their peacock necks to crop the tiny leaves which fluttered above their heads, in a mimosa grove that beautified the scenery. They were within a hundred yards of me, but having previously determined to try the boarding system, I reserved my fire. Although I had taken the field expressly to look for Giraffes, and had put four of the Hottentots on horseback, all excepting Piet had as usual slipped off unperceived in pursuit of a troop of Koodoos. Our stealthy approach was soon opposed by an ill-tempered Rhinoceros, which, with her ugly calf, stood directly in the path: and the twinkling of her bright little eyes, accompanied by a restless rolling of the body, giving earnest of her intention to charge. I directed Piet to salute her with a broadside, at the same moment putting spurs to my horse. At the report of the gun, and the sudden clattering of hoofs, away bounded the Giraffes in grotesque confusion, clearing by a succession of frog-like hops, and soon leaving me far in the rear. Twice were their lowering forms concealed from view by a park of trees, which we entered almost at the same instant; and twice, on emerging from the labyrinth, did I perceive them tilting over an eminence immeasurably in advance. A white turban, which I wore round my hunting cap, being dragged off by a projecting bough, was instantly charged by three Rhinoceroses; and looking over my shoulder, I could see them long afterwards fagging themselves to overtake me. In the course of five minutes, the fugitives arrived at a small river, the treacherous sands of which receiving their long legs, their flight was greatly retarded; and, after floundering to the opposite side, and scrambling to the top of the bank, I perceived that their race was run. Patting the streaming neck of my good steed, I urged him again to the utmost, and instantly found myself by the side of the herd. The stately bull being readily distinguishable from the rest by his dark chestnut robe and superior stature, I applied the muzzle of my rifle behind his dappled shoulder with the right hand, and drew both triggers; but he still continued to shuffle along, and being afraid of losing him, should I dismount, among the extensive mimosa groves, with which the landscape was now obscured, I sat in my saddle, loading and firing behind the elbow, and then placing myself across his path, until, the tears trickling from his full brilliant eye, his lofty frame began to totter, and at the seventeenth discharge from the deadly grooved bore, bowing his graceful head in the skies, his proud form was prostrate in the dust. When I leisurely contemplated the massive frame before me, seeming as though it had been cast in a mould of brass, and protected by a hide of an inch and a half in thickness, it was no longer a matter of astonishment that a bullet discharged from a distance of eighty or ninety yards should have been attended with little effect upon such amazing strength. The extreme height from the crown of the elegantly moulded head to the hoof of this magnificent animal was eighteen feet; the whole being equally divided into head, body, and leg. We all feasted heartily on the flesh, which, although highly scented at this season with the rank mokaala blossoms, was far from despicable.

"The rapidity with which these awkwardly formed animals can move is beyond all things surprising, our best horses being unable to close with them under two miles. Their gallop is a succession of jumping strides, the fore and hind legs on the same side moving together, instead of diagonally, as in most other quadrupeds, the former being kept close together, and the latter so wide apart that in riding by the animal's side, the hoof may be seen striking on the outside of the Horse, momentarily threatening to overthrow him. Its motion altogether reminded me rather of the pitching of a ship, or rolling of a rocking-horse, than of any thing living; and the remarkable gait is rendered still more automaton-like by the switching at regular intervals of the long black tail, which is invariably curled above the back, and by the corresponding action of the neck, swinging as it does like a pendulum, and literally imparting to the animal the appearance of a piece of machinery in motion. Naturally gentle, timid, and peaceable, the unfortunate Giraffe has no means of protecting itself but with its heels, but even when hemmed into a corner it seldom resorts to this mode of defence.

"The Giraffe is by no means a common animal, even in its head quarters. We seldom found them without having followed the trail, and never saw more than five and thirty in a day. It utters no cry whatever. The male increases in depth of colour according to the age, and in some specimens is nearly black; but the female is smaller in stature, and of a lighter colour, approaching to yellow. Although very extensive, the range of its *habitat* is exclusively confined to those regions in which the species of mimosa, termed mokaala, or *Kameel doorn*, is abundant, the leaves, shoots, and blossoms of that plant being its ordinary food."

BREEDING OF THE WOODCOCK (*Scolopax rusticola*, Linn.) IN IRELAND, AND HABITS OF THE BIRD.

CONSIDERING the popular and economic value attached to the Woodcock, every thing relating to its haunts and habits necessarily possesses an interest superior to what its merely scientific bearing would confer; hence we more freely request attention to the following important additions to its history.

From time immemorial the Woodcock has been known as an inhabitant of high latitudes, moving southwards with the severity of winter, and visiting these islands about the middle of November. For more than half a century it has moreover been known, upon the testimony of such Naturalists as Pennant, Latham, Montagu, &c., that it was an occasional breeder in England during spring; and within the last few years the *Proceedings of the London Zoological Society* have informed us "that the number of Woodcocks nestling in England and Scotland is greatly on the increase." It is only, however, within the last few years that a similar remark has been extended to Ireland; and on the authority of William Thompson, Esq., the well known and able President of the Natural History Society of Belfast (see Annals of Natural History for January, 1839), we shall supply a few particulars.

In the spring and summer of 1828, a fine Woodcock was observed in the demesne of Florida, County Down. In July 1832, one was seen in the County Kerry; and in April 1834, a brood was reared on the property of the Earl O'Neil, in the county of Antrim. In the summers of 1833 and 1834, a fine bird was transmitted for stuffing to a bird preserver in Dublin, in the former from Queen's County, and the latter from Wexford; and more recently, greater numbers have been discovered in the county of Wicklow and elsewhere. The most important witness on these points has been the intelligent gamekeeper at Tullamore Park, Lord Roden's seat, county of Down. It was in the year 1835 that this individual first became aware that these birds continued throughout the summer in the Park: and this year he discovered two broods, consisting of four and five young ones. In the summer of 1836 he saw in one day five old Woodcocks in the Park, and though he discovered none of their nests this year, he on one occasion saw three young birds. He is of opinion that Woodcocks pair before leaving this country for more northern climates; and he stated, that in their evening flight, at this particular season, they *twist* amazingly, the hinder one following the foremost through every curve of its course, which is extremely rapid. Their call may now be expressed by the word *hisp*, by the accurate repetition of which he has brought them back when flying past him. During the breeding season, they, in addition to this, have calls which sound like *waap, waap—weep, weep*, succeeding each other, and repeated as here set down; both sexes are considered to make use of the two calls. At the season of incubation, they call at early dawn; and at this period their flight is very different from that in the month of March, being now slow, or with wings scarcely moving; but occasionally they may be seen circling about as if at play, at all events describing such a course as evinces that they cannot be in search of food. In winter this observer believes that Woodcocks have a regular line of flight from the covers to their feeding ground, and acting upon this belief, by taking his stand at particular spots, he has shot many flying over them.

In 1837 three nests were found at Tullamore Park, the first early in April, when it was surrounded with snow. The nests have in every instance been in slight hollows of the ground, with some grass or dead leaves at the bottom as lining. To withdraw attention from one of these nests, when containing young, the parent tumbled about as if wounded, thus feigning to a greater extent than the keeper had ever witnessed in any other species of bird. In 1838, long before the general departure of the Woodcock, the gamekeeper saw what he believed to be five distinct brace of these birds in one part of the Park. Daily throughout the year he now either hears or sees Woodcocks without going out of his way or attending to them; indeed, they fly very much about his cottage, and may be seen on the wing every evening from its door.

The cause of this novel fact thus clearly established is far from being very apparent. Something is ascribed to the wider extent of the woods of the country; and something to the more equable character of the seasons, proceeding, perhaps, in some degree from the former cause. We have not, however, room for dilating upon this point; and must finish with the conclusion of our able informant, that the small proportion of Woodcocks which breed in Ireland are probably permanent residents.

BIRDS OF ICELAND.—It is perhaps not so generally known as it might be, that the Durham University has established a museum as an appendage to its academical establishment; the sub-curator of which obtained permission

to go to Iceland in the summer of 1837, to procure a collection of the birds of that island. Three months were passed in the most northern part of the island. Skins of fifty-two species of birds were brought home, besides skins of the Rein-deer, three species of Seals, two large fishes (Anarrhicus), and a Porpoise. Frederick Faber, in his Ornithology of Iceland, published at Copenhagen in 1822, enumerates 84 species of birds, of which about twenty are land birds, and 60 water birds. Faber adopted the nomenclature of Linnæus, but an examination of the skins brought home has led to the belief that several of Faber's birds are not identical with the Linnæan species. The Iceland Falcon is considered as distinct from the whiter Falcon of Greenland. The Iceland Grouse is considered as peculiar to that island. The Bridled Guillemot, *Uria lacrymans*, Lapyl., is for various reasons believed to be a species distinct from the Common Guillemot. *U. troile*, Lath., *Clangula Barrovii*, was found breeding on the ground, in a nest formed of its own down, and placed among aquatic plants a little above high water mark. Some rare eggs were also obtained, namely, those of the Iceland Falcon, Little Auk, Bridled Guillemot, and Sclavonian Grebe.—(*Proceedings of the Linnæan Society.*)

EELS VIVIPAROUS.

M. de Joannis, Lieutenant of the Navy, has lately presented a memoir to the Academy of Sciences at Paris, and which has been reported upon by Messrs Duméril, de Blainville, and Milne Edwards. M. de Joannis' object is to establish that Eels are viviparous, and not oviparous, or ovoviviparous. We have only room for the following passage:—"A peasant came to me one day," says the author, "for the purpose of informing me, that the evening before he had observed something which had greatly surprised him, and the like of which he had never before seen. He informed me that the day before, being the 20th of March, he caught, while fishing, a large Eel, immediately went home, put his Eel into a large hollow dish, covered it with a plate, and returned to his work. He went home again in the evening, and great was his astonishment, when, in lifting up the upper plate to take out the Eel, he found it surrounded with perhaps 200 small ones, which were from an inch and a half to two inches long, with the thickness of a thread, and nearly white." This fact appeared to M. de Joannis so interesting and decisive that he very carefully interrogated the man; supplying a summary of the information he received. When the man first noticed the fact, the Eel was still in the act of depositing her young, for he saw them actually issuing from their mother; a small quantity of glary matter was at the bottom of the dish, but very little. The young ones which had most recently appeared, moved in a serpentine form, and endeavoured to mount up the sides of the dish; some of them were glued to it by the hinder part of their bodies, and could only raise the head with a convulsive effort; others were dead, whilst others were tolerably active, especially at the bottom of the vessel. Their eyes were very distinctly perceived, as two large black points. In general, it was remarked that those which glided along the sides of the dish were impeded in their movements by a coloured matter enveloping their bodies, and which made them more or less adhere. After the man had satisfied his astonishment, he ate his Eel, and threw the little ones away, not being deeply versed in the Natural History controversy.

"These are the facts, of which," adds Lieutenant Joannis, "I am as thoroughly convinced as if I had myself seen them. I know the man, and he is truly moral, his character is steady and serious, and his very ignorance in such matters supplies most ample proof for the establishment of the veracity of his recital. Accordingly, I do not fear to advance it as a fact which I regard as demonstrated, that Eels are viviparous. I will not say that they are oviviparous, since, so far as I know, the eggs have not hitherto been noticed."—(*Comptes Rendus*, Février, 1839.)

BOTANY.

UPON THE RESPIRATION OF PLANTS.

Those two distinguished French Naturalists, Messrs Edwards and Colin, have commenced reading to *L'Academie des Sciences* a series of papers developing their views upon the interesting subject of the *Respiration of Plants*, which go far to overturn the received doctrines upon this interesting function of vegetable physiology. These gentlemen having been long dissatisfied with the popular theory, undertook an extensive set of experiments which throw quite a new light upon the subject. With the prevailing theory, we presume that many of our readers are so familiar, that any lengthened exposition is unnecessary; and we shall, therefore, merely remark, that it maintains that the process consists solely, and directly, in the mutual action between the plant and the atmosphere; that so far as the leaves are concerned, carbonic acid is disengaged during the night, and absorbed during the day, oxygen appearing under the direct rays of the sun, whilst, as it regards the seeds in germination, there is a mere combination of the oxygen of the air with the carbon of the seed, forming carbonic acid gas; the influence of water in this process being either nothing, or wholly secondary; it is, in short, that the absorbed carbonic acid is decomposed by the plant, which appropriates the carbon, oxygen being disengaged.

The experiments of these Naturalists were carried on, not in the air, but in water. They selected some very large round-shaped bottles with a narrow neck; to this neck a bent tube was attached, the other end of which was introduced into a receiver; and the whole apparatus was completely filled with fresh water. Into the bottle were introduced forty garden beans, in a perfectly healthy state, well washed and shaken in water to free them from air; so that the seeds were in contact only with water, and with the air which it contained.

For a time nothing could be remarked. Ere long, very minute bubbles of air were observed on the surface of the beans; these insensibly became larger, and in the space of twenty-four hours they were very conspicuous; and finally, many of the beans floated on the water, upborne by the air, falling to the bottom only when the bubbles burst. No doubt is entertained that the gas issued from the beans, as it was actually witnessed issuing from the internal substance of some which had been cut.

The quantity of water which, during this process, was absorbed, was very great. After being four or five days in the water, the weight of the beans was more than doubled; and on being taken out, they manifested they were in a healthy state, by germinating in the ground, and more conspicuously when kept in moistened paper, between two plates.

The quantity of gas which accumulated in the receiver was very small, amounting only to a few cubic inches. Not so, however, with that dissolved in the water, and subsequently disengaged by boiling. The water, when put into the bottles, was found to contain about five cubic inches of air; and after the experiment had lasted for five days, it contained more than thirty-three, leaving twenty-eight cubic inches produced solely by the action of the water and the beans. This gas consisted of more than nine-tenths of carbonic acid gas, a very minute quantity of nitrogen, and a mere trace of oxygen. In the production of this enormous quantity of carbonic acid gas, the air naturally in the water must go for nothing, and it must have been derived from one of the elements of the water. The water, therefore, is decomposed; its oxygen unites with the carbon of the seed, and forms the carbonic acid, which disengages itself, in whole or in part; and the hydrogen, the other element of the water, not being evolved, must be absorbed by the seed, in whole or in part. The important fact, then, brought out by these experiments, is the decomposition of water, a fact which does not enter into the popular theory of the subject at the present time. Messrs E. and C. have obtained corresponding results by experimenting upon the bulbs, stems, leaves, and flowers of plants, as from the seeds. And hence it follows that respiration is not, as has hitherto been considered, a function of secretion merely, but it, moreover, exhibits a fundamental fact concerning the nutrition and development of the embryo seed by the absorption of hydrogen. To this highly interesting subject we may probably again revert.—(*See Ann. des Scien. Nat.* December 1838.)

MISCELLANIES.

A Prolific Ewe.—In the park at Cardross, this season, 1839, a Ewe, belonging to Mr Erskine, dropped five lambs; the same Ewe last year had three lambs, and the year before three; making the extraordinary number of eleven produced in the course of three years.—*Newspaper Paragraph.*

Lace made by Caterpillars.—A most extraordinary species of manufacture has been contrived by an officer of engineers, residing at Munich. It consists of lace veils, with open patterns in them, made entirely by Caterpillars. The following is the mode of proceeding adopted: Having made a paste of the leaves of the plant, on which the species of the Caterpillar he employs feeds, he spreads it thinly over a stone or other flat substance, of the required size. He then with a camel-hair pencil, dipped in olive oil, draws the pattern he wishes the insects to leave open. This stone is placed in an inclined position, and a considerable number of the Caterpillars are placed at the bottom. A peculiar species is chosen, which spins a strong web; and the animals commence at the bottom, eating and spinning their way up to the top, carefully avoiding every part touched by the oil, but devouring every other part of the paste. The extreme lightness of these veils, combined with their strength, is truly surprising. One of them, measuring 26½ inches by 17, weighed only a grain and a half, a degree of lightness which will appear more strongly by contrast with other fabrics. One square yard of the substance of which these veils are made weighs 4½ grains, whilst one square yard of silk gauze weighs 137 grains, and one square yard of the finest net weighs 262½ grains.—No mention is made of the particular species of Caterpillar employed in the manufacture.—(*From "The Naturalist."*)

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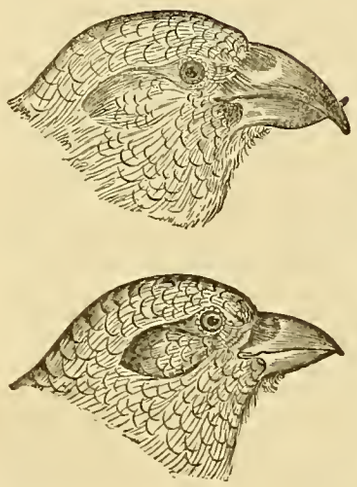
THE COMMON CROSSBILL FOUND BREEDING IN SCOTLAND.

That indefatigable and most acute observer of the habits of birds, Thomas Durham Weir, Esq., of Boghead, some of whose numerous and highly interesting additions to our knowledge of the Ornithology of Scotland are recorded in the first and second volumes of Macgillivray's History of British Birds, has recently favoured us with an account of the breeding of the Common Crossbill in the counties of Stirling and Linlithgow, which will appear in the third volume of the work just mentioned. A young bird, which had newly left the nest, was shot by him as its parents were feeding it, and as the bird in this state has very seldom been examined, a minute account of it will be interesting to our Ornithological readers. It was killed on the 15th of June. The plumage was not perfect, as the quills and tail-feathers had not received their full growth.

Length five inches and eight-twelfths; extent of wings ten; bill along the ridge seven-twelfths; wing from flexure three and two-twelfths; tail one and one-twelfth. The bill is perfectly symmetrical, being rather short, robust, triangular at the base, considerably compressed, and much higher than broad; the outline of the upper mandible decurved, its sides sloping and flattened, the edges straight, sharp, and slightly overlapping; the tip very small, acute, deflected, only one-twelfth of an inch longer than the lower; the lower mandible with the angle broad and rounded, the dorsal line ascending and nearly straight, the edges involute, the tip pointed and a little ascending. The lower jaw is of extreme width at the base, the distance from the exterior of one joint to that of the other being nine-twelfths of an inch. The lateral motion is very great, but there is no greater facility of movement toward one side than to the other, the tip of the mandibles being separable three and a half twelfths to either side. On the roof of the upper mandible are two longitudinal flattened ridges. The tongue as in the adult.

The general colour of the plumage of the upper parts is dull greyish-ochre, longitudinally streaked with dusky, the central part of each feather being of the latter colour, which is more decided on the back; the rump with more yellow, the cheeks and sides of the neck lighter. The lower parts are white, the fore part of the breast tinged with yellow, and the whole under surface streaked with greyish-brown in lincar-oblong lines. The quills and coverts are blackish-brown, narrowly edged with pale yellowish-brown, as are the tail-feathers.

Mr Yarrell, in his excellent History of British Birds, describes a young Crossbill, which "was brought from Hampshire at the latter end of March, and was obtained within a few miles of Winchester. Its whole length is only five inches; the feathers of the wings and tail not yet completed; the former measuring but three inches from the carpal joint to the end, and the tail-feathers only extending five-eighths of an inch beyond the ends of the upper tail-coverts. This bird cannot have flown far from the nest in which it was reared, and was probably hatched about the beginning of March. In the colour of its plumage it very closely resembles those observed on young birds of the year when obtained in June, namely, the head, neck, and upper part nf the back, the rump, and all the under surface of the body, greyish-white, streaked longitudinally with dusky brown; the feathers of the wings and tail hare brown, with narrow edges of pale brown; the beak, though rather long, has both its mandibles perfectly straight, the lower one just shutting within the edges of the upper, nor is there the slightest indication to which side either mandible would hereafter be inclined."



It thus appears, that until the Crossbill has used its beak in extracting the seeds from between the scales of the cones of pines and firs, so as, by the peculiar action which it employs in so doing, to bend the tip of the upper mandible to one side, the curious crossing and elongation of the tips of the mandibles characteristic of this genus are not observable, the bill being similar to that of a Finch or Sparrow, though stronger and more compressed. In this respect the Crossbills are not singular. Thus the Oyster-catcher, when young, has the tips of both mandibles pointed, and that of the upper considerably elongated; whereas, by the action of driving limpets from the rocks, the end of the bill is ultimately thinned on either side, so as to become wedge-shaped. It appears that in some degree the bills of Woodpeckers owe their cuneate form to the same cause. The thin edges of the mandibles of many sea-birds, as the Gannets and Phaetons, become transversely or obliquely fissured by use; and the serratures on the claws of Gannets, Cormorants, and Herons, have no existence while the young birds remain in their nests.

The undue prolongation of the mandibles, in consequence of a deflection from their natural direction, is frequently observed in the Rook, which, on account of its habits, is peculiarly liable to this accident. It is also not unfrequently seen in cage-birds. The elongation of the upper mandible invariably takes place in all birds which, by captivity, are prevented from using their bills in the natural manner or degree, and is usually very conspicuous in tame Eagles and Parrots. This abnormal growth is not confined to the mandibles, but is common to all horny parts, as the claws and hoofs of birds and quadrupeds, as well as the horns of the Ruminantia, and extends even to the teeth, as is naturally seen in the Hog genus, and accidentally in the Glires.

THE BLOOD-HOUND.

The first part of an original and valuable paper upon some varieties of the Dog has lately appeared in one of the Dublin Medical Journals, with a short account of which we shall gratify our readers. It is devoted to some kinds of *Blood-hounds*, and seems the result of long and patient research and observation. It is anonymous, which we regret.

"There are three Dogs at present known under the name of Blood-hound, which, though by some considered distinct from one another, I am disposed to regard as varieties of the same animal, the difference in their appearance being probably owing to climate, if not, indeed, to some intentional or accidental cross. These varieties are the African, the Cuban or Spanish, and the British.

"The first, viz. the African, I am inclined to regard as the original

whence the others sprang. The Cuban seems to have a dash of Greyhound in him, and the British would appear to have been *improved* by the intermixture of the old English Talbot, which I take to be a far more genuine as well as more *ancient* animal.

" The first to be described, therefore, is the African, and of him there must be the least known—as far, at all events, as regards his original extraction. The African Blood-hound is very seldom to be seen in this country; he sometimes resembles a very large and raw-boned Spanish Pointer, (*C. aviculàris Hispan.*) His ears are pendulous and fine in texture, about the length of a Foxhound's; coat very fine, and skin apparently thin; colour generally dark liver-colour clouded with black, yet sometimes tan; muzzle nearly always black, as also the tip of his ears; head pretty large, and shaped like a Pointer's; eyes placed towards the front; tail fine, and carried rather horizontally than erect. The appearance and manners of this Dog are ferocious in the extreme; he stands about twenty-six inches high at the shoulder, often less, but seldom more.

" I saw one of these animals in London some time ago, which had been brought from the Cape of Good Hope, and from him took my description; he was the only African Blood-hound I have ever seen; and as these Dogs are apt to die when brought to a cold climate, I dare say few of my readers (if any) have ever met with one of them. Two African Blood-hounds were brought to England, and presented to the Tower Menagerie, by Major Denham. A drawing of them may be seen in the first volume of a very interesting work published by the Society for Promoting Entertaining Knowledge—entitled *The Menageries.* I was also shown a sketch of one, and furnished with a description similar to the one I have given above, by a friend who had spent some time at the Cape. These are very swift Dogs, of exquisite sense and smell, great endurance, and indomitable courage. My account of the African variety ends here, and I now come to one somewhat better known—one, at all events, concerning which information is more easily obtained—viz., the Cuban or Spanish.

" This animal does not differ so greatly in form from the former-described variety as at first sight might be supposed. It is in general much taller, is of a slighter make, bears its head higher, and is altogether a more imposing-looking Dog than the preceding. It is said to be inferior in smell, which I conceive must be the case from the formation of the head and nose; but what it wants in scent it makes up in speed, being in this respect little inferior to many Greyhounds. This Dog is to be found in greatest perfection at present in South America; many are brought from the West Indian Islands also, but are scarcer there than on the Continent. This is a very tall Dog, being frequently twenty-seven to twenty-eight inches high at the shoulder: in his general shape he resembles a Smooth Lurcher, or a cross between a Greyhound and a Mastiff; his head is thick across the temples; muzzle long and rather fine, yet by no means so small as a Greyhound's; ears something like a Greyhound's, but larger and much more pendulous. This Dog's neck is long, and as he carries his head well up, he has, when a good-sized specimen, a very noble appearance; his tail is moderately long, and tapers to the extremity; it is very slightly villous beneath; colour generally tan shaded with black above—sometimes liver-colour—and occasionally mouse-coloured or silvery-grey; the muzzle and tips of his ears are generally darker than the rest of his body—often black. This Dog, be it observed—and I state this on the authority of a native of South America—is never seen mottled or of two colours; that is to say, speckled or streaked, or black and white, &c. When such is the case, rest assured that the Dog is not by any means well-bred, but has probably had for one of his parents a Boar-hound or Danish Dog. The eyes of this Dog are placed very much towards the front of the head, and very close together, which I conceive must tend in some measure to confine his vision to objects more immediately in front.

" This is the well-known Dog rendered so famous, or rather infamous, from his having been employed by the Spaniards in their cruel and exterminating conflicts with the Americans. The same, also, since frequently used in the capture of runaway slaves in the West Indies. I have been informed that on such occasions a small Dog of the Spaniel breed should be used, called a Finder, as the Blood-hound is slow at hitting off the trail unless so aided, not possessing the same nicety of smell that is displayed by the two other varieties.

" He is a Dog of extreme courage; is capable of much affection; seldom exhibits treachery unless to entrap a declared foe or a strange beggar-man, on which occasions he has been known to simulate sleep, and thus induce the unsuspecting man to pass within reach, on whom he would certainly spring were he so unwary. Their manner of seizing and biting closely resembles the practice of the Bull-dog, (*C. molossus*) They never let go their hold when they have once fastened, but increase their mouthful continually, making every effort to tear away the bit, which they not unfrequently do. Let them once fasten on the throat of their foe, and, whether uppermost or undermost, the battle is their own. One of these Dogs killed a good-sized Bull-dog in about ten minutes, never having changed the hold he got at first. I saw one of these Dogs opposed to a Bear, on which occasion he did very well, but Bruin having ripped the skin off his shoulder, he declined further combat, and resigned the field of battle in favour of a young Boar-hound, son of his Grace the Duke of Buccleuch's Dog 'Hector,' which, though barely eighteen months old, pinned the shaggy monster by the nose, hurled him to the ground, and punished the poor Bear so severely, that in a few minutes the brute howled for quarter, and was glad to yield, 'rescue or no rescue.' I feel it my duty to remark, '*en parenthèse*,' before going any farther, that although I may thus mention '*combats des animaux*,' or even minutely describe them, yet I condemn them *in toto*—as cruel and degrading to human nature. I saw many such scenes when a much younger man than I am now. My blood was warmer than it is at present, and in the excitement of the scenes I witnessed, I forgot for a long while to reflect upon their barbarity. When I mention such things, therefore, it is merely to display the character of the animal I am describing in a clear point of view, while at the same time I disapprove of such practices.

" The Spanish Blood-hound is more commonly seen in this country than the African or Spanish varieties, and I have found that to it is the name of Blood-hound almost exclusively applied. The finest specimen of the breed I have ever seen was in the possession of Mr Johnston, of Edinburgh, to whom, as I was told, it had been sent from Jamaica by a brother resident there. I was informed that Mr Johnston was offered sixty guineas for this Dog, which, however, he refused. I saw this animal, in company with a young South American, who assured me of its being, as far as he could judge, a perfectly fine specimen. I saw also a smaller Dog of the same breed in Edinburgh, in the possession of Mr Charles MacKnight, son of the late Dr MacKnight of that city. At that time I did not believe Mr MacKnight's Dog to be thoroughbred, in consequence of its diminutive size. I have since, however, seen one in Dublin, the property of Sir Philip Crampton, the Surgeon-General, which is even less than it, and of the purity of whose blood I can hardly entertain a doubt. The Surgeon-General's Dog is of a very light mouse or silvery-grey colour, and appears certainly far better bred than any of her offspring I have ever seen. I also saw two of this breed in London; they had been brought from Barbadoes, and were handsome animals."

THE WALRUS OR SEA-HORSE A VISITANT IN BRITAIN.

The Walrus, however familiarly known in the arctic regions as an object of commercial pursuit, has yet rarely been seen alive on the British shores. We are aware only of two instances on record; one in the Island of Harris in the year 1817, and the other in Orkney in 1825. (Nat. Lib. Mam. VII.) To these we now add a third:—" About a fortnight since a strange large animal was observed on the sands of the Severn at Purton, and, as a man went towards it, it retreated towards the water. This emboldened the pursuer, and he soon approached very near to the animal, upon which it turned round and exhibited a countenance of such apparently extraordinary ferocity and disposition to do battle, that the man was glad in his turn to take to flight with pretty considerable speed. He then procured a large duck gun with a man to accompany him, and to lend his shoulder to support the gun while he took aim, and by this means the strange visitant was very soon dispatched. On examination it turned out to be a Walrus or Morse, a well known animal of the Seal tribe in the Polar Seas, but which very seldom, we believe, is seen in these latitudes. It was quite young, as it measured only about seven or eight feet in length, while the average length of a full grown Walrus is from twelve to sixteen feet, and some have even measured twenty feet. After its death, it was, we understand, conveyed to Berkeley Castle, where its tusks, &c. will probably be added to the other trophies of the chase which are preserved in that ancient baronial fortress."—*Gloucester Journal.*

We cannot but express our regret at the inhospitable reception bestowed upon this young and confiding stranger on the banks of the Severn. The pursuer was here exposed to no kind of danger: and the capture of the poor Morse would have been an easy task, and kind treatment would have been appreciated, not to say repaid. Any of our Zoological Gardens would have regarded the animal as an invaluable prize, and the owner might, had he chosen, been in this way richly rewarded.

Bearing on this point, we take the liberty of extracting the following sentences from the last volume of one of our most popular works on Natural History, (Nat. Lib., by Sir William Jardine, Bart.)—" Considering the intelligence and amiability that are thus displayed by the Walrus, we are not greatly surprised to learn that it can be domesticated. The instances we have met with are not numerous, yet we cannot withhold our credence to the statement which De Laet quotes from Edward Worst, who mentions that he saw one of these animals alive in England, which was three months old, and which had been brought from Nova Zembla. Every day it was put into water for a short time; but always seemed happy to return to dry ground. It was about the size of a calf, and could open and shut its nostrils at pleasure. It grunted like a wild Boar, and sometimes cried with a strong deep voice. It was fed with wild oats or

millet, which it rather sucked in than masticated. It was not without difficulty that it approached its master, but it attempted to follow him, especially when it had the prospect of receiving nourishment at his hand."

BIRTH OF A GIRAFFE IN BRITAIN, AND DEATH.

Many of the members of the London Zoological Society in particular, and Naturalists generally throughout the country, have lately felt deep interest in the present announcement. It was on the 19th of June that the beautiful Giraffe in the garden of the Zoological Society gave birth, after a gestation of fifteen lunar months, to a fine young male animal,—the first of its species ever born in this country, or indeed in Europe. Professor Owen stated at a meeting of the Society, that the young animal, when born, was perfectly motionless, and apparently dead; but when gentle friction was applied, it unexpectedly gave a sudden shudder, and respired, whilst motion quickly followed. It made vigorous efforts to stand, raising itself on the fore-knees, and was able to support itself two hours after birth. The next day it was capering about, showing a remarkable degree of development and strength, as might be expected from the long period of gestation. The length of the young Cameleopard from the muzzle to the setting of the tail was six feet ten inches, the tail terminating with the usual tuft of long black hair, and its head reached the height of six feet. It was not a little remarkable that the mother, though not unkind to her offspring, yet refused to suckle him; a misfortune, however, which seemed to have been got over by the young animal imbibing with avidity warm cow's milk from a bottle. For the first few days of its existence it appeared very healthy, occasionally uttering low, gentle bleatings, like a fawn or calf. It died in about a week; an event which has been attributed to the strange conduct of the dam, and the disagreement of the cow's milk.

We now return to the interesting work of Captain Harris, and will supply a few additional extracts:—

Hunting at Meritsane, South Africa.—Crossing a river, we took a northwesterly direction through a park of magnificent camel-thorn trees, many of which were groaning under the huge nests of the Social Grosbeak: whilst others were decorated with green clusters of misletoe, the bright scarlet berries of which were highly ornamental. We soon perceived large herds of Quaggas and Brindled Gnoos, which continued to join each other until the whole plain seemed alive. The clatter of their hoofs was perfectly astounding, and I could compare it to nothing but to the din of a tremendous charge of cavalry, or the rushing of a mighty tempest. I could not estimate the accumulated numbers at less than 15,000; a great extent of country being actually chequered black and white with their congregated masses. As the panic caused by the report of our rifles extended, clouds of dust hovered over them; and the long necks of troops of Ostriches were also to be seen, towering above the heads of their less gigantic neighbours, and sailing past with astonishing rapidity. Groups of purple Sassaybags, (Acronotus lunatus,) and brilliant red Hartebeests, (Acronatus Caama,) likewise lent their aid to complete the picture. The savages kept in our wake, dexterously dispatching the wounded Gnoos by a touch on the spine with the point of an assagai, and instantly covering up the carcasses with bushes, to secure them from the voracity of the Vultures, which hung about us like specks in the firmament, and descended with the velocity of lightning, as each discharge of our artillery gave token of prey. As we proceeded, two Elands (Boselaphus Oreas) made their appearance, the savages at the same moment exclaiming with evident delight, *Impoofo*, *Impoofo*, and pressing our horses to the utmost speed, we found ourselves, for the first time, at the heels of the largest and most beautiful species of the Antelope tribe. Notwithstanding the unwieldy shape of these animals, they had at first greatly the speed of our jaded horses, but being pushed, they soon separated; their sleek coats turned first blue, and then white with froth; the foam fell from their mouths and nostrils, and the perspiration from their sides. Their pace gradually slackened, and with their full brilliant eyes turned imploringly towards us, at the end of a mile, each was laid low by a single ball.

In size and shape, the body of the male Eland resembles that of a well conditioned Guzerat Ox, not unfrequently attaining the height of nineteen hands, and weighing 2000 lbs. The head is strictly that of an Antelope, light, graceful, and bony, with a pair of magnificent straight horns, about two feet in length, spirally ringed, and pointed backwards. A broad and deep dewlap, fringed with brown hair, reaches to the knee. The colour varies considerably with the age, being dun in some, in others an ashy blue, with a tinge of ochre, and in many also sandy grey, approaching to white. The flesh is esteemed by all classes in Africa above that of any other animal; in grain and colour it resembles beef, but is better tasted, and more delicate, possessing a pure game flavour, and the quantity of fat with which it is interlarded is surprising,—greatly exceeding that of any other game quadruped with which I am acquainted. The female is smaller, and of slighter form, with less ponderous horns. The stoutest of our savage attendants could with difficulty transport the head of the Eland to the waggons.

The Water Buck (Ægocerus ellipsiprymnus) is about the size of an Ass, and of somewhat browner colour. The hair is coarse, like that of the Indian Rusa Stag, and in texture resembles split whalebone. The appearance of the male animal is stately; the eyes are large and brilliant; the horns ponderous, three feet in length, white-ringed, and placed almost perpendicularly on the head, the points being curved to the frond; a mane encircles the neck, and an elliptical white band the tail, which is tufted at the extremity. The female is similar, but hornless, and rather smaller. The flesh of both is coarse, and so highly ill-favoured that even savages are unable to eat it. On cutting off the head, the effluvium literally drove me from the spot. Mr Stedman had the merit, a few years ago, of bringing this Antelope under the observation of the scientific world; and Dr Smith brought down other specimens with the late expedition. It is gregarious, and found only on the banks of rivers near the tropic, the Limpopo and Marigna especially.

Fight between Partridges and the Carrion Crow.—"A person engaged in a field, not far from my residence, had his attention arrested by some objects on the ground, which, upon approaching, he found to be two Partridges, a male and female, engaged in battle with a Carrion Crow; so successful, and so absorbed were they in the issue of the combat, that they actually held the Crow till it was seized, and taken from them by the spectator of the scene. Upon search, the young birds (very lately hatched) were found concealed among the grass. It would appear, therefore, that the Crow, a mortal enemy to all kinds of young game, in attempting to carry off one of these, had been attacked by the parent birds, and with the above singular success."—*Selby on British Birds.*

Vanity of the Peacock.—The late Baron Ternaux, says an anonymous writer, decorated his grounds at St Ouen, near Paris, with splendid looking-glasses, which reflected the varied landscape, and produced a very fine effect. One day the gardener found one of the Peafowls before the glass, with its tail displayed, and apparently contemplating itself with great satisfaction. The gardener let it remain there until he went round the grounds; he returned in a few hours, and found the Peacock still before the glass. He now drove it away, but it as constantly returned. He at length took it to the aviary; but the Peacock, as soon as it could get out, went back to the mirror, refusing all food for the delight of beholding itself in the glass. The Baron at last suffered it to remain, ordering food to be placed before it near the glass; but it did not touch it: and, on the third or fourth day, the bird of Juno was found lying dead before the glass. A second Peacock, which had never seen the mirror, was brought, that it might be observed whether the effect would be the same; when it was found that it was as proud of viewing its own image as its predecessor; and, to prevent its meeting a similar fate, it was not allowed access to the grounds. The above anecdote was communicated to the narrator by the Baron himself, on his last visit to London. The same phenomenon has been observed in other kinds of birds, as Goldfinches, Turkeys, &c.; in some cases the idea of the presence of a companion must be the dominant feeling.

BOTANY.

GREAT GIANT GOLIATH RHUBARB.

In the market gardens round London, a large species of rhubarb is extensively cultivated, with which the excellent markets of the metropolis are well supplied; but beyond the range of a few miles, the particular kind to which we would direct attention is comparatively little known; the generality of country gardens being disgraced with a root or two of docklike plants, with stalks no thicker than a finger, fibres like a whipcord, and little or only a bad flavour. No wonder so few persons *thus possessed* should not like rhubarb tarts. The noble plant which we would recommend to every living being who owns a patch of garden-ground, is as superior to the old-fashioned nauseous plant just mentioned, as our cultivated celery to the rank weed of the same name growing by muddy ditches. One would be led to suppose that, from the rarity of the giant rhubarb, it was difficult of cultivation, tender, and troublesome to manage: whereas it is as easily propagated as any other perennial vegetable; is so hardy, that no degree of frost which we have ever experienced will injure it; and of all esculents for pies and puddings, it is the most readily prepared. It is so prolific, that half a dozen roots would keep a small family constantly supplied during four months of the year, from the beginning or middle of April, until the beginning or middle of August. We have known instances of this *fruit* (must we style it?) being preferred to all others for the purpose of pastry, throughout the summer, even where fruits of every kind abound. We have known stalks of this rhubarb measure six inches in circumference, and nearly two feet in length; so delicate and soft too is its texture, that as soon as it arrives at the boiling point, it becomes a fine pulp, and is already sufficiently cooked. As a garden production for

culinary purposes, it is certainly invaluable; being in perfection when apples become tough, and before gooseberries have made their appearance. Its flavour is so delicate, that it ought not to be mixed with any other ingredient than sugar; and on no account should it be peeled.

This rhubarb may be propagated either by sowing the seeds, or purchasing young roots of one year's growth, and planting them during the spring months in a good rich soil. In the former case, they are to be transplanted in a few weeks, and in the following year their stalks will be large enough to pull. If the roots obtained be planted in March, the plot will be available in a month or six weeks. No further care is requisite than to manure the bed in autumn. As soon as the growth becomes vigorous, each root sends up a flower-stalk, which will readily be distinguished from the leaf-stalks; these must be pulled away, and only one left, (if it be intended to procure seed,) and this plant should be used little or none during the season. The leaves are enormous, many being four feet long and three and a half wide. The roots, too, are gigantic,—so large, that in the course of three or four years, a single root will fill a wheelbarrow; hence the plants require a wide space—say five feet apart each way.— *Quarterly Journal of Agriculture, &c. June* 1839.

ELECTRICITY.

THUNDER AND LIGHTNING.

In a late Number we supplied an extract from M. Arago's most interesting Treatise on Thunder and Lightning, promising to return to the subject. Strongly would we advise those who have it in their power to refer to the more original sources, whence they will derive much information and amusement. We have room for only one short extract, which will be devoted to the question—

" *Does Lightning strike before it becomes visible?*—I much question," says the illustrious Frenchman, " whether any natural philosopher has, for some years, hazarded publicly to propose the question at the head of this section. During this period it has been supposed that nothing could, by possibility, be more rapid than Light. A well determined velocity of eighty thousand leagues a second appeared so astonishing, that the imagination never ventured to think of going further. The experiments, however, of Mr Wheatstone will probably effect a change upon this point. These have, in truth, I will not say demonstrated, but they have at least led us to conceive the possibility of even greater velocities than that of light; and that in a substance, whose identity with Lightning a hundred comparisons tend to establish. The suspicion, then, announced at the head of this chapter, merits investigation in a theoretical point of view. Meteorology must gain by the inquiry; and I imagine the problem has a relation, on some points, to physiology. Finally, it appears to me that many timid individuals will be spared many poignant moments during Thunder-storms, were it proved that nothing is to be apprehended when the flash has been seen.

" Mr Thomas Olivey, a farmer in Cornwall, who was knocked unconscious to the ground by a fearful thunderbolt, on the 20th of December 1752, so little heard the noise, or perceived the light of the meteor, that in coming to himself at the end of a quarter of an hour, his first inquiry was, *Who had struck him?* A man was struck with Lightning near Bitche, on the 11th of June 1757. After being for a time asphyxiated, he was asked, on returning to consciousness, by the Abbé Chappe, What had been the nature of his sensations? when he answered, I heard nothing, *I saw nothing*. The rector of Saint-Keverne, in Cornwall, Mr Anthony Williams, was struck on the 18th of February 1770, by the same thunderbolt which did so much damage in the parish church. On recovering, after having been long in a fainting state, he declared *he had neither seen the Lightning nor heard the Thunder*. Mr Luke Howard interrogated one of two gardeners who were thrown unconscious to the ground, in a country house in the neighbourhood of Manchester. This individual, George Bradbury, positively declared that he had neither heard the Thunder nor *seen the Lightning* at the moment of the accident. On the 11th of July 1819, a thunderbolt broke upon the church of Châteauneuf-les-Moutiers, near Digne, in the Department of the Low Alps; it killed *nine* and wounded *eighty-two persons*. Among these last was the curate of Moutiers; he was taken up completely asphyxiated; his surplice was in flames. He revived two hours after the accident, and declared ' that he had heard nothing, and knew nothing of all that had passed.' Mr Rockwell, who was struck with Lightning in August 1821, had neither *seen the Lightning* nor heard the noise. H. N. Reeves, a workman, who, in June 1829, was labouring on the steeple of Salisbury, fell down unconscious immediately after a vivid flash of Lightning: when he awakened from his deep unconsciousness, he stated that he did not perceive the Lightning at the moment of his fall."—*Edinburgh New Philosophical Journal, January* 1839.

GEOLOGY.

Geology as prosecuted in Russia.—Some idea of the activity of the Russians in pursuit of Science, and especially that of Geology, may be gathered from the following statements. The inspector-in-chief of the mines, the Count Cancrina, has for several years obtained His Imperial Majesty's permission to make geological and mineralogical researches in various parts of this vast empire, and a scientific committee has been established to superintend the publication of a work entitled " Annals of the Russian Mines." M. Parrot, professor at the University of Dorpat, was ordered by the Russian Government to explore Armenia and Transcaucasia, and he placed his barometer at the top of Mount Ararat, which he found to be of volcanic formation. M. Kupffer has determined the height of Elbrous, the culminating point of the Caucasian chain, and is at this moment making meteorological and magnetic observations throughout the empire. Baron de Humboldt and M. Rose have traversed the northern mountains. M. de Pusch has described the chalk formation in the south of Poland, M. Pander those of the neighbourhood of St Petersburgh; M. Dubois de Montpereux has for years been devoted to the same researches in Caucasia, the Crimea, and Podolia, and M. de Verneuil has also visited the Crimea. M. de Semenoff, principal engineer of mines, has described the geological formation of the northern part of the Altaï Mountains, the central crest of which is composed principally of granite, and granitoid syenite, which are often at the base adjoining to mica slate. The lower regions are marly and covered with forests, which disappear in the regions of eternal snow, and from the alluvial soils which load the shallows and beds of the rivers, gold is now plentifully extracted by washing. M. Amixine has thrown light on the western ramification of the chain of the Jablonowoë, in Eastern Siberia, in which granite and mica slate predominate, and a formation of porphyry of fifteen square leagues is on all sides surrounded by granite mountains of great elevation. In this same chain M. Fileff also found red sandstone, diorite, and a trachitic formation. The Altaï and Aral seem, however, to have been most explored, from the rubies which they present. Not only have they rich veins of gold, but lead, and garnets, tourmalines, topazes, amethysts, aquamarines, and the finest emeralds. On the coast of the Caspian Sea are hills, which contain an abundance of fossil shells, and strata of gypsum and rock salt. A great extent of coal is found in the chain of Donetz, and in the government of Karkoff.—*Athenæum, April* 1839.

Subterranean Caverns at Chudleigh.—A curious discovery of a range of caverns was made last week in Chudleigh Rock, in consequence of a Terrier Dog getting into a fissure in pursuit of a Rabbit. The Dog was heard at various times to bark for more than a week; and as it was almost impossible to extricate him, it was attempted to destroy him by burning brimstone. On the fifteenth day after the Dog's entombment, his moans were plainly heard by many persons, when a further endeavour was made, in vain, to extricate him. A lad on the following day had the courage, with a rope affixed to him and two lanterns, to enter the chasms; and after two hours, working a passage of twenty feet, he descended into a dry chamber, about thirty feet square and sixty-three feet below the opening, where he found the Dog dead, but still warm. From an aperture in this cavern gushed a stream of air leading into another cavern, which is supposed to be still deeper, as the boy had not rope enough to descend. This range of caverns is beneath those where Professor Buckland many years since discovered some extraordinary antediluvian remains.

MISCELLANIES.

Origin of Lithography.—Fifty years ago, there lived at Munich a poor fellow, by name Aloys Senefelder, who was in so little repute as an author and artist, that printers and engravers refused to publish his works at their own charges, and so set him upon some plan to do without their aid. In the first place, Aloys invented a certain kind of ink which would resist the action of the acid that is usually employed by engravers, and with this he made his experiments upon copper-plates as long as he could afford to purchase them. He found that to write upon the plates backwards, after the manner of engravers, required much skill and many trials, and he thought that were he to practise upon any other polished surface —a smooth stone, for instance, the least costly article imaginable—he might spare the expense of the copper until he had sufficient skill to use it. One day, it is said, that Aloys was called upon to write—rather a humble composition for an author and an artist—a washing bill. He had no paper at hand, and so he wrote out the bill with some of his newly invented ink, upon one of his Kilheim stones. Some time afterwards he thought he would try and take an *impression* of his washing bill—he did, and succeeded. Senefelder invented lithography.—*Westm. Rev.*

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DESCRIPTION OF THE APPARATUS BY WHICH THE TONGUE IS EXTENDED IN THE FAMILY OF WOODPECKERS.

The singular apparatus by means of which the Woodpeckers are enabled to secure their prey has often been described, but generally in an imperfect, and often, in some respects, in an erroneous manner. Having recently examined individuals of several species, we are enabled to present a detailed account of the subject. In the first place, let us take the Ivory-billed Woodpecker, *Picus principalis*, one of the largest species known.

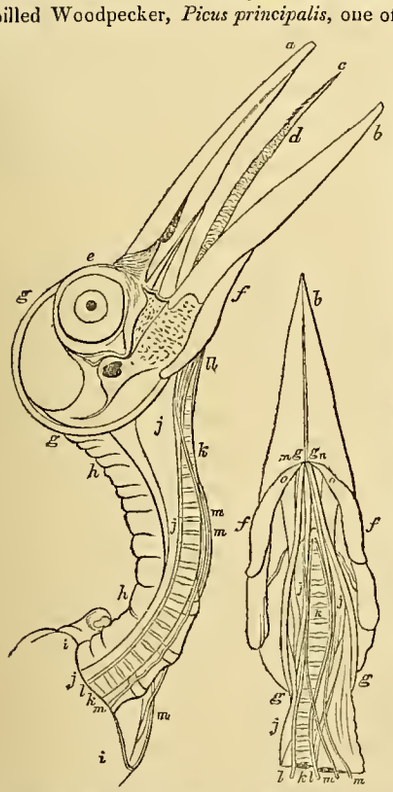

Fig. 1 represents—The upper and lower mandibles, *a b*, the tongue, *c d*, the terminal barbed portion, *c*, the fleshy part, *d*, the orbit and eye, *e*, the salivary gland of the right side, *f*, the hyoid bones, *g g*, the neck, *h h*, the furcula, *i i*, the œsophagus, *j j*, the trachea, *k*, its lateral muscles, *l l*, the cleido-tracheal muscles, *m m*. In fig. 2 are seen — The lower mandible, *b*, the salivary glands, *f f*, the hyoid bones, *g g*, the œsophagus, *j j j*, the trachea, *k*, the lateral muscles, *l l*, the cleido-tracheal, *m m*, the glosso-laryngeal, *n n*, the muscles by which the tongue is exserted, *o o*.

The bill of this species, Fig. 1, *a b*, measures three inches and two-twelfths from the angle of the mouth; and the tongue, *c d*, which lies in the broad groove of the lower mandible, reaches to two-twelfths of the extremity, but at the will of the bird may be exserted so as to extend 3¼ inches beyond the point of the bill. The tongue itself presents the appearance of a slender worm-like body, having a middle longitudinal groove on its upper surface, which is transversely wrinkled, and terminated by a slender tapering bony point, of which the margins and part of the upper surface are covered with acicular prickles, which are in some degree moveable and directed backwards, but not capable of being bent outwards, much less in the direction of the tip of the tongue. The length of this organ is apparently two inches eight-twelfths; but if measured from the base of the basi-hyal bone, only one inch eleven-twelfths; its breadth at the base two and one-half-twelfths, slightly tapering to the end of its fleshy part, where it somewhat suddenly contracts, so as to have a breadth of little more than one-twelfth. The length of the horny tip is nine-twelfths. The tongue at the base is entirely destitute of the lobes and papillæ which in other birds give it a sagittate appearance; and there is no uro-hyal bone, which in them slips into a groove along the front of the thyroid bone of the larynx. The mouth is of moderate width, its breadth being, as already mentioned, eleven-twelfths, it being in this respect very different from that of Flycatchers, Goatsuckers, Swallows, and such birds as seize on living insects while on wing. The lower mandible is deeply concave within, wider than the tongue, and covered with mucous membrane until one inch five-twelfths from the point, beyond which it is horny, with a median groove, near the commencement of which is a small aperture for the ducts of the salivary glands. The tongue is capable of being retracted ten-twelfths of an inch from the tips of the mandibles, and is then seen to slide into a sheath, formed by an induplication or intussusception of the membrane covering it, and having two frænula of elastic tissue inserted into the angle of the jaw. Here it may be proper to state, that in birds generally the bony elements of the tongue are seven, as may be represented by the accompanying diagram, in which the first or upper piece is named the glosso-hyal, the next the basi-hyal, the third, in the same line, the uro-hyal; the two coming off from the base of the second piece or basi-hyal, are the apo-hyal, to each of which is appended another, the cerato-hyal. The tongue itself is in no degree extensile or contractile, but has for its solid basis a very slender basi-hyal bone, one inch two and one-half-twelfths in length, terminated by a glosso-hyal bone half an inch in length, but, as already said, has no basal or uro-hyal bone, which, on account of the unusual extent of its motion, would form an impediment.

From the base of this basi-hyal bone there proceed, backwards and slightly diverging, two slender apo-hyal bones one inch one-twelfth in length, each of which is continuous, with an extremely elongated cerato-hyal bone, four inches and one-twelfth in length, three-fourths of one-twelfth in breadth at the commencement, gradually tapering to a blunt point, convex on its lower surface, concave or channelled on the upper, passing under and internally of the articulation of the jaw, and curving upwards along the occiput, until the two meet on the top of the head, at the level of the posterior margin of the orbit, in the median line of the cranium, which is much depressed, whence they proceed in mutual contact, inclining slightly to the right side, and terminate a little before the anterior margin of the orbit, half an inch behind the right nostril, and a quarter of an inch from the base of the bill. These prolongations of the os hyoides, being of an osseo-cartilaginous nature, are possessed of much elasticity, so as in some measure to resemble a curved spring.

From near the angle or point of union of the two crura of the lower mandible internally, there proceeds on each side a slender muscle, *oo*, which, running backwards, comes in contact with the prolongation of the hyoid bone, at the joint between the apo-hyal and cerato-hyal portions, and is thence continued along the whole extent of the latter, *og*, *eg*, running chiefly along its upper side, but partially inclosing it, and bound to it by a sheath of cellular tissue, which allows it considerable motion. The bone and muscle together are inclosed in an extremely delicate, transparent, tenacious sheath, moistened internally with a serous fluid, and terminating at the end of the bone, where it is attached by elastic tissue to the cellular substance and periosteum near the base of the bill. This delicate sheath, perfectly smooth and lubricated on its inner surface, is on the outer attached by delicate filaments to the dense cellular tissue which forms a kind of external sheath. It is fixed in its place, and the hyoid bone, with its muscle, *gg*, slides backwards and forwards in it.

The entire length from the tip of the tongue, *c*, to the tip of each prolongation of the hyoid bone at *e*, is seven inches two-twelfths. The protrusion of the tongue is effected by the contraction of the slender muscle above described, *o*, which having a fixed basis in the lower jaw near its

angle, and acting upon the tip of the hyoid bone, which is in this bird situated anteriorly to the eye, on the forehead, near the base of the upper mandible at *c*, causes the hyoid bone to glide within its sheath until its tip has moved backwards over the forehead, the crown, and occiput, and then advanced forwards until beneath the articulation of the lower jaw, thus traversing a space of three inches and a half, so that the tongue is protruded to three inches and four-twelfths beyond the tip of the bill. When the muscle is relaxed, the parts regain their ordinary position by the aid of the elasticity of the prolongation of the hyoid bones, and the action of another pair of muscles, to be presently described.

The tongue, *d*, is covered externally with a dense sheath of fibrous tissue. On its lower surface is seen on each side a very slender muscle, commencing at the extremity of the glosso-hyal bone, and running along the whole length of the basi-hyal bone, as well as of the apo-hyal, to be inserted into the cerato-hyal, at the distance of one inch from its base, on the outer edge. The action of this muscle, which has a strong tendon in its whole length, is to bend the tip of the tongue downwards, or to move the horn of the hyoid bone outwards. It may be called the glosso-hyal. It has another tendon running parallel to that mentioned along its upper edge, of which the action must be to bend the tongue upwards upon the apo-hyal. Besides these muscles, there is another pair, forming the greater part of the fleshy portion of the tongue. They commence at the tip of the basi-hyal bone, or, at *d*, proceed along the upper surface of the tongue, and, after running a course of two inches and three-fourths, pass along the anterior surface of the thyroid bone, wind along its edge, and are inserted near the middle surface of the trachea, about its tenth ring. The action of these muscles, alluded to at the end of the last paragraph, and marked *nn*, is to retract the tongue, when extended, as well as to pull forward the larynx. Another pair of very slender muscles, *mm*, commence upon the edge of the thyroid bone externally of those last described, separate immediately from the trachea, pass directly down the neck in front, under the subcutaneous muscle and skin, to which they are firmly attached by cellular tissue, and are inserted into the furcular bone about the middle of its length. These muscles, the cleido-tracheales, are not peculiar to Woodpeckers, and have nothing particular to do with the movements of the tongue in those birds.

Parallel to the lower edge of the jaw, and extending from four-twelfths anteriorly to its articulation to the junction of its crura, is, on each side, an elongated salivary gland, *ff*, attached to the jaw by cellular tissue. It is of a yellowish colour, internally parenchymatous, and sends off a duct, which enters the mouth by the aperture already mentioned, at the commencement of the groove, in the horny part of the lower mandible. The fluid which it secretes is a glairy mucus, of a whitish colour, which, being poured forth around the tip of the tongue, covers it with a glutinous substance well adapted for causing the adhesion of any small body to it.

The Ivory-billed Woodpecker, then, having discovered an insect or larva in a chink of the bark, is enabled, by suddenly protruding its tongue, covered with thick mucus, and having a strong, slender, sharp point furnished with small reversed prickles, to seize it and draw it into the mouth. These prickles are of special use in drawing from its retreat in the wood those large larvæ, often two or three inches in length; but it does not appear probable that the bristly point is ever used to *transfix* an object, otherwise, how should the object be again set free without tearing off the prickles, which are extremely delicate, and not capable of being bent in every direction ?

The trachea, *kk*, is five inches four-twelfths in length, considerably flattened, nearly of the uniform breadth of three-twelfths throughout. The aperture of the glottis is four-twelfths long, with a posterior flap of several series of papillæ. The rings of the trachea are very strong, firmly ossified, 92 in number. At the upper part three are incomplete, the last entire ring is very broad and bipartite, and there are two additional dimidiate rings. The bronchi are short, of twelve half rings. The lateral or contractor muscles, *ll*, commence in front, at the base of the thyroid bone, diverge, presently become lateral, and thus proceed until four and one-half-twelfths from the extremity, when they terminate partly in the sterno-tracheal, but also send down a very thin slip, which is inserted on the first dimidiate ring.

The explanation of the mechanism by which the tongue is protruded as above given, differs materially from any of those to be found in English works at least, in some of which there is a very unnecessary prolixity as well as ambiguity. It does not appear that hitherto the real sheath in which the horns of the hyoid bone, with its muscle, move, has been observed, and the two very slender muscles which run from the sides of the thyroid bone to the furcula, are common to almost all birds, although they have been supposed to be peculiar to Woodpeckers.

THE SPANISH BLOOD-HOUND.

In our last Number we gave an interesting and somewhat minute account of the differences which distinguish the African and Spanish Blood-Hounds, supplied by an anonymous correspondent to one of the Dublin Medical Journals. That interesting communication was terminated by an anecdote, which the author assures us is both authentic and original, illustrative of the courage, strength, and sagacity of the latter animal. We enrich our pages with an abridged account of it. "One morning the subject of this anecdote left home, and proceeded alone on a shooting excursion. I should scarcely, however, be justified in asserting that he went forth absolutely alone, for two powerful Tiger-hounds followed closely at his heel. His favourite Blood-Hound howled long and plaintively for permission to join the party, but his master was inexorable; he was tied up and left behind. Indeed, even the two Dogs he took with him were more as companions than from any idea he entertained that their services would be called into requisition. Had he expected danger, it was not on them he would have relied, but on the noble animal whose courage and fidelity he had so often proved, and who was now left at home.

"The day passed over without any remarkable encounter, and Mr A. was on his return home, his game-bag laden with feathered spoil, and a fine buck suspended from a projecting branch of a *marked* tree, awaiting the morning's sun till a slave should be sent for it. He had now nearly reached the outskirts of the wood, when he suddenly perceived in the thicket, on one side of the path through which he must pass, two small faint and twinkling lights, like that of a pair of Glow-worms; his practised eye instantly informed him that this appearance proceeded from nothing but the malevolent eyes of a wild beast—whether Cougar, Puma, Jaguar, he hesitated not to determine; one thing was certain, retreat was fatal, and to advance was apparently equally so. The sportsman's first action is to throw the barrel of his piece, unfortunately only a smooth bore, across his left arm, the thumb of his right hand cautiously and noiselessly cocks the gun, and the fore-finger of the same hand feels the trigger. Mr A. steadily advanced; he was not suffered to remain long in suspense; he had proceeded but three paces when with a terrific cry the Cougar (for such it was) sprung from its lair and dashed upon him. He fired, but apparently without effect; where were now his hounds? They had fled at the first glimpse of the furious beast, and rent the woods with their cowardly wailings! He struck indeed a few blows with the butt-end of his piece, but the robber of the forest was too nimble for him; a momentary struggle and he was upon his back. The ferocious Cougar was standing or rather crouching over him; one paw was upon his broad chest, and each protruded talon, penetrating his clothes and flesh, caused a stream of blood to trickle down his side; the other paw grasped his skull, and he felt as if each claw penetrated to his brain; his senses reeled, and his blood suffused his eyes and nearly blinded him: still, however, this heroic American fainted not, nor ceased struggling manfully for the victory. His vigorous arms were extended, and his hands grasped the monster's throat, thus keeping him for a time from bringing into play those rapacious jaws, which, as the hunter's strength declined, were gradually advancing into a closer proximity with his face; such a fearful struggle could not be of long continuance. The burning eyeballs of the Cougar glared nearer, and more near still, as they looked into the bloodshot orbits of the prostrate but still fearless victim; their owner was forced to turn them aside from the encounter, as if conscious of the dastardly nature of his attack, and the superior bravery though inferior strength of the man upon whom he couched. The powers of the man relaxed; Nature had done her utmost, she was at length exhausted. The darkness of despair was on the point of plunging his senses in unconsciousness, and death was about to seize upon his victim, when the brushwood behind him crashed and yielded before a heavy weight; the bay of a Blood-Hound awoke him to consciousness and hope, a large animal bounded upon his merciless foe, the shock hurled the destroyer from its prey, and the brave hunter felt that he was saved.

"An American hunter, whether a native of the Northern or Southern division of that vast Continent, rarely, if ever, loses his presence of mind. The prostrate and much-lacerated man tottered to his feet, and recovering his hunting-knife, which he had lost in the struggle, staggered forward, and at imminent further hazard to himself, plunged it repeatedly between the ribs of his late conqueror, who, although he had well-nigh mastered the Dog, (for such was his deliverer,) was still too firmly fixed in the Blood-Hound's gripe to foresee or evade his avenging thrusts. It then fell backwards and released its courageous opponent, who, however, despite his wounds, maintained firm hold of his throat until Mr A. had reloaded his gun, and, applying it to the monster's ear, put it out of pain, and deprived it of the capability of doing further mischief.

"Need I explain the occasion of this truly providential and almost miraculous rescue? The favourite Blood-Hound which, on quitting home, he had left behind him, had continued howling all day as if possessing a sort of prophetic prescience of the accident, by which his owner's life would be placed in such extreme danger, and having at length broken loose, had gone forth in quest of his missing master, and found him in time, but only just in time, to save him from one of the most horrible of deaths."

The Dog and Boa.—Lieutenant C. had a singular adventure near this place. He entered the jungle in search of game, preceded by a favourite powerful Dog, that had courage to seize any thing. The Dog ran a

little a-head, and suddenly made a noise as if choking. "Run, Master, a Cheetah has caught your Dog," said the natives. Lieutenant C. advanced cautiously, and saw a large heap just the colour of a Royal Tiger, black and orange. In a few minutes he beheld the head and neck of an enormous Boa Constrictor, slowly uncoiling itself and gliding towards him. He waited until half of the Snake was out of its coil or lump, and then fired both barrels. One ball entered immediately behind the eye; the other about four inches from the head. The whole coil immediately fell, and revealed the poor Dog crushed to death within its folds. In the meantime all Lieutenant C.'s followers fled, and he was forced to go to a village for assistance. Having with some difficulty mustered a little band, he returned and brought out the Snake, the Dog, and a Spotted Deer that the Snake had killed. The Boa was twenty-three feet eight inches long, and about six feet in circumference. There was a large cake of fat inside, all the way from the head to the tail; and of this the natives showed great anxiety to obtain possession, declaring it was an infallible cure of all diseases.—*Thirty Years in India.* By Major Bevan.

The Swallows and Cat.—One evening last week, while the wind was from the south, and blowing with sudden gusts, a Swallow's nest in the corner of a window in Maybole (Ayrshire) was blown down, and the scarcely fledged young, six in number, were thrown to the ground. Two of them were secured by the humane gentleman, the corner of whose windows the old ones had tenanted for many a year; three others were afterwards found on the street, and the five were lodged in a wooden dish in a garret room, where, the window being left open, the old birds entered, and converted the dish into a nest. The sixth, however, was still missing, nor was it discovered till an hour afterwards, when it was seen on the green sward, behind the house, in an imminently dangerous predicament. A Cat had marked it for her prey, and would have devoured it instanter, but that almost all the Swallows about Maybole had come to its rescue, screeching their bitter war-cry, were swooping at her in dozens, and whisking the hair out of her head at such a rate, that poor Grimalkin ran a great chance of being pecked to death! Fairly routed, Puss beat a speedy retreat, when, unprecedented though the incident may appear, the young Swallow was raised by about half a dozen of its brave defenders, carried up, not without difficulty, to the garret window, and restored to its place among the rest of the brood, all of which are now fully feathered, and will be soon on wing.—(*Newspaper Paragraph.*)

METEOROLOGY.

Effects of the Hurricane of January 7, 1839, in Ireland.—Under the above title, in a valuable communication from William Thomson, Esq., of Belfast, we find the following interesting particulars. In a letter from Viscount Cole, dated Hazelwood, Jan. 14, 1839, is the following passage:—"I mention underneath a curious fact hardly to be believed, but which two decent men would testify by affidavit—that on the morning after the hurricane a great quantity of Perch fry were found thrown up high and dry two yards, and some more, on the grassy shore of Church Island in Lough Gill or Hazelwood Lake, in the county of Sligo." In a note with which I was subsequently favoured, Lord Cole remarked, that he had "heard" of several Roach being thrown up on an island in Lough Earn on the night of the great storm. On the 24th of January, Robert Ball, Esq., wrote me from Dublin to the effect—that after the late hurricane, the dead bodies of Rooks, to the amazing number of 33,000, (as a matter of curiosity the number was reckoned by some boys,) were picked up on the shores of a lake some miles in extent, and with extensive rookeries on its borders, in the county of Westmeath; and that in the same locality numbers of Perch were thrown to some distance into the fields. The almost incredible mortality of Rooks induced me to make further inquiry, when I was informed that Dean Vignolles (on whose property the circumstance occurred) states that the number of these birds above mentioned were certainly destroyed. This gentleman likewise submitted to Mr Ball's inspection a more than ordinarily strong panel of a new window shutter which was driven in and broken through by a Rook dashing, or perhaps rather from being dashed against it on the night in question. He further mentioned that some of the Perch were found as far as fifteen yards from the edge of the lake.—*Ann. of Nat. Hist., May* 1839.

Meteoric Paper which fell from the Sky.—The celebrated Professor Ehrenberg has lately supplied the following information.—On the 31st January 1687, a great mass of a paper-like black substance fell with a violent snow-storm from the atmosphere near the village of Rauden in Courland; it was seen to fall, and after dinner was found at places where the labourers at work had seen nothing similar before dinner. This meteoric substance, described completely and figured in 1686, was recently again considered by M. v. Grotthus, after a chemical analysis, to be a meteoric mass; but M. v. Berzelius, who also analysed it, could not discover the nickel said to be contained in it; and Von Grotthus then revoked his opinion. It is mentioned in Chladni's work on Meteors, and noticed as an aërophyte in Nees von Esenbeck's valuable Appendix to R. Brown's "Botan. Schriften." I examined this substance, some of which is contained in the Berlin Museum, (also in Chladni's collection,) microscopically. I found the whole to consist evidently of a compactly matted mass of *Conferva crispata*, traces of a *Nostoc*, and about twenty-nine well-preserved species of Infusoria, of which three only are not mentioned in my large work on Infusoria, although they have since occurred living near Berlin. Moreover, of the case of *Daphnia Pulex?* Of the twenty-nine species of Infusoria, only eight have silicious shields, the others are soft or with membraneous shields. Several of the most beautiful exceedingly rare *Baccillariæ* are frequent in it. These Infusoria have now been preserved 152 years. The mass may have been raised by a storm from a Courland marsh, and merely carried away, but may also have come from a far distant district, as my brother Carl Ehrenberg has sent from Mexico forms still existing near Berlin. Seeds, leaves of trees, and other things of the kind scattered through the mass, were, on the examination of larger portions, easily visible. The numerous native Infusoria and the shells of the common *Daphnia Pulex* seem to speak thus much for the substance, that its original locality was not the atmosphere nor America, but most probably either East Prussia or Courland.—*Ann. of Nat. Hist., May* 1839.

HYDROGRAPHY.

SUDDEN DRYING UP OF SEVERAL OF THE PRINCIPAL RIVERS IN SCOTLAND.

A valuable paper concerning the drying up of the Rivers Teviot, Clyde, and Nith, and their tributaries, on the 27th of November 1838, was last session read by David Milne, Esq., advocate, to the Royal Society of Edinburgh, of which we supply the following summary:—"It appears that, betwixt 10 P.M. on the 26th November, and 6 A.M. on the 27th November, the channels of the Teviot, Clyde, and Nith, became nearly dry for a great part of their course, so that scarcely any current flowed in them. All the mills on the Clyde, as far down as several miles below New Lanark, were stopped from want of water. The Nith was nearly dry as far down as Enterkinefoot; and the mills on it, and on its tributaries, were stopped. This was the case also on the Teviot. The phenomenon was most strikingly manifested in the higher parts of the rivers, near their sources. The small streams from which they derive their supplies were in general completely dried up. The rivers, in the lower parts of their course, were not entirely deprived of their current; nor were the rivulets, which there supplied them, nearly so much affected as the rivulets in more elevated districts.

"The desiccation continued all the morning, forenoon, and part of the afternoon of the 27th November. When the current was restored, it returned not with a sudden rush, but gradually; nor, when the current was restored, did the waters rise much above their ordinary level.

"With reference to the cause of the phenomenon, some persons had attributed it to the *high wind* obstructing the flowing of the current; others, to the *frost* in forming barriers of ice on the caulds or dam-heads; others, again, had suggested that the phenomenon might be connected with an earthquake. In support of this last theory, it was mentioned, that Professor Phillips had, in a recent work on Geology, attributed to this cause the drying up of the English Rivers Trent and Medway, in the 12th century.

"Mr Milne stated that he adopted none of these views, and that he thought the phenomenon might be accounted for by the united action of the frost and wind which prevailed during the night of the 26th November. After four o'clock that afternoon, the thermometer all over the south of Scotland sunk to 26°, at which point it remained for several hours. Accompanying this frost, there was a gale of wind from the east, which had the effect of very rapidly reducing the temperature of exposed and unsheltered spots. In this way the small and shallow streams flowing in open drains and rivulets, or oozing through mosses and marshes in the hills, were soon frozen and arrested. But, on the other hand, larger bodies of water flowing rapidly in the main channels, at a lower level, and sheltered by high or wooded banks, could not in the same space of time lose enough of their temperature to be frozen. The waters thus ran off, without the usual renewal of supplies from the sources, so that the channel or bed of the river became speedily drained.

"The reason of this phenomenon not happening more frequently appears to be, that there is very seldom a gale of wind in this country accompanied by a severe frost; and even on this occasion, the frost was not equally intense over the whole island. When a severe frost sets in, there is usually but little wind, so that the water in the *upper* parts of the river is not liable to be cooled more rapidly than in the lower and more sheltered parts of its course. Though the sources will, in that case, to a certain degree, be frozen, and so, part of the usual supply cut off, the main body of the stream is frozen likewise, whereby the velocity of its current is diminished, by the obstruction of the ice at the bottom and at the surface of the current. So that, if only half the usual supply is furnished to the river from its partially frozen sources, there will be no diminution

in the quantity of water flowing in the main bed of the river, if it flows off with half its usual rapidity. This is the ordinary way in which frost acts on the rivers in this country. But when, as on the night of the 26th November, the frost is accompanied with a strong and keen wind, which lasts for only a few hours, it freezes the water in the small rivulets near the sources of the rivers in high and exposed situations, whilst it has not time to freeze even the surface of the deeper and more rapid currents flowing in the lower parts of the rivers.

"The easterly gale which, by its low temperature, produced this phenomenon, continued to blow until about 7 or 8 A.M. on the morning of the 27th November. The temperature of the atmosphere then underwent a sudden change, as indicated both by the barometer and the thermometer. This change was brought about by the advent of two storms, which came from southern latitudes, and one or perhaps both of which had, on the morning of the 27th, begun to affect the upper regions of the atmosphere, and load them with warm vapour."

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.—On the anniversary of the birth-day of Linnæus, the meeting was held at the rooms of the Society in Soho Square, the Bishop of Norwich, President, in the chair, when the annual report of the auditors was read, and Dr Boote, the Secretary, read a biographical list of the members who had died the previous year. The members afterwards dined at the Freemasons' Tavern, and the Bishop of Norwich gave a *conversazione* in the evening at his house in Lower Brook Street. Amongst various illustrations in Natural History, the most important was a portable machine for artificial incubation, from Mr Bucknell. There were exhibited birds in every stage of progression, from the embryo to the perfect, living, liberated, and healthful animal. A fresh egg was first broken to show the germ or ciatricula of the future being, and afterwards twenty-one eggs in succession, to show the process of development to maturity. Not one of the entire series was a failure, the whole possessing life and animation. Under a glass cover warmed artificially were about a dozen birds that had come into existence within a few hours, which displayed great vivacity; and in a second were placed eggs in which the birds were attempting to liberate themselves from their shells, which they perform in a curious manner, by making circular openings with their bills. The most wonderful phenomenon was the pulsation of the heart and the circulation of the blood, which in a living specimen continued the whole of the evening, without apparently suffering in the slightest degree from exposure to the light and air.—*Naturalist, July* 1839.

EDINBURGH SOCIETY OF ARTS.—*Observations on Boots and Shoes, with reference to the Structure and Action of the Human Foot.* By Mr JAMES DOWIE, M.S.A. Published in Edinburgh Philosophical Journal, April 1838.

MORE COMFORTABLE BOOTS AND SHOES.—This announcement will, we are persuaded, give joy to many. Learned treatises have been written on this subject by great philosophers before this time; and we wish we could say that these treatises had rendered others unnecessary. The communication before us is penned by a respectable and practical tradesman, which, in our apprehension, greatly enhances its value, and ensures regard. The experience of too many sufferers proves that we ought not to be satisfied with the "do well enough" principle, and we are confident, that skill and genius would meet an ample compensation by being directed to this subject. We trust that this has been the happy experience of our author, who seems to have been at the expensive vexation of taking out a patent. The paper dwells first on the defects of the common shoe, and then on the advantages of the patent one, which we have never seen. We can afford room only for two sentences of this respectable communication. "Some of the defects arise from ordinary leather not possessing that degree of pliability and elasticity which is requisite to admit of the natural action of the foot. Another important fact is, that the foot, when under the pressure of the body, is elongated. This principle of elongation seems to have been long admitted, inasmuch as boots and shoes have been hitherto made a little longer than the foot of the wearer; but it rarely happens that sufficient allowance is made, and many persons can scarcely even obtain shoes large enough for their feet. I believe I have remedied these defects by making those parts of the shoes immediately under, on each side of the principal arch of the foot, of an *elastic material*. This is composed of caoutchouc and animal skin, so manufactured, as to bestow on the fabric the elasticity of the caoutchouc, while it retains the tenacity and durability of leather. The introduction of this elastic substance allows considerable changes to be made in the form of the boots and shoes, and gives the wearers the free use of their feet and ankle-joints in walking to a much greater extent than any hitherto in use." Our notice of this paper is the more virtuous, because we are quite satisfied with our own boots and shoes, and have no intention of withdrawing from the obliging tradesman who supplies them; at the same time, if Mr Dowie can furnish comfortable shoes to those who now find them the reverse, we are sure he merits a *civic crown*.

BIBLIOGRAPHICAL NOTICE.

THE FRUIT, FLOWER, AND KITCHEN GARDEN.—*Being the Article* HORTICULTURE *of the Seventh Edition of the Encyclopædia Britannica.* By P. NEILL, LL.D., F.R.S.E., Sec. C.H. Soc.

THIS elegant little volume, as its title bears, is one of the many admirable dissertations of the current edition of the Encyclopædia Britannica, which the spirited publishers have reprinted from the goodly quarto, and presented to the public, at a moderate price, as a convenient sized "Hand Book." The name of the author, who has now, we believe, for nearly thirty years been the assiduous Secretary of the Caledonian Horticultural Society, is alone the most satisfactory guarantee of the excellence of the performance; and his past experience in this kind of composition must have gone far to make it well nigh perfect; for to say nothing of Dr Neill's other well known works on this particular subject, he many years ago prepared the article HORTICULTURE for Sir D. Brewster's Edinburgh Encyclopædia, and some sixteen or seventeen years ago gave an account of the principal advances of the art during the ten or twelve preceding years, in the Supplement of the sixth edition of the Encyclopædia Britannica. The plan of the Work appears simple and natural, and therefore excellent; treating first of the general properties and appendages of the Fruit and Kitchen Garden; of the Propagation, Planting, and Training of Fruit-trees; of the Culture of the *Hardy* Fruits, and the *Small* Fruits, of the Forcing Garden, and all its luscious sweets,—the Kitchen Garden, and all its useful supplies; and, finally, the *Flower* Garden, with its more showy and modest beauties; the whole being concluded with an original and useful Calendar, and illustrated with numerous excellent Wood-cuts. Nothing more, then, we are satisfied, is necessary to recommend the Work to the general attention of those interested in the subject. We cannot afford room for extracts, but in a single sentence we shall convey one sentiment of the author, which our own observation has sometimes verified, but by no means so universally as we have wished. "All circumstances being favourable, a British Garden is perhaps unrivalled in fertility by any cultivated spot in the world. A copious supply of esculents flows into the Kitchen at all seasons; and, after a rich abundance of fruit has been afforded during summer and autumn, the winter stores may be easily prolonged till the early forced fruits come again to the table."

MISCELLANIES.

SCIENTIFIC MEETING AT PISA, DURING THE AUTUMN 1839.—The influence and example of the great scientific meetings held annually in Germany, (where they originated,) France, and England, have at length reached Italy, and it has been resolved to establish an Italian Association for the Advancement of Science, to assemble in the autumn of this year at Pisa. Circulars, announcing the meeting and inviting co-operation, have just been received by many distinguished individuals, signed by Prince Carlo L. Buonaparte; Chev. Vicenzio Antinori, (Director of the Imperial and Royal Museum of Natural History in Florence,) &c. The following is a translation of so much of the circular as will interest the scientific men of this country:—"Following the advice of many, and the approbation of others, and in conformity with the successful practice in Germany, we have now to announce, that from the 1st to the 15th of October will be opened in Pisa, the Association of the Professors and Cultivators of the Physical Sciences in Italy, including Medicine and Agriculture; and we hasten, consequently, to make this known to Professors of the above-mentioned sciences in the several Universities of the Italian States, and to the Presidents of the most celebrated Academies of Europe, requesting them to communicate this notice to their various members, who will be honourably received amongst us. It will devolve on the senior Italian Professor, who may be present at Pisa on the first day of October, to open the meeting, of which he shall remain Director throughout its proceedings. It will be for him also to select a Secretary from among the Professors of the University of Pisa. The general assembly will, on the second day, divide itself into as many sections as may be requisite for the interest of the various branches of science; and the members of each section will elect an Italian President and Secretary. The General Assembly will decide, on the seventh day, when and where the Association shall meet in the following year. At the commencement of the month of August, circular letters will be sent, in which the local arrangements will be indicated, not only for lodgings, but for every thing that regards the accommodation and the agreeable quiet residence of all those who may be pleased to attend."—*Athenæum, April* 1839.

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SEPTEMBER, 1839.

BRITISH MAMMALIA.—THE WEASELS.

The Mammiferous Animals which occur in Britain being, on account of their habits, less subject to observation than Birds, and therefore more neglected, it is our intention to present a short account of them in connection. The number of ascertained species (not including the Cetacea) at present amounts to fifty-two; but it is probable that several remain to be discovered of the smaller kinds, such as Mice, Shrews, and Bats. Of these fifty-two species, fifteen are cheiropterous, eight insectivorous, thirteen carnivorous, fourteen belong to the order Rodentia, and two to the Ruminantia. As the Carnivora seem to merit the same pre-eminence which among Birds is accorded to the Raptores, we shall commence with them. They may be primarily divided into such as are Digitigrade, or walk on their toes; Plantigrade, walking on the entire sole of the foot; and Pinnipede, or with feet adapted for swimming. The Digitigrada are formed of five genera, of which the first is that composed of the Weasels.

I. Mustela, Weasel.—Four grinders above, five below, on each side; the body elongated; the feet short; the toes not webbed, the claws acute; the tongue rough, with sharp prominent papillæ. Of this genus three species are found in Britain.

1. *M. Putorius, Polecat, Foumart,* or *Fitchet.*—This species, which is about seventeen inches in length, is of a slender form, with the head of moderate size, oblong, the muzzle rather rounded; the ears short and rounded; the neck of moderate length, but nearly as thick as the body, which is very long, and nearly of uniform girth throughout; the feet short and strong, as in the other species; there are four toes on the fore-feet, five on the hind. The hair is rather long, the pile rather coarse, smooth and glossy, the under fur very soft and woolly; the general colour dark brown, the long hairs being brownish-black, the under fur yellowish, and more apparent on the sides; the lips and tips of the ears are white, and there is a brownish-grey patch between the eye and the ear.

The Polecat generally resides in woods and thickets, on the sides of hills, forming a burrow in the soil, or finding a secure retreat among blocks of stone, or in a crevice. When its settlement is in the neighbourhood of a farm-house, it is apt to commit depredations among the poultry, not only sucking eggs, but destroying chickens, and even grown-up fowls of the different kinds reared. It is not always content with obtaining enough of prey to satisfy its hunger, but frequently destroys all within its reach, biting into the brain of its victims, and, it is said, sucking or lapping their blood. Its great agility, cunning, and ferocious disposition, render it very destructive to game of all kinds: it destroys the eggs, often surprises the birds on their nests, seizes the young ones, catches Leverets, and hunts down Rabbits, which, on being pursued by it, seldom betake themselves to their holes, knowing by instinct that they have a better chance of escape in the open air. It also appears to feed occasionally on reptiles and fishes. The Ferret is supposed to be a domesticated variety of the Polecat, which it certainly much resembles in form and size, and with which it breeds. The Foumart produces five or six young ones in the beginning of summer. It is generally distributed in Britain, but is now nearly extirpated in many of the lower and more cultivated tracts. The fur, which is darker and of finer quality in winter, is held in considerable estimation, but is scarcely an object of traffic in our country, which is supplied from the north of Europe.

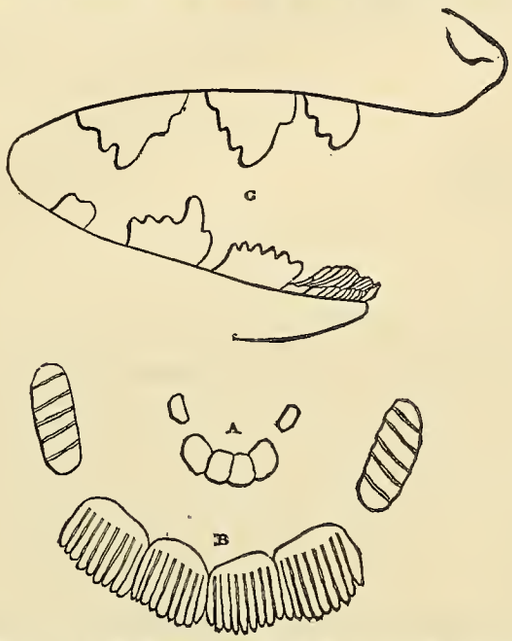
2. *M. Erminea, Ermine* or *Stoat.*—The Ermine is much smaller than the Polecat, its length being about fifteen inches, with the body much elongated in proportion to its thickness; its neck rather long, and almost as thick as the body; its head oblong, with a rather short muzzle; the ears rather large, broad, and rounded; the tail about a third of the entire length. The pile is shortish and soft, the under fur very soft and woolly. In winter the colour is yellowish-white, in summer brownish-red, on the upper parts; but at all seasons the terminal half of the tail is black. It appears that the change from brown to white at the beginning of winter is not caused by the bleaching of the hairs, but by the substitution of white for coloured hairs. This very beautiful and lively animal is similar in character to the Polecat, to which it does not yield in agility, address, or ferocity. It frequents stony places and thickets, usually forming a subterranean retreat for itself, but sometimes taking possession of a Rabbit's burrow. Its food consists of birds of various kinds, including Grouse and Partridges, young Hares and Rabbits, Rats, Moles, Mice, and eggs. It has been known also to commit depredations on domestic poultry. Its motions are extremely elegant, and in activity it certainly is not surpassed by any of our native animals, its bounds being of surprising extent; but although capable of great speed, it seldom trusts itself in an open place, its first object when pursued being to obtain the shelter of some bank or thicket. This species, to which the name of Club-tailed Weasel is sometimes given, is not uncommon in most parts of Scotland, but in England is seldom met with. Its fur, which is well known to be highly valued, is not with us obtained for sale, but is imported from the northern parts of the Continent.

3. *M. vulgaris, Common Weasel.*—This species is much smaller than the Ermine, from which, moreover, it is readily distinguished by its having the tail proportionally shorter, less bushy at the end, and without black, it being of the same colour as the body, of which the upper parts are brownish-red, the lower yellowish-white. It does not undergo a change of colour, like the Ermine, which it otherwise, however, resembles in form and disposition. It is generally distributed in England and Scotland, and appears to be more common in the cultivated districts, it being one of those small animals, which, finding more food in the vicinity of man, are enabled by their instinct to secure themselves against his animosity. This the Weasel can well do to a great extent, its extreme agility and slender form procuring safety for it where a larger animal would have little chance of escape. In barns and out-houses its presence is beneficial, for it destroys Mice and even Rats, which it can pursue into their holes; but it sometimes sucks the eggs of poultry, devours chickens, and even, small as it is, has been known to destroy full-grown poultry. Young Hares and Rabbits, young birds and eggs, Field Mice and Voles, form its ordinary food. None of our native animals appears to possess the courage of the Weasel, which, when its nest is plundered, has been known to spring upon the Dogs, and even to attack Men. It is said to produce five or six young ones, two or three times in the year.

The Vampire.—A great deal of curiosity was excited last week in St Katharine Docks, by the report of the arrival of a living Vampire. The vessel was crowded during the day, until its removal to the Surrey Gardens, to which establishment it was consigned. It is the Sumatran species, and the first living specimen ever seen in England. It is of the most horrible aspect, and well deserves the name of *Vespertilio spectrum*, given to it by Linnæus, remaining constantly suspended to the roof of his cage by the immense hooks at the edges of his wings, his head hanging downwards, and his eyes glistening with the most vivid brightness. It was mentioned by one of the persons on board, that during the whole voyage the Vampire had never been seen at the bottom of the cage.—*Times.*

TEETH OF THE FLYING LEMUR.

In the accompanying wood-cut, we supply a representation of the curious dental system of the Red Flying Lemur, that singular animal, about the size of a Cat, provided all round with a regular parachute which supports it in the air, and enables it to take immense leaps, though it cannot fly like the Bats. These sketches were supplied by Audebert, in his great work upon the Monkeys, and were taken from a stuffed specimen, in which the whole of the mouth could not be examined. Figure A shows the incisors of the lower jaw, of their natural size. In figure B these are magnified, to show their singular pectinated appearance. The foremost tooth in figure C is a profile view of the last of the incisors of the upper jaw; the next is regarded as the canine, and the third, very much of the



same shape, is the first molar, which is followed by four others, of the same general appearance, though somewhat less in size. The teeth are thus in many ways anomalous, as is the strange animal to which they belong.

The Hippopotamus, (*Hippopotamus amphibius.*)—This animal abounds in the Limpopo, dividing the empire with its amphibious neighbour the Crocodile. Throughout the night the unwieldy monsters might be heard snorting and blowing during their aquatic gambols, and we not unfrequently detected them in the act of sallying from their reed-grown coverts, to graze by the serene light of the moon; never, however, venturing to any distance from the river, the stronghold to which they betake themselves on the smallest alarm. Occasionally, during the day, they were to be seen basking on the shore, amid ooze and mud; but shots were most constantly to be had at their uncouth heads, when protruded from the water to draw breath; and, if killed, the body rose to the surface. Vulnerable only behind the ear, however, or the eye, which is placed in a prominence, so as to resemble the garret window of a Dutch house, they require the perfection of rifle practice, and after a few shots become exceedingly shy, exhibiting the snout only, and as instantly withdrawing it. The flesh is delicious, resembling pork in flavour, and abounding in fat, which in the colony is deservedly esteemed the greatest of delicacies. The hide is upwards of an inch and a half in thickness, and being scarcely flexible, may be dragged from the ribs in strips like the planks from a ship's side.

Of all the Mammalia, whose portraits, drawn from ill-stuffed specimens, have been foisted upon the world, *Behemoth* has perhaps been the most ludicrously misrepresented. I sought in vain for that colossal head—for those cavern-like jaws, garnished with elephantine tusk—or those ponderous feet, with which "the formidable and ferocious quadruped" is wont "to trample down whole fields of corn in a single night!" Defenceless and inoffensive, his shapeless carcase is but feebly supported upon short and disproportioned legs, and his belly almost trailing upon the ground, he may not inaptly be likened to an overgrown Pig. The colour is pinkish-brown, clouded and freckled with a darker tint. Of many that we shot, the largest measured less than five feet at the shoulder.—*Capt. Harris' Narrative.*

The African Elephant.—Much has been said of the attachment of Elephants to their young, but neither on this, nor any subsequent occasion of hunting that animal, did we perceive them evince the smallest concern for their safety; on the contrary, they left them to shift for themselves.—*Ibid.*

The Ostrich.—Miserably mounted as we were, any attempt to overtake this gigantic bird would have been vain, but a shot could always be obtained at arm's length, by galloping to a point in the course it had selected, and from which it rarely swerved. The male bird often measures nine feet at the crown of the head, and exceeds 300 lbs. in weight—the thigh being equal in size to the largest leg of mutton. Excepting the costly white plumes, so prized by the fair sex, and which are chiefly obtained from the wing, instead of from the tail, as generally imagined, the colour of the body is the deepest black in the male bird, and in the female a dingy brown. While running, the wings are raised above the back; and the clatter of the feet, which are only provided with two toes, resembles that made by a horse in trotting. The puny Bushman avails himself of the disguise afforded by its skin, to mix with a troop of wild animals, and select his victim. At the twang of his tiny bow, away scours the herd in dire consternation, and, more alarmed than all, off scuds the impostor with them, again propelling a shaft as soon as the panic has subsided. The destruction committed in this manner is incredible,—a slender reed, only slightly tipped with bone or iron, but imbued with a subtle poison, and launched with unerring dexterity, being sufficient to destroy the most powerful animal.—*Ibid.*

BOTANY.

FOOD FROM SEA-WARE.

A few years ago a Paper, by Mr J. Brown, junior, of Haddington, was read to the Society for the Encouragement of the Useful Arts in Scotland, concerning a vegetable principle, which, it was maintained, could be extracted from the common sea-ware growing so abundantly on the British coasts, and which, by a little ingenuity, might be converted into invaluable food for cattle and mankind. This proposal created a considerable sensation at the time, and was favourably reported of by a respectable committee of the society; and, as it must be universally a subject of regret, that a really useful prospect should be blighted and forgotten, we shall now endeavour to restore the one in question to popular attention, and promote, if possible, its practical application.

That these sea-wares (*fuci*—tangles) luxuriate in the richest abundance in almost every part of our rocky shores, is a fact too generally known to be insisted on; and it was a circumstance which our ancestors did not fail to improve. From them our soda, chlorine, iodine, and kelp, used formerly to be procured, and from this last article especially, till obtained more readily from other sources, there flowed much wealth to the manufacturer, and large fortunes to the proprietors. Were Mr Brown's anticipations to be realized, our sea-weeds, as they are designated, would yet become more profitable to their owners, and more useful to the community, than they have hitherto been.

Various circumstances lead to the supposition that the fuci might contain the elements of wholesome and substantial food. Our Irish brethren eat their *Carrageen*, and Scotchmen their *Dulce*; and the former of these, *F. endeviæfolius*, is now well known over the country by the name of "Irish Moss," as a nourishing and easily digested food for invalids. As to cattle, again, we are told that in Orkney they are in the habit, of their own accord, of descending to the sea-side for the purpose of devouring them; and in some parts of our coasts, it is a common practice to mix tangle with their ordinary food. If, improving upon these hints, we appeal to chemical analysis, we are speedily instructed that sea-ware contains, in large quantities, a vegetable principle of deservedly very high estimation. This ingredient by some chemists has been regarded *albumen*, (a familiar instance of which is exhibited in the white of the egg,) and by others as vegetable jelly, (*gelatine*;) but Mr Brown, following in the footsteps of others, has very successfully shown that these opinions are erroneous, and that the principle is identical with the *Mucilage* contained in the roots of the marsh-mallow, or the *pericarp*, or seed-vessel of linseed. Mucilage, we may here remark in passing, is very generally regarded as a mere watery solution of gum-arabic. But this appears to be a mistake, for the so designated mucilage of the chemist and pharmacopolist quickly acidifies and moulds, whilst true mucilage has the valuable property of never doing so. As to the quantity of this principle, Professor John states that one of the tangles, *F. vesiculosus*, contains 780 parts in every 1000; a statement Mr Brown considers exaggerated; whilst, according to his own researches, another kind, the *F. salmatus*, yields, by infusion, about half its weight of the principle in question. Some, it is ascertained, supply more than others; but such large proportions in so exuberant a production, procurable at a cheap rate, is invaluable.

As good mucilage suitable for feeding cattle, the food should be prepared on an extensive scale, as follows:—Let the tangle-ware be bruised by some rude machine; macerate a day or two in water acidulated by vitriol, wash well with cold water, boil some hours in three or four times its own bulk of water; strain, evaporate the decoction to a thickish ropy consistence; mix with bran, and put up in cakes. These cakes, after being dried, keep for any length of time, and may be given to cattle in the same way as linseed cakes, broken and mashed with warm water. The decoction might also be evaporated to dryness, and transported, in the form of

cakes of mucilage, or it might be dispersed from the manufactory as "dreg" is from distilleries.

A second proposal is, that the mucilage should be converted into gum-arabic, and applied to the purposes for which this substance is employed. To procure the mucilage in a perfectly pure unmixed condition, the following formula will be found adequate: Bleach some of the fuci by exposure to the sun—bruise them—macerate a day or two in often-changed acidulated water—boil half an hour in an extremely attenuated aqueous solution of sulphuric acid—agitate the decoction with animal charcoal, a little carbonate of baryta, and a little litharge. Filter and evaporate over a warm bath. After powdering the mass obtained in this way, and washing it with alcohol, fine mucilage is procured; and this, when boiled long with sulphuric acid, becomes similar to, or rather identical with, gum-arabic.

Gum procured in this way would serve all the purposes of foreign gum-arabic, and, from its cheapness, might be applied to a host of others. This substance would then, probably, not be so little used as an article of diet in this country, seeing its nutritious qualities are so well attested by the fact that the Moors of the deserts subsist upon six ounces a day for weeks together. Why then should so many of our countrymen bear the signs of famine in their eyes, and be continually exposed to the temptation of moral and political defection, while treasures of such wholesome food lie scattered in such kind profusion on our shores? We can perceive no reason why advantage should not be taken of this mucilaginous matter growing indigenously and so abundantly in our island; we might thus save another of its native products from the obloquy of uselessness, create another object of industry for some of its unwilling idlers, and erect another defence against the melancholy invasion of scarcity and famine.

METEOROLOGY.

SHOOTING OR FALLING STARS.

A LARGE share of attention has within these few years been directing to the occurrence of shooting or falling stars, as they are called, which has been much augmented by M. Arago having lately made the phenomenon the subject of his contribution to the *Annuaire du Bureau des Longitudes*, the authoritative nautical almanac of the French government. The distinguished philosopher states, that these stars have most frequently attracted attention in the months of April and November; and particularly requests that all observers throughout the world, on sea and land, would particularly watch the celestial phenomena on the nights between the 10th and 15th of November, signalizing this period, if we remember right, from the supposition that at that time our globe, in her annual circuit, approximates a region where these singular luminaries are especially rife. A time intermediate between the two just specified, namely, the 10th of August, has long been signalized in Germany, as remarkable for this appearance, and to some of the particulars observed at that date, in the current year, we shall now shortly advert.

On the 14th of August last, M. von Boguslowski, of Breslaw, supplied the following particulars to the Prussian State Gazette. The night of the 10th of August was particularly propitious for observing the falling stars. An extraordinary fall was noticed as soon as the dark permitted. Fifteen individuals, who assembled in the observatory, and occupied six windows, began their observations at 6″ past nine o'clock. Till 14″ past three, when the dawn put a stop to their labours, they noticed 1008 falling stars, not including numbers which must have been overlooked on account of the insufficient numbers of observers. The courses of 977 of these were marked upon the star maps, with all the circumstances relating to them. Five stars appeared as bright as Venus, 14 as Jupiter, 238 as stars of the first magnitude, 354 of the second, 257 of the third, and 101 still smaller, were reckoned. Next night three individuals engaged in the same task, and, though the sky was partly clouded, saw 323 falling stars; and in the night of the 12th, one gentleman counted 103 from ten P.M. to 45″ past one. The following paragraph, copied from a recent Brussels Paper, throws additional light upon the phenomenon. During the night of the 9th and 10th of August, the heavens were bestrewed with falling stars of extraordinary brightness. Mr Forster counted above 600 of them. It is not a little singular, that the peasants of Franconia and Saxony have believed for ages past that St Lawrence weeps tears of fire, which fall from the sky every year on his feast-day, the 10th of August. And, finally, we may notice that Professor Powell, at the late meeting of the British Association for the Advancement of Science, at Birmingham, stated that, on the 10th of August, he saw at Tunbridge Wells, a very brilliant exhibition of these meteors; they averaged from 15 to 20 in the quarter of an hour; they all left trains of light after them; and the motion of all was from north to south.

At this same meeting, Mr Addison mentioned, that having on one occasion been surprised by observing, through a break in the clouds, something like a shower of stars, he ascended the neighbouring Malvern Hills, to a height sufficient to raise him above the clouds, when a spectacle was unfolded to his view such as he never expected again to behold; the number of shooting stars or meteors was so great, that he could compare it to nothing so well as to a shower of fire: each star as it fell seemed to leave a long train of fire after it for some seconds. He had his seconds watch, and was thus able to count 48 in a minute flitting about. This was on the 15th of November 1832, a season more favourable than the 10th of August, and one which we know is watched by many observers.

In connection with this interesting but still very obscure subject, we are solicitous to record a remarkable appearance lately noticed in London. At two o'clock on Wednesday morning, September 4, the whole of London was illuminated as bright as noon-day, and the atmosphere was remarkably clear. The southern hemisphere, although unclouded, was very dark; but the stars, which were innumerable, shone beautifully. The opposite side of the heavens presented a singular but magnificent contrast. It was clear to the extreme, and the light was very vivid; and there was a continual succession of meteors, which varied in splendour. They apparently formed in the centre of the heavens, and spread till they seemed to burst; the effect was electrical: myriads of small stars shot out above the horizon, and darted with that swiftness towards the earth that the eye scarcely could follow the tract. They seemed to burst also, and throw a dark crimson vapour over the entire hemisphere. Nothing could be more magnificent than the colours which were seen. At half-past two o'clock the spectacle changed to darkness, which, on dispersing, displayed a luminous rainbow in the zenith, and round the ridge of darkness then overhanging the southern portion of the country. Soon afterwards, columns of silvery light radiated from it, they wonderfully increased, intermingled with crimson vapour, which formed at the same time, and which at full height displayed a sublime spectacle. Stars were darting about in all directions, and continued till four o'clock, when all died away.

BIBLIOGRAPHICAL NOTICES.

Principles of General and Comparative Physiology, intended as an Introduction to the Study of Human Physiology, and as a Guide to the Philosophical Pursuit of Natural History. By W. B. CARPENTER, Memb. Roy. Col. of Surgeons, Lond. &c. Lond. 1839.

WE are solicitous to recommend this volume to the notice not only of the professional student, but also to the general reader who is interested in the subject; and especially to the intelligent youth of both sexes, who delight in the fascinating science of physiology. The author was led to undertake the Work from experiencing the want of one on a similar plan, during the course of his own studies, and he seems assiduously to have mastered the subject, and, with peculiar tact, to have made it patent and agreeable to others. It is now generally allowed that Physiology can only be properly studied by a constant reference to the comparative structure and functions of many different classes of animals; and, in most of the recent works on this science, an outline of the development and actions of each system in the inferior tribes is prefixed to the details relating to its condition in Man. This outline is filled up in the present volume, not only by amplifying the portion of it which relates to the Animal Kingdom, but also by the introduction of a similar view of the comparative structure and functions of vegetables, which is here shown to be governed by the same laws. This constitutes the peculiar feature of the work; and we believe is the first attempt in this country to form any thing like a systematic comparative Physiology of Vegetables.

The treatise is accordingly divided into three parts. The first comprehends organized structure in general, and branches out into elementary vegetable structure, and animal structure, and the transformation of tissues, to which succeeds a general view of the vegetable and animal kingdoms. A *Book* then follows on General Physiology; and another, the last, and by much the longest, on Special and Comparative Anatomy. It is quite beyond our power to convey within our limits any adequate conception of the varied merits of this volume. With the studies akin to Physiology, the author seems most familiar, more especially with Botany and Chemistry, and he evidently has drunk deep at the streams of the inductive philosophy. He is, moreover, a skilful draughtsman, and has illustrated his statements with several hundred very elegant and expressive engravings and wood-cuts. The tone and style of his writing also are excellent; in proof of which, we must make room for one characteristic extract. "There is another set of changes in which vital actions would seem yet more intimately concerned, but which still appear to be *immediately* dependent upon the same laws which regulate inorganic matter. These consist in the production, from the alimentary materials, of *organic compounds*, either such as gum, sugar, albumen, gelatine, &c., which are destined to be still further organised, or such as urea, cholesterine, &c., which are to be thrown off from the system. This process must not be confounded with that of *organization*, since it only prepares the materials upon which that is concerned. It will be hereafter shown, that the nutritious elements contained in the food do not serve for the support of the structure, until they have been united into new combinations; and there appears good reason to believe that these preparatory changes are of a

strictly chemical nature, since many of them are imitable in the laboratory of the philosopher. There may be recognised in them, more or less distinctly, the action of physical laws operating under those peculiar conditions which the living organism alone can perfectly supply; and, in so far as the skill of the chemist can imitate those conditions, he may hope to produce similar combinations, as to a small extent has already been effected. But no one can ever hope to effect the *organization* of such products, or their conversion into living structures; since it is unquestionably an action of a strictly *vital* character, and, as far as we at present know, is dependent upon the previous existence of some other organised body."

The author has commenced his public career under very flattering circumstances. The work before us embraces the substance of an Essay on the "Laws regulating Vital and Physical Phenomena," to which, in the year 1837, was adjudged the Annual Student's Prize, by the Medical Faculty of the University of Edinburgh; and also, of an Essay on some Departments of Vegetable Physiology, which received the First Prize given by the Professor of Botany in the year 1836. Dr Carpenter is now, we observe, connected as a Teacher with the Medical School of Bristol. This city is honoured by the residence of Dr Prichard, one of the chief ornaments of science of whom Britain can now boast; and we cannot indulge a more appropriate wish than that our author, proceeding as he has commenced, may follow the footsteps, and imitate the career, of his illustrious fellow-citizen.

A History of British Birds, Indigenous and Migratory, including their Organization, Habits, and Relations, &c., illustrated by numerous Engravings. By William MacGillivray, A.M., F.R.S.E., &c. &c. Vol. II.

It would be an act not only of fastidiousness on our part, but of injustice to our Readers, were we not to intimate the appearance of the second volume of our excellent associate's History of British Birds. It contains descriptions of the British species of birds constituting the ordinal group which the author has named *Cantatores* or Songsters, disposed into the Seven Families of the *Myrmotherinæ*, Antcatchers and allied species,—the *Turdinæ*, Thrushes and allied species,—*Alaudinæ*, the Larks,—the *Motacillinæ*, Wagtails,—the *Saxicolinæ*, Stonechats, —the *Sylvianæ*, Warblers, and the *Parinæ*, Tits and allied species; in all twenty-one genera and fifty species, together with two "Lessons," as they are called, of Practical Ornithology; the former chiefly upon the Organs of Respiration, and Voice of Birds, and the latter being an account of an Ornithological Excursion in the Environs of Edinburgh, in which Mr Audubon was one of the party. The volume is illustrated with four plates, containing about fifty figures, and ninety wood-cuts, mostly, if not all, from preparations and sketches made by the author.

To this simple intimation we shall subjoin the few extracts our limits will allow. From the first lesson we copy the following sentences: "We have thus traced eleven pairs of muscles belonging to the trachea: five pairs being appropriated to the larynx, two pairs to the tube of the trachea, and four pairs to the syrinx, as I have called it, or inferior larynx. You will find the number stated in books to be much less; but we take our lessons from Nature, and regard no other authority. It is by these muscles that the different parts of the air-tube are stretched and relaxed, opened and closed, so as to produce modulated sounds; and all this complex apparatus is necessary to enable a Rook to emit its various cries, which, however, are much more numerous than is generally supposed, and fully as diversified as those of the Blackbird, although it has not the faculty of emitting them in continuance, so as to form what is called song. * * * The modifications of these organs, presented by the different species of this order, are slight, and, in all those which I have examined, I have found the same parts, and the same number of muscles. The peculiar songs of different species must depend upon circumstances beyond our cognition, for surely no one could imagine that the Raven, the Hooded Crow, and the Rook, require as complex an apparatus to produce their unmusical cries, as that which the Blackbird, the Song Thrush, the Nightingale, and the Linnet, employ in modulating their voice, so as to give rise to those melodies which are so delightful to us; and yet the knife, the needle, and the lens, do not enable us to detect any inferiority in the Warbler over the Crow."

The following we extract from the account of the Pied Wagtail.—"The places usually frequented by this beautiful bird are the margins of streams, ditches, pools, and lakes. Towards the end of July, when the cares of rearing their young are over, they betake themselves in great numbers to the mouths of rivers, especially such as have marshy meadows along their sides, or muddy expanses to which the tides have access. Often one may see them wading in shallow places in quest of insects and worms, carefully holding up their tail, to prevent its being draggled. If you watch the motions of an individual just coming up to join the party, you see it alight abruptly, twittering its shrill notes, and perching on a small stone, incessantly vibrate its body, and jerk out its tail. It now perhaps walks out into the water, and searches for food, or, finding none, flies to the shore, and runs along with great rapidity, stopping and stooping now and then to pick up a tiny wormlet, and momentarily spreading out its ever vibrating tail. * * * Now it runs into a meadow in pursuit of a fly, which it has no sooner caught than it spies another. The lazy geese, which have nibbled the grass bare, allow it to pass in the midst of them without molestation, or, if some malicious Gander or foolish Gosling attempts to seize it, they find they have given themselves too much credit for dexterity. There the Cows are grazing, in the midst of a swarm of Gnats and other insects, and the Wagtail has arrived in the vicinity. Running forward, it catches a small fly, bends to one side to seize another, darts to the right after a third, and springs some feet into the air before it secures a fourth. While in pursuit, it encounters another of its own species; but they quarrel not, no doubt aware that there is room enough for them in the world, or even in the meadow, which we now see to be covered with Wagtails, all busily occupied, some walking, others running, a few flying off, and many arriving. You may walk in among them; they are not very shy, for they will allow you to come within fifteen yards, or sometimes less; and you may shoot as many as you please, for although some will fly off, others will remain."

MISCELLANIES.

Galvanic Telegraph.—This Telegraph, quick as Light, we are glad to learn, is in actual operation, and succeeding to a wish. It is in daily use on the Great Western Railway from Paddington, as far as West Drayton, a distance of about fourteen miles, between which places an answer can be asked and answered in about two minutes; and it is the intention of the Company to carry it forward as far as Bristol. The wires communicating with each end pass through a hollow iron tube not more than an inch and a half in diameter, which is fixed about six inches above the ground, running parallel with the railway, and about two or three feet distant from it. The space occupied by the machinery, which stands upon a table, and can be removed to any part of the room, is little more than that required for a hat-box. The Telegraph is worked by pressing small brass keys, (like those of a keyed bugle,) by means of galvanic power, upon various hands placed upon a dial plate at the other end of the telegraphic line. These point to every letter of the alphabet, to the numerals, and all the various points used in writing or printing. There is also a sign for a mistake having been made—when an erasure must be made. The numerous benefits which may result from this simple apparatus cannot easily be predicated.

Antarctic Expedition.—The Council of the Royal Society have now finished the Report they were requested to draw up for the guidance of the scientific expedition about to proceed to the antarctic regions under the auspices of the British Government, and the command of Captain James Clark Ross. Among the individuals of eminence who assisted in its construction were the Marquis of Northampton, Sir J. F. Herschel, Dr Faraday, Professors Grant, Lyell, &c. The expedition, which is abundantly provided for, is to conduct its observations in concert, on the most extensive scale; and several of the leading members of the Royal, the Geographical, and the Zoological Societies, have signified their intention of joining it.

Shower of Butterflies.—Captain Fitzroy, in his late interesting Narrative of the Surveying Voyages of the *Adventure* and the *Beagle*, records the following strange phenomenon as having occurred on the coast of South America:—"The horizon was strangely distorted by refraction, and I anticipated some violent change. Suddenly, myriads of white Butterflies surrounded the ship, in such multitudes, that the men exclaimed, 'It is snowing Butterflies.' They were driven before a gust from the north-west, which soon increased to a double-reefed top-sail breeze, and were as numerous as flakes of snow in the thickest shower. The space they occupied could not have been less than 200 yards in height, a mile in width, and several miles in length."

We are sorry to observe that "The Naturalist" of this month contains the intelligence, that the existence of this respectable and amusing periodical has come to a close. The editor, Mr Neville Wood, well known as a zealous Zoologist, and especially for his acquirements in Ornithology, ascribes its want of success to its having been printed in the country; and, unquestionably, a metropolis affords many advantages for the conduct of a periodical. We lament the event for our own sakes, having often received gratification from its pages; but trust the cause will not long suffer from its suspension. The late editor well merited the approbation of the Naturalist for his services, and we shall hail the day, when the opportunity offers for his executing his present purpose, of still further promoting the interests of Natural History.

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BRITISH QUADRUPEDS.—THE MARTEN AND OTTER.

A GENUS very intimately allied to that of the Weasels, and indeed scarcely separated from it on sufficient grounds, is that formed by the Martens, which have the same slender form, and the same number of toes, which are not webbed, but differs in having one grinder more on each side, and an elongated bushy tail, while the tongue, in place of being scabrous, is smooth. Only one species occurs in Britain.

Martes foina.—The Common Marten. Considerably larger than the Polecat; greyish or yellowish-brown above; the feet and tail chocolate-brown; the throat yellow in younger, white in older individuals; the tail, including the hair, as long as the body, exclusive of the head. The head is rather flattened above, somewhat triangular, and tapers to a rather sharp muzzle; the eyes rather small: the ears short, broad, and rounded; the limbs of moderate length. The fur is dense, rather long, and soft, more elongated on the hind parts, and especially the tail; the under fur thick and woolly.

Two species of Marten figure in most works on the Mammalia of this country:—The Beech Marten, *Martes fagorum*, and the Pine Marten, *Martes abietum*; the former with the throat white, the latter with that part yellow; but, on comparing specimens, it has been found that the form and proportions are the same, that individuals intermediate in colour are seen, and, besides, that at one season the throat of the same individual may be yellow, and at another white.

The Marten, although found in woods, nestling sometimes in deserted nests of rooks or hawks, and climbing trees with the greatest facility, is not essentially sylvicolous, for it occurs in the outer Hebrides, which are totally destitute of wood, and all over the Highlands its residence is among loose blocks or stones on the sides of the hills. In other parts of the country it is occasionally met with in woods, but more frequently in rough or stony ground, on the sides of valleys overgrown with bushes. Sometimes it takes up its abode in ruined buildings, and can ascend a wall with the greatest agility. It is one of the most graceful, active, and lively of our native Quadrupeds, runs with great speed, and has been known to perform very surprising leaps. Its food consists of the flesh of small Quadrupeds, and of Birds of all kinds, being very destructive to feathered game. Now, however, it is of very rare occurrence, owing to the hostility of gamekeepers and shepherds, and for every Marten killed in the country there are at least ten Polecats. The fur is valuable, and is imported in great quantity from the northern parts of the Continent, where it is very abundant.

The Otters differ from the Weasels and Martens in having the feet short, the toes webbed, the body very long and cylindrical, and the tail long, tapering, and a little flattened. They live chiefly on fish, and reside on the banks of rivers and lakes, as well as the shores of the sea.

Lutra vulgaris.—The Common Otter. This species varies in size and somewhat in colour, some individuals measuring four feet in length, while others are half a foot shorter, and the colour being of various shades of brown. Its body is very long and cylindrical, the neck thick, the head depressed and broad, the muzzle short, broad, and rounded; the eyes very small, as are the ears, which are broadly rounded. The legs are short, very muscular, and exceedingly flexile; the feet with five toes connected by membranes extending to three-fourths of their length, with naked soles and acute claws. The fur is short, the long hairs flattened and acuminate, the woolly hairs extremely fine. The colour of the upper parts is dark brown, sometimes blackish-brown, or greyish-brown; the sides of the head and the fore part of the neck brownish-grey; the lower parts not much lighter than the upper.

The Otter lives almost exclusively on Fish, which it pursues not only on rivers and lakes, but also in estuaries, bays, and even the margins of the open sea on the most exposed headlands. It has been thought that from this difference of habits, two species occur in Britain; but skins of Otters from Shetland, Orkney, and the Hebrides, differ in no essential respect from skins of Otters killed on rivers in the south of Scotland and in England. On shore the Otter runs with considerable speed, but not with a bounding or leaping motion, like the Martens and Weasels. In the water it moves with astonishing ease, swimming with a speed equal to that of many Fishes. Although capable of remaining immersed a considerable time, it cannot eat a Fish under the water, but brings it on shore, usually to the nearest point, and, commencing at the shoulders, devours it downwards, leaving the head and tail. It is said to destroy great numbers of Salmon in rivers and estuaries, and for this reason is proscribed. Along the coast it finds a retreat in caves, or among blocks, whence it is hunted by small Terriers. On rivers and lakes it retreats to holes in the banks, or beneath the roots of trees. Although properly piscivorous, it sometimes attacks young domestic animals, and has been known to devour earthworms and larvæ. The number of young is said to be from three to five. When taken young, the Otter may be tamed, and even taught to fish for itself and return to its home.

ON THE HABITS OF A NEWLY DISCOVERED SPECIES OF LONG-SNOUTED MOUSE.

M. DUVERNOY, in a late volume of the Memoirs of the Strasburg Natural History Society, supplied the first description which has appeared of the *Macrocelides*, which he has designated from its discoverer *M. Rozeti*; and Dr Moritz Wagner has still more recently, in Wiegman's Archives, 1839, supplied some observations concerning its habits. This curious small Insect-eater, he observes, inhabits the western portion of the Province of Algiera, and has hitherto been discovered only in the neighbourhood of the towns of Oran, Tlemsan, and Arzew, and is obtained with much difficulty even there. Captain Rozet, who first sent it to France, procured it in a rocky mountain to the west of Oran, whose summit is crowned by a Marabut temple and the Spanish fort of St Cruz. The animal lives there among the cavities formed by large fragments of rocks. It seeks out natural places of concealment, and does not excavate holes; the female, however, forming a nest for her young amongst the most dense thickets of the dwarf palm. In the early hours of the day the animal quits its hiding-place, and picks out a sunny spot; and during the middle of the day, lies in the shade, among the shrubs, there lurking for its prey—the Insects which settle on the lower plants. It prefers Insects, Larvæ, Grasshoppers, and especially Snails, in fact, all small soft animals. Incapable of breaking the hard house of the *Helix lactea*, it thrusts its remarkably prolonged narrow mouth into the aperture, and generally tears away a portion of the Snail before it has time to draw itself completely into the interior of its shell. Dr W. kept twelve animals for some weeks alive in his lodgings, and fed them on small Orthoptera. They would not touch bread, maize, or sugar, although Captain Rozet states that he supported his on bread. They are exceedingly gentle animals, never biting even when tormented. They do not go on the hinder-feet, like the genus *Dipus*, or Jerboas, but always on all-fours, and when running, the length of their hind-limbs is not perceived. On the other hand, when sitting on a rock, they are frequently in the attitude of a Rabbit, either

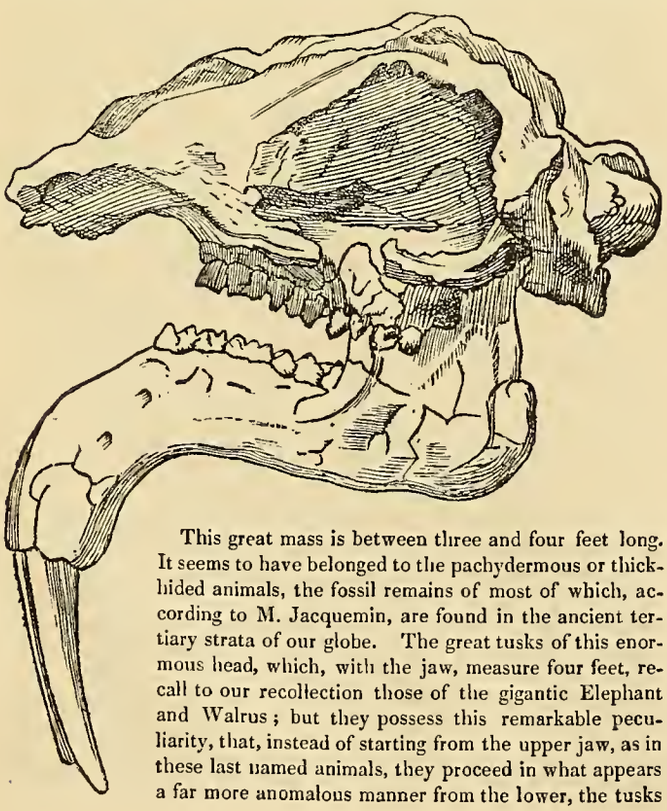
* OCTOBER 1839.—We have this month the pleasure of announcing that we have prepared a SUPPLEMENTARY NUMBER of the Journal, consisting of Titles, Preface, Lists of Plates and Woodcuts, and a copious Index to the First Volume of our Work. To this we have added two Plates: one, the Rhinoceros, wholly new, derived from sources which were not in existence when our former Plate appeared; and the other, of the Camels, greatly altered and improved. For the valuable figure, No. 1. of the Rhinoceros Plate, we avail ourselves of this opportunity of tendering our thanks to D. A. Smith, the distinguished Naturalist, so well known as connected with the Cape, for the permission he kindly granted to copy one of the series of his beautiful "Illustrations of the Zoology of South Africa," now in course of publication. Our Readers, in binding their copies, will have the kindness to substitute these plates for the former ones of the same animals.

watching their pursuers or looking for their prey. When catching Insects on the wing, they hide themselves among the dwarf palm, and generally endeavour to catch their prey with a long spring, in which the length of their hinder-feet is of great service. During the hot months, and in rainy days, they disappear; and the best time to procure them is spring and autumn. The soldiers found the very small young of this Long-snouted Mouse in the month of February, consequently the pairing-time must be the winter. When imprisoned, they give out a very peculiar and strong exhalation. A single individual, which had been confined for some days in a large case, left an odour which the box retained for several weeks. Among themselves they are very mild, and not quarrelsome, and are not observed to fight even about their food.—*Ann. of Nat. Hist.*

Aerial Voyages of Spiders.—The power of certain Spiders to make long aërial voyages must be pretty generally known, but seldom has it been more strikingly illustrated than in the following interesting narrative of a recent intelligent traveller. "One day," says Dr Darwin, "the weather having been fine and clear, the air was full of patches of the flocculent gossamer web, as on an autumnal day in England. The ship was 60 leagues distant from the land, in the direction of a steady though light breeze. Vast numbers of a small Spider, about one-tenth of an inch in length, and of a dusky red colour, were attached to the webs. There must have been, I should suppose, some thousands on the ship. The little Spider, when first coming in contact with the rigging, was always seated on a single thread, and not on the flocculent mass. This latter seems merely to be produced by the entanglement of the single threads. The Spiders were all of one species, but of both sexes, together with young ones. The little aëronaut, as soon as it arrived on board, was very active, running about; sometimes letting itself fall, and then re-ascending the same thread; sometimes employing itself in making a small and very irregular mesh between the ropes. It could run with facility on the surface of the water. When disturbed, it lifted up its fore-legs in the attitude of attention. On its first arrival it appeared very thirsty, and with exserted mamillæ drank eagerly of the fluid. Its stock of web seemed inexhaustible. While watching some that were suspended by a single thread, I several times observed that the slightest breath of the air bore them away out of sight in a horizontal line. On another occasion, under similar circumstances, I repeatedly observed the same kind of small Spider, either when placed, or having crawled, on some little eminence, elevate its abdomen, send forth a thread, and then sail away in a lateral course, but with a rapidity which was quite unaccountable."—*Voyages of the Adventure and Beagle.*

CRANIUM OF THE DINOTHERIUM GIGANTEUM.

The accompanying engraving, (which is an accurate copy of one in a late volume of the Magazin de Zoologie,) representing the cranium of what has been called the Dinotherium giganteum, belongs to one of the most extraordinary extinct animals with which we have been made acquainted by the discoveries of fossil Zoology, and well merits attentive examination.



This great mass is between three and four feet long. It seems to have belonged to the pachydermous or thick-hided animals, the fossil remains of most of which, according to M. Jacquemin, are found in the ancient tertiary strata of our globe. The great tusks of this enormous head, which, with the jaw, measure four feet, recall to our recollection those of the gigantic Elephant and Walrus; but they possess this remarkable peculiarity, that, instead of starting from the upper jaw, as in these last named animals, they proceed in what appears a far more anomalous manner from the lower, the tusks and their sockets describing a complete semicircle as the shaft is prolonged downwards. No disposition similar to this is found in any of the existing races of animals, nor, so far as we are informed, in the extinct. Many other remains of this animal have at different times and places been discovered, so that a complete conception has been formed, not only of its skeleton, but also of its softer covering and general lineaments. These we may on a future occasion represent, when it will be seen that, furnished with a great proboscis, it must have possessed a general resemblance to the Elephant of the present day, and still more to the larger Mastodon of a former period.

This cranium was discovered under the auspices of Dr Kaup, keeper of the Museum at Dramstadt, by a gentleman named Klipstein, whilst making a drain on his property near Eppelsheim, a small town on the left bank of the Rhine, in the grand duchy of Hesse. It was raised from a depth of 18 feet, where it lay imbedded in marly clay, and required no small care lest it should be injured. It was cautiously freed from the surrounding soil, and all beneath was removed save ten columns, which were allowed to remain, and on which it reposed. For these natural columns, artificial ones of gypsum were substituted, and finally it was made to rest upon a firm slab of this gypsum; beneath this bars of iron, terminating in strong rings, were placed, and a dozen of men elevated it by pulleys safely to the surface, amid the acclamations of a crowd of curious spectators: it was then carefully conveyed in a carriage to Dramstadt, a distance of 40 miles.

Dr Kaup conceives that the Dinotherium was a terrestrial animal which frequented the banks of rivers, and fed upon the roots, &c. which grew upon its banks, uptearing them with its tusks, and conveying them to its mouth with its trunk; and M. de Blainville states, that he considers that this animal of the ancient world is a lost link intermediate between the Elephants and herbivorous Cete, including the Dugong, Manatus, &c. This opinion is favoured by Dr Buckland's remark that the cranium has a strong resemblance to those of the order Cetacea.

ANTARCTIC EXPEDITION.

We derive the following particulars concerning this interesting expedition from a correspondent of the "Literary Gazette," who accompanied it at starting. "The Erebus, Captain James C. Ross, and Terror, Captain Crozier, seem to be twin ships, alike in build, in colours, in masts, and rigging, and, indeed, in every external appearance. An inexperienced eye could not tell the one from the other. The Erebus is about 370 tons, the Terror 340. In each the full complement of officers and men is 64—128 in all. Nothing that the art of the shipwright could accomplish has been omitted to fit them for their perilous undertaking. * * * They are victualled with fresh provisions for three years; and pemmacan and prepared meats in cases are stowed away in the least possible compass. The provision of scientific instruments, under the superintendence of the Royal Society, is very complete; and double sets, to supply the loss of any which may be broken or rendered useless, seem almost to furnish the commander's cabin. In this respect the Admiralty has been most liberal; and indeed we may say, that, after the first official difficulties were got over, the Government has taken up the expedition with the most commendable spirit, and done every thing that can contribute to its successful issue. The phenomena of terrestrial magnetism will be independently observed throughout the voyage, and also in connection with the new observatories about to be established at St Helena, the Cape, Van Diemen's Land, &c. The declination, inclination, and intensity of the magnet will thus form tables of the utmost importance towards solving this grand problem; there are besides dip circles, transits with azimuth circles, and chronometers of the most approved construction. There are also pendulums for ascertaining the true figure of the earth, thermometers for determining the temperature of the sea at given depths; photometric sensitive paper for experiments on light; barometers; glasses for sideral observations; drawing utensils; repositories for geological, botanical, and natural history specimens; hygometers; and, in short, such means to employ, and so much to be done, that there will be no great leisure for our enterprising countrymen when all these instruments are put in requisition, and their results are regularly chronicled for the information of the world.

The earlier proceedings of the voyages will lead them to St Helena, where Lieutenant E. Wilmot, Royal Engineers, will be left in charge of the new observatory. Next, at the Cape, another officer will be landed for a like purpose. The vessels then make their way across the ocean, touching at and examining Kerguelin's Land, Amsterdam, and other islands. Arrived at Van Diemen's Land, the instruments, &c. for the observatory will be sent ashore, and, whilst it is erecting, they will cruise to various points where the scientific pursuits of the expedition are most likely to be advanced. On their return they will start *de novo* in a direct southern course, towards the antarctic pole. How far they will penetrate is in the hands of Providence. They will afterwards circumnavigate the pole, and try in every quarter to reach the highest point, whether

near Enderby's Land discovered in 1832, or by Captain Weddell's furthest reach, about 73°, in 1823. It is between Sabrina Land and Balleny Isle, to the northward, and in about 50° and E. long. 140°, that it is expected the south magnetic pole will be found. Strange if he who discovered either that of the north, or so near an approach to it, as Captain James Ross did, should also ascertain this long sought phenomenon. We had forgotten to mention, that the vessels are constructed on the plan which divides them into three compartments; so that either extremity or the middle might be stove in, and yet the remainder be a safe hold for the crew.

CHEMISTRY.

ROCK-SALT CONVERTED INTO A DUCTILE THREAD.

M. Gaudin, one of the employés of the Observatory of Paris, has just submitted to the Academy of Sciences a process for converting *Rock-salt* into ductile thread. You must not shake your head at this, M. Gaudin is no quack. The Academy, at any rate, received his memoir with marked favour. Every body knows that glass, when in a state of fusion, may be drawn out into very slender threads; and M. Gaudin having succeeded in melting down Rock-salt, discovered that it was susceptible of the same modifications as vitreous substances—that it could be wound round a bobbin, or converted into a solid tissue at will. But of what use, you may say, is this discovery? According to M. Arago, there are various ways of turning it to good account. The torsion balance, which in the hands of Coulomb has proved so useful, is rendered *uncertain* by the variable elasticity of the wires which support the electric or magnetic needle. To remedy this defect, there can be no surer way than to substitute Rock-salt threads for the metallic wire now employed. There are other applications equally interesting. For instance, something is still wanting to give to the oscillations of the pendulum a mathematical certainty. It is hardly necessary to allude to the multitudinous uses of pendulums: yet, when the wire of a pendulum is metallic, we cannot say what modifications it may experience in length during an operation; but if we substitute M. Gaudin's Rock-salt thread, the results, there is room to hope, will be more conclusive. The importance of M. Gaudin's discovery, so far as the Chemical sciences are concerned, is also great. There is a class of phenomena—those that have reference to the internal organization or molecular juxtaposition of bodies—with the nature of which we are still imperfectly acquainted. The modern discoveries respecting light and colours show that certain effects result from the properties of molecules themselves, others from their agglomeration: it is more than probable that this discovery will throw further light on the subject.—*Correspondent in the Athenæum.*

GEOLOGY AND MINERALOGY.

NATURAL EXHALATION OF CARBURETTED HYDROGEN GAS.

In the vale of Crowdare, near the village of Aberdare, Glamorganshire, there is a waterfall, which has, latterly, become an object of peculiar interest, in consequence of a phenomenon, hitherto unnoticed, and probably altogether new in character. It consists of an extraordinary exhalation of gas, spontaneously issuing from the bed of the stream, and which, being ignited, continues to burn, without intermission, with a yellow coloured flame, interspersed with streams of vivid white, orange, purple, and blue. There are more than twelve apertures through which the gas escapes beneath the water, (causing it to rise and bubble:) others in the dry banks, which increase daily in size. One of the apertures is considerably larger than the rest, the flame from which burns about two feet in length, and a foot and a half in width; at times it burns considerably higher. The soil consists chiefly of argillaceous schist, or fire clay, sufficiently hot to burn the hand. Fish caught in the stream have been boiled upon it; and the friends who accompanied me to the spot prepared a good supper of broiled bacon for ourselves and the spectators. My first impression was, that this phenomenon was occasioned by an escape of carburetted hydrogen from a coal level, but, from its distance from a mine, and the occasional appearances in the flame, I do not think the idea can be correct: most probably it is a mixture of gases. The water has been observed to bubble for many years by the peasantry, but not to any extent, until within the last two months, when the attention of a Staffordshire miner was attracted by the noise and height of the bubbles, and, subsequently, by the application of a fire. I had an opportunity of witnessing this wonderful appearance by night, and regret my inadequacy to describe a sight so interesting. There were not less than twelve large bodies of brilliant flame, of great illuminating power, issuing from the bed of the stream, and underneath the rock which forms the waterfall; the rich glare of variegated light cast upon the trees and surrounding objects, the noise of the waterfall of the stream, and the reflection of the whole in the water, afforded one of the most imposing sights I ever beheld. I collected two quart bottles of the gas, and have given them for analysis to my friend Mr Mougham, of the Gallery of Practical Science, Adelaide Street, who will furnish you with a Paper on the results.—Yours, &c. Alexander Byrne. (*Correspondent in the Athenæum.*)

ARBORESCENT OR DENDRITIC FIGURES IN MINERAL FORMATIONS.

In many cases the progressive influence of physical causation are more apparent in mineral bodies than in the complicated and living structures of animals and vegetables; and these examples of resembling figures will, therefore, commence with minerals which present dentritic figures, uninfluenced by the disturbing actions of vitality.

The most simple, and one of the most common examples of dendritic figures occurs in the manufacture of the cheapest sorts of ornamented pottery ware, termed the "Mocha pattern." These picturesque figures are made by children who are entirely ignorant of the art of design. While the vessel is in the unglazed state called *Biscuit*, it is daubed in given places with a liquid pigment which runs by descent, as the surface of the vessel is inclined, and thus it instantly spreads from trunks into regularly subdivided branches; the rough surface of the biscuit, and the gradual thickening of the liquid pigment, producing these appearances. Streamlets similarly divaricating appear on the sea-shore where little pools of water remain embanked by sand. The water, oozing through the sand, issues in streams, and these subdivide, according to the declivity, into arborescent streamlets, which sometimes again reunite into larger branches, as in the anastomoses between arteries and veins of animal structures. The same appearances often occur upon clayey or muddy declivities, over which streamlets of water flow. Dendritic figures are also common in many stones which were formerly regarded as petrefactions of previously organized structures. In the compact marly limestone called lithographic stone, these figures often occur, and generally on surfaces of laminæ, by which it would seem that the ochry pigment had percolated and spread in the same manner as that described respecting pottery. The moss-agate, certain marbles, and mocha-stone, exhibit similar dendritic figures. The entire bodies of certain corallines assume an arborescent character, as in the *Corillina muscosa* of Ellis.—Sir Anthony Carlisle, *in the Edin. New Phil. Journal.*

PROCEEDINGS OF LEARNED SOCIETIES.

BRITISH ASSOCIATION FOR ADVANCEMENT OF SCIENCE.—SECT. IX.—MECHANICAL SCIENCE.—*Paving Streets and Roads with Blocks of Wood.*

Mr J. I. Hawkins made a communication on paving roads and streets with blocks of wood, placed with the grain in a vertical position. The subject, he observed, has latterly become one of considerable interest. Although some patents have been taken out in this country within less than twelve months, there is no specimen of the pavement calculated to afford the means of forming a sound public opinion on the subject. He had attentively watched, from 1827 to 1831, the effect of much travelling over wooden pavement, well executed, in the principal thoroughfare of Vienna, and observed that it appeared to wear away less than any other kind of paving material whatever. In his opinion he was confirmed by inquiries which he made relative to the condition of a piece of wooden pavement laid about three years in the Broadway of New York; and he had been informed by one gentleman that he saw a stone of nearly 20 tons weight drawn on a carriage over it without appearing to make the least impression. From these circumstances he considered that roads formed of sound wood, with the grain vertical, might be made so even as to constitute a sort of universal railway, on which carriages might be drawn by a small proportion of horse-power, and on which steam-carriages might run as safely and almost as fast as on railways. The directions to be attended to in the formation of efficient and durable roads on this principle, which the author gave, were comprised under the following heads:—1. The wood must be chosen from the heart of sound trees. Larch and other resinous firs offer excellent materials at moderate prices. 2. The blocks, which are to be laid contiguously, must be cut to an exact guage, so as to fit closely and evenly together, and no block must be higher than another. 3. The depth of the blocks should be at least that of a breadth and a half, a firm lateral support being found necessary to stability. Each block, when rectangular, is supported by four others; and, when formed into hexagonal prisms, which appears to be preferred, each block is supported by the six surrounding ones. 4. The blocks must be laid on a bed firmly made with gravel, shingle, hard rubbish, or other material, well rammed down, and made even, previously to laying the blocks. 5. A thin layer of only an inch of fine gravel must be spread evenly over the levelled surface at the time of laying the blocks, to favour their adjustment. 6. The blocks must be laid so as to present an even upper surface before they are rammed, in order that the ultimate making them level shall not depend so much on the effects of the rammer as on the evenness of the bed. It is essential

that the blocks be cut from dry wood, and used soon after being cut, lest their figure vary by warping.

LINNÆAN SOCIETY.—*A Plant producing perfect Seed without any apparent Pollen or Stigma.*—By Mr JOHN SMITH, A.L S.

THE subject of the present notice belongs to the natural family of *Euphorbiaeeæ*, and has been cultivated for several years in the Royal Botanic Garden at Kew, under the name of *Sapium aquifolium*. It is a native of Moreton Bay, on the east coast of New Holland, where it was discovered by Mr Allan Cunningham, who sent three plants of it to Kew in 1829. A short time after their introduction the plants flowered, and they proving to be all females, they were naturally passed over as belonging to a diœcious plant, until Mr Smith's attention was particularly drawn to them by the fact of their producing perfect seeds. They have annually flowered and matured their seeds since; and, notwithstanding the most diligent search and constant attention, no male flowers or any pollen-bearing organs have been detected. Young plants have been raised, at different times, from the seeds, and they bear so close a resemblance to their parents that it is scarcely possible even to suspect the access of pollen from any other plant. Mr Smith considers the plant as the type of a new genus, which he names *Cœlebogyne*. It forms an irregular branched, rigid, evergreen shrub, of about three feet in height, with alternate, petiolate, elliptical, mucronate, coreaceous leaves, having three large spinous teeth on each side, and furnished with two small subulate persistent stipules. The paper was accompanied by a young plant raised from seed produced at Kew, and by a beautiful drawing of the parts of fructification from the pencil of Mr F. Bauer.

THE PLANS AND INFLUENCE OF THE HIGHLANU AND AGRICULTURAL SOCIETY OF SCOTLANO.

THE labours of the Society have been productive of much good, were it only by having banished all political discussions from the meetings, and taught the agriculturists of Scotland that in the Hall of the Society they could meet as brethren. Nor has this beneficial change extended only to the proceedings of the Society, or told within its walls; for, as the page of history narrates how a wicked monarch and a dissolute court spread the rivers of a moral pestilence throughout the fated land, till every inhabitant in the darkest cave and lowest cottage was inoculated with the soul-destroying plague; and, turning to the bright side of the picture, a good king and a virtuous queen are found. not only making a healthier atmosphere in the court itself, and throwing an aroma (as it were) of purity around their own exalted sphere, elevating the tone of morals throughout the land; so, in like manner, has this *now* powerful body given the tone to all the local associations throughout Scotland, so that in the business as well as social meetings of every one of them, nothing but harmony and unanimity is to be found. Again, in the days of its youth and feebleness, the Highland Society sent the leaven of the turnip husbandry into all the glens and straths of the north, by offers of small prizes to certain Highland parishes, and the same may be said as to the growth of clover and the finer grasses. As it advanced in strength, (as to numbers and cash,) attention was turned to premiums for stock; then came offers of reward to men of science to discover better implements and machines to diminish friction, and consequently draught, such as in the thrashing-mill, and other parts of agricultural machinery. Still advancing in the scale of intellect and of science, premiums were offered for essays to bring to light the facts connected with chemistry and natural philosophy; and under the auspices of the Society was set up the Quarterly Journal of Agriculture, a work which has been the vehicle of conveying so much useful information to the agriculturist that, we humbly venture to say, it ought to appear on the table and book-shelf of every farmer's parlour. After this the great stock-shows were resolved upon, as another link of union between the Society and the practical farmer; at the same time throwing aside all paltry feeling, and making them open to stock from both sides of the Tweed. How well they have succeeded let the last one at Glasgow bear witness. Nor has the Society forgotten the beauty of the country, as the premiums offered in regard to planting trees and such like subjects fully testify; and, to sum up all, it may be said, the Highland Society bas been a "*point d'appui*," a rallying point, to which the agriculturists of Scotland might look, and a fostering mother to all who, although strong in talent, were weak in interest to make it public. An ardent lover of the plough, and all that can speed it, the writer would do what he can to advance the delightful science, the culture of the fields.

——————————"The men
Whom Nature's works can charm, with God himself
Hold converse; grow familiar day by day
With His conceptions; act upon His plans,
And form to His the relish of their souls."

Quarterly Journal of Agriculture, June 1839.

MISCELLANIES.

STEREOGRAPHY.—We must direct the attention of our readers to the specimen of the art we have just named, as exhibited in page 34, more especially as the representation of the Dinotherium would appear to a casual observer as nothing more than an ordinary wood-cut.

The inventor of this new art, to which he has applied the name STEREOGRAPHY, an old if not very familiar word, is our ingenious fellow-citizen, Mr William Howell. He was occupied with it, together with others, and chiefly Mr Daniel Somerville, drawing-master in Edinburgh, some twenty years ago, the last gentleman especially producing many creditable specimens; but all, at the time, failed in bringing it to any practical bearing or general application. About four years ago Mr Howell again turned his attention to the subject, and ever since, under many discouragements and sacrifices, has devoted much time and labour in advancing its progress.

The process he pursues, stated in general terms, is, we understand, the following:—He prepares a tablet of artificial stone of the required size, as if for lithography. Upon this the subject to be cut is drawn with a pencil. This drawing is then carefully scratched, and the stone thus scratched forms a mould whence the cast is taken, in the same manner as common stereotypes would be. It is in the method of preparing the stone that Mr Howell's claims of merit chiefly rest, it being of a nature to resist injury from the contact of the heated metal; and also in the manner in which he produces light and shade, which he keeps a secret. The great object and the great difficulty in all attempts of this kind, has been to produce cross lines, or hatching, as it is called, in the style of ancient wood engraving, and all endeavours at this have usually been failures. A glance, however, at our figure will at once show that this obstacle has at length been effectually overcome.

In the Scotsman of the 25th September last we find the following observations from the pen of our ingenious artizan:—"In stereography, as in lithography, it is the original lines that give the impression, but, unlike it, the design does not require to be reversed, while no more care is required than with drawing paper, and alterations can be made with facility. The size of the drawing causes no more difficulty than in the present mode of stereotyping, with this advantage, that it is not subject to break in casting. Of the immense number I have cast I have never lost one. The plate can be of any dimensions, by being joined, as stereotype work is at present. When injured, it can be easily repaired, or altered, if required, casts can be taken to any amount, and the expense is small." We have had the pleasure, at the University Press, (where Mr H. has introduced important improvements in the art of stereotyping,) of examining the specimens above referred to, and have no hesitation in saying, that they merit the high commendation of being striking resemblances of the copies they are designed to represent, a remark which pre-eminently applies to our own specimen. We at the same time learned, that accurate copies of all kinds of wood-cuts can, by this method, be easily obtained; and, moreover, that fac-similes even of copperplates, such, for example, as maps, can be obtained in the same way; and that from these stereograph blocks hundreds of thousands of impressions may without detriment be thrown off. Lastly, we learned that the expense of this art in comparison of wood-cutting, from the great saving of time and trouble, is at a reduction of between 20 and 30 per cent. of the present price of wood-cutting. In conclusion, let it be noted that this art is still in its infancy, our present specimen being the second that has been published.

INTERESTING DISCOVERY IN VACCINATION.

MR CEELY, Surgeon, of Aylesbury, has demonstrated the important fact, that small-pox and cow-pox have the same origin, the latter being small-pox communicated to the Cow.

Mr C. inoculated Cows with small-pox matter; the vesicle produced in the animal had every appearance of the vaccine pock. To ascertain the point, children were inoculated with matter taken from the Cow thus artificially infected; the result was, a fine genuine vaccine vesicle. To establish the fact satisfactorily, these children were submitted to small-pox inoculation, and found to be protected from the disease. Twenty-five successive inoculations have now been performed with this new virus, which may truly be named *Variola vaccina*, and it continues to produce the most satisfactory vesicles; the matter has been employed in Bristol with perfect success. The importance of this discovery cannot be too highly appreciated. Small-pox often breaks out in countries where cow-pox cannot be procured; now it is only necessary to inoculate a Cow with the small-pox, and that virulent, morbid poison, so fatal to human life, will be converted by this useful animal into a mild fluid capable of protecting all inoculated with it from that dreadful malady the small-pox. —*Bristol Journal.*

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DECEMBER, 1839.

BRITISH QUADRUPEDS.—THE COMMON FOX.

The next animal that comes under consideration is the Fox, of which several varieties occur in Britain, although only one species is found there. The Foxes are characterized by their compressed body, moderately long and slender limbs, elongated bushy tail; narrow muzzle, large, erect, and pointed ears and elliptical pupil. They have six grinders above, and seven below, on each side.

The Common Fox, *C.* (*Vulpes*) *vulgaris*.—Most of the varieties of this species agree in being yellowish-red above, white beneath, with the ears black behind, the tail dusky towards the end, its tip usually white, and the feet black. In its general form it approaches to that of the shepherd's Dog. The head is of ordinary size, with a slender muzzle, the neck of moderate length, the body rather long, compact, and compressed, the limbs rather slender, with five toes on the fore feet, and four on those behind, the tail long and bushy. The fur is rather soft, moderately long, of two kinds, fine woolly hairs, and long hairs of a stiffer quality. On the face and limbs it is shortish and firmer, and the soles are covered with hair, unless on the prominent parts. The general colour is yellowish-red, mixed with white hairs; the snout and lips blackish, the outer part of the ears black, the tail pale red, with tips of the long hairs black, and the extremity white. The lower part of the cheeks, the neck in front, the breast and abdomen, with the inner part of the thighs, a narrow line down the fore part of the hind legs, and the hind and inner parts of the fore-legs, white. The fore part of the feet is black, the hair on the soles deep red. But several remarkable varieties occur in Scotland. The largest kind, or that found in most parts of the Highlands, has the fur of a stronger texture, and of a lighter tint, there being more white hairs on the back and hind quarter, and at least two inches of the end of the tail white. In the Low Country, the Foxes are considerably smaller, more slender, of a lighter colour, with the tail also white at the end. Individuals of a still smaller size, with the fur of a darker red, the lower parts dusky, or dull brownish-white, and with little or no white on the tip of the tail, occur in the hilly parts of the southern division. The Fox resides in burrows which it excavates for itself in sequestered places, remaining concealed all day, and coming forth in quest of food towards evening. It preys on small quadrupeds, birds, and reptiles, frequently seizes poultry, and is very destructive to game, especially Pheasants, Grouse, and Partridges. The Highland Foxes often devour Lambs, and sometimes attack even Sheep. On the other hand, crabs, mollusca, insects, and worms, are occasionally had recourse to, when nothing better can be obtained. The cunning of the Fox is proverbial, and, although its sagacity has been greatly exaggerated, there can be no doubt that its intellectual faculties are of a higher order than any other of our native Quadrupeds. When obtained young, it may be domesticated in some degree, but never shows an approximation to the confidence of the Dog. It lives in pairs, and the female produces from three to five cubs in the end of spring.

ANECDOTES ILLUSTRATING THE HABITS, &c. OF ANIMALS.

In our Number for September last, we commenced a series of papers on the Mammiferous animals which occur in Britain, and have given a short description of those found in the divisions Mustela, Martes and Lutra. With these we would now connect a few anecdotes calculated alike to enliven and illustrate the classical details.

Weasels attacking Man.—In a late Number, (see p. 29,) we remark, "None of our native animals appears to possess the courage of the Weasel, which, when its nest is plundered, has been known to spring upon the dogs, and even to attack men;" and in conformity with this is the remark in a late Volume of the Naturalist's Library, (Mam. vii. 164.) "The stories which have been told of troops of Weasels attacking men and women seem to require confirmation." The following narratives may so far be considered as supplying the desideratum. We extract the following from the Dumfries Courier: A young woman was walking from the town of Kirkcudbright to her father's house, a few miles distant, and after travelling for some time, she struck off the public road, and took a 'near cut,' and while crossing a boggy piece of low lying land, at a distance from any house, her attention was attracted to certain shrill shrieks proceeding from the bottom of a dyke over which she was climbing. Being a little alarmed at this, she hastened a few steps forward, and upon looking back, she observed two Weasels running after her, while immediately afterwards upwards of a dozen more issued from the bottom of the dyke, joining the others in pursuit. Being greatly agitated, she set off at full speed to reach another dyke, over which she jumped, hoping thereby to find a barrier between herself and pursuers, but to her great surprise, they came bolting through the holes of the second dyke also, chasing her apparently with the most determined fury. Upon this the poor girl ran on, until, to use her own words, 'her heart was like to burst, and her legs to fall under her.' For upwards of a quarter of a mile the furious creatures continued close behind, and it was not till she reached a piece of rising ground, on the other side of the bog, that she fairly outstript them. There can be no doubt that had she fallen or fainted from fright, the consequences might have been of the most serious nature. The young woman reached home safely, deeply thankful for her escape. Several years ago, in another district, a farmer, while riding on horseback through boggy land, over which he could make but little speed, roused by accident upwards of twenty Weasels, also from an old dyke, in which they had burrowed. They sprang up upon the horse's legs, and the boots of the rider, and though he defended himself dexterously with his whip, what with the jumping about of the terrified animal he rode, and the agility of his assailants, he declared "he fought as for his life to beat them off."

Account of a tame Marten.—In June 1836, says St K. Von Siemuszova Pietruski, I obtained a very young Pine Marten, which, in a short space of time, became so domestic that he attracted the admiration of all who saw it. It went freely through all the rooms in the house, without doing harm to any one, played in the court-yard with my Danish dogs, often sprang upon their backs, and rode frequently on these patient animals after the manner of monkeys for a good while, and in a very comical style. The dogs, too, were very fond of the Marten, and never showed the slightest signs of animosity towards it. In time it became so much attached to my person that it followed me everywhere, even into the neighbouring villages as a dog would do. In these walks it was very interesting to observe how he was able to overcome his natural propensity to climb trees; for it very frequently happened that the desire seized him, but as soon as he had perceived that I had gone on, it hasted after me immediately. Even upon long excursions to the old forests of the Carpathian mountains, at a distance of twelve or eighteen miles, the Marten was my faithful companion; he swam through rivers and brooks with perfect ease like an otter. The most remarkable circumstance was, that he never went far from me; the following occasion, however, I well remember. In the month of August he had followed me into Potoninen, a part of the Carpathians. I was then busied in collecting the beautiful *Carabus Sacheri*, and quite forgot my Marten, which had been busied in devouring a nest of young blackbirds. I then wished to climb a lofty hill

called Paraska, missed the Marten, and continued my way without him. How great was my joy, upon my return, after eight long hours, to find the sensible animal again in the very meadow where I had lost him. If I were absent from home this animal would take no food the whole day long, and when I returned he showed his joy by merry leaps and caresses. It ate every thing that came to table, bread, fruit, cheese, and milk, but was fondest of raw flesh; he drank wine with great relish, and plentifully. This even hastened his death, for once he drank so much, that, on the following day, he was found dead on the floor.—(Abridged from *Wiegmann's Archiv.*)

An Otter Hunt.— * * * Every minute increased his distress; he could no longer keep under water, but swam up and down gasping, and gnashing his white fangs above the surface, in the utmost fury of rage and despair. When overtaken or met by any of the hounds, he would for a second conceal himself beneath, but, being unable to remain, he would again rise above, and bite and grapple with them with the deadly fierceness of a Serpent. Twice in this manner he swam the length of the pool, followed by the whole pack baying at his tail, and hailed by the united thunder of some fifty gazers. At last S——, thinking it time to close the scene, in order to spare his Dogs, advised every body but himself to fall back from the lower shallow. The poor wretch soon discovered the deserted quarter, and made towards it. But, before he could escape, he had to clamber over the top of the net, which extended across the river at this point, sunk to the bottom by heavy leads, and attached to each of the banks. A moment after, in making this endeavour, he was raised from the stream to writhe upon the barbed spear. There he hung, wriggling and twisting, and his eyes flashing the red sparks of rage, until all the party had collected round him; he was then cast into the midst of the hounds, upon whom having wreaked his vengeance by the infliction of some fearful gashes, and, in return, having every bone within him ground and smashed almost into pulp, he, Otter-like, without a cry, without a groan, returning wound for wound, and torture for torture, at length yielded his life, but not, however, till his enemies had paid for it a most costly price. The above is extracted from "The Sportsman;" and our readers, we are assured, without any prompting from us, will feel indignant at such cruel *sport* enjoyed at a price so agonizing and protracted.

THE UNITY OF SPECIES IN THE DIFFERENT RACES OF MANKIND.

M. Flourens has, within these few months, published some observations in the Annales des Sciences Naturelles, December 1838, on the Natural History of Man, from which (recommending them to the attention of those who can refer to them) we now supply a few extracts. With his introductory remarks we entirely concur. The study of Man, he observes, viewed in the light of Natural History, has a peculiar importance, to which no other branch of this science can pretend. The physical characters which distinguish the *human races* from one another, constitute the circumstance of Natural History which has at all eras most excited general attention. The astonishment of the first Portuguese who, in the fifteenth century, penetrating into the interior of Africa, and there found Men perfectly black, with curled hair, flat noses, and thick lips, is well known. This astonishment was renewed at the epoch of the discovery of the New World. Historians mention that, on the first return of Columbus, the Europeans could not withdraw their eyes from the unknown plants and animals he had brought back, and, above all, from the Indians, who were so different from all the Races of Men they had ever beheld.

Blumenbach, as is well known, fixes the number of the human races at five, viz. the Caucasian, the Mongolian, the Negro, the American, and the Malay. Cuvier, again, reduces them to three: the White or *Caucasian*, the Yellow or *Mongolian*, and the Negro or *Ethiopian*, at the same time confessing that neither the *Malays* nor the *Americans* can be clearly referred to any of the others. More lately, Mr Prichard, regulating himself by the form of the cranium, raises the number of the human races to seven, adding to Blumenbach's four, that of the *Hottentots* and *Boschismans*, the *Papuans*, the *Polynesians* with curly hair, and the *Alfourans* and *Australians*. Lastly, M. Flourens considers that he can establish ten distinct forms or types from the human cranium: these are the *Caucasian* type, the *Mongolian*, the *Negro*, the *American*, the *Malay* or *Javanese*, the *Hottentot*, the *Boschisman*, the *Papuan*, the *Alfourou*, and the *Zealandic*. The *Caucasian* type is distinguished chiefly by the oval head, the height of the cranium, the prominence of the forehead and nose; the *Mongolian* type by the lateral prominence of the cheek-bones, and the square form of the cranium; the *Negro* by the compressed forehead, flat nose, and oblique incisor teeth; the *American* by the prominence of the nose, and the width between the orbits; and the *Malay* by the projection which the very large parietal protuberances make behind, and the manner in which the occipital bone is abruptly flattened below these protuberances. The cranium of the *Hottentot* evidently forms a type distinct from that of the Negro; it is long and narrow, but is proportionally very elevated, and by this is clearly distinguished from that of the *Boschismans*, which is singularly flattened, and as it were crushed from above downwards. The Papuans, carefully described by Messrs Quoy and Gaimard, and the Alfourous by M. Lesson, form two distinct types. The *Papuans* are remarkable for the flatness and depression of the forehead and the face; whilst the *Alfourous* have a long and narrow cranium. Finally, the last of M. Flouren's types is the *Zealandic*, marked by the height and narrowness of the cranium, especially in front, by the extent of the temporal fossa, and by the anterior prominence of the apophysis of the chin.

The observations of M. Flourens, as tending to show the variations of the crania among the several races of mankind, are doubtless possessed of much interest; but, considered as a system for classifying the families of the human race, they are eminently defective, and open to some objections, which a more careful attention to the labours of his predecessors on this subject might have spared him. Indeed, this could not fail to be expected, as M. Flourens has attempted to arrange the races simply according to the forms of the crania, omitting all other considerations, such as language, stature, hair, or colour, and we have elsewhere shown (Animal Kingdom, vol. I. p. 144) that the characters of any *one* particular structure are not sufficient of themselves to establish the differences of races. In which of these races would M. Flourens place the Caffres—a race of men very different from the Negroes? or does he confound the Esquimaux (Hyperboreans) with the Chinese? The term Zealandic, by which M. Flourens probably means the Polynesian, is no improvement in the nomenclature of Virey, Bory St Vincent, or J. B. Fischer, whose labours in the subject have been so singularly unnoticed by M. Flourens.

His concluding remarks seem to imply that the distinction between genus and species, as applied to Man, possesses much of a conventional character.

I cannot, he says, conclude this article without adverting to the much controverted question.—Whether the different *races of men* form a single *species*; and if, forming different species, they constitute what is called in Natural History a *genus*? A simple glance at the correct definition of the word species will remove all difficulty on this point. Buffon defines species to be "a succession of similar individuals which reproduce each other." Cuvier defines it "the union of individuals descended from each other or from common parents, and of those which resemble them as much as they resemble each other." Now, both of these definitions are complex, uniting two distinct facts, viz. the fact of *reproduction* or *succession*, and the fact of *resemblance*. The fact of resemblance, however, is completely subordinate to that of succession; and Buffon and Cuvier agree in this. "The comparison of the *resemblance*," says Buffon, "is only an *accessary* idea, and often independent in the other." "The apparent differences of our domestic species," says Cuvier, "are stronger than those of any savage species of the same genus." The fact of the *succession*, therefore, and of the *constant succession*, constitutes alone the *unity of the species*. Then, *unity*, *absolute unity* of the human species, and *variety* of its races as a final result, is the general and certain conclusion of all the facts acquired concerning *The Natural History of Man*.

LONDON EGG-HATCHING EXHIBITION.

We have taken frequent opportunities of alluding to this truly interesting exhibition, and now avail ourselves of some curious particulars communicated by an intelligent correspondent in a recent Number of Chambers' Edinburgh Journal. The superintendent of the oven politely exhibited a compartment in which the eggs were chipping. Some had chipped the day before, others that day, and some would not be chipped till the morrow; in a few cases we observed the beak of the chick boring its way through the shell, and getting itself emancipated. When the little creatures are issued into the world, they are not immediately removed out of the oven, but are allowed to remain for a few hours till they become dry; they are then removed, and put into the glass-case on the table at the end of the room. This case is very shallow, and the glass cover can be easily pushed aside, to permit the superintendent handling them if required. They are here for the first time fed, though not for twenty-four hours after being hatched; the material scattered amongst them is small bruised grits, or particles little larger than meal; these they eagerly pick up without any teaching, their instinctive desire for food being a sufficient monitor. After the brood has been kept in the glass-case (which is partially open) for two or three days, and been thus gradually accustomed to the atmosphere, they are removed to one of the divisions in the railed inclosure on the floor. Here hundreds are seen running about, uttering peepy cries, picking up grits, or otherwise amusing themselves, all being apparently in as lively and thriving a condition as if trotting about in a barn-yard. At six in the evening they are put to bed for the night in the coops, twelve together in a coop; these coops are small wooden boxes, lined with flannel, and furnished with a flannel curtain in front, to seclude, and keep the inmates as warm and comfortable as if under the wing of a mother. At six or seven in the morning, they are again allowed to come forth into the court-yard.

This exhibition, trifling as it may appear to some, is highly deserving

of public attention. Attempts to hatch eggs in ovens are of old date, but have never succeeded on a permanent or large scale in this country. In Egypt the practice has been more successful; yet even there, with the advantages of a superior climate, one of five of the hatched birds dies, and many are deformed, doubtless from the unequal application of the heat. It has only been by his Eccaleobion, as far as I can learn, that the birds have been brought out with certainty, or been reared successfully after being hatched; every bird is perfect, and will grow to its full size. The distinguishing characteristic of this invention is exact regulation of temperature at different stages of advancement; for eggs, as is well known, develope heat naturally in the course of hatching, and, consequently, the artificial heat requires to be judiciously diminished as the natural heat increases. By employing steam or hot water pipes, the temperature is not only capable of being exactly regulated, but is diffused generally and equably throughout the oven, and acts upon all sides of the egg alike. Hence the eggs require no handling or turning during the process—there is no fear of their being either roasted on one side or cold on the other. Provided all is as fair as the proprietor describes, there can be no difficulty in multiplying egg-hatching and chicken-rearing establishments all over the country. Poultry is at present a dear article, on account of the very limited and imperfect manner of its production; but this need not be the case any longer. There is nothing to prevent every town in the kingdom having its chicken manufactory as well as any other branch of business. Wherever there are establishments with steam-engines having a small redundancy of steam, it would be the easiest thing in the world to erect a fowl-producing apparatus in connection with the works. And if this did not in some degree improve the resources of the country, and the condition of its people, I do not know what would.

BOTANY.

THE TEA PLANT IN BRITISH INDIA.

In the fifth volume of the Agricultural Society of India, there is a valuable Report, on the Tea Plant of Upper Assam, to which we must advert. It was not till near the end of 1834 that it was discovered that the genuine Tea Plant was indigenous in Upper Assam; and, from the representations of Captain Jenkins, the Government agent for the north-east frontier, it was resolved that the districts, or rather tracts, producing the plant, should be examined with care by a scientific deputation, consisting of Dr Wallich, and Messrs Griffith and M'Clelland. These gentlemen examined the Tea Plant in its native state at five different places, where it was found to grow abundantly. Two of these, which are in the Singhe country, and within the British territory, were Kufoo and Ningrew. Nadowan and Tingrei are situated in the Bengmora country, which, although it belongs to a nominally independent native Rajah, is considerably within the control of the British authorities. Another locality was Gulroo Purbut, within the territory of Rajah Poorundur Singh; and various others were shortly afterwards intimated and examined. These places are comprehended in a tract of country situated between the parallels of 26° and 27° N. lat. and 94° and 96° E. long. In all the above localities the Tea Plant only occurs in patches of very limited extent, a circumstance which points out the similarity of the Assamese and Chinese plants which, according to Mr Ellis, "always occur in small patches." Those specified are all in low spots, that at Gulroo being perhaps the only one which is always exempt from inundation. All were characterized by excess of humidity; and Kufoodoo alone had no stream near it. In every instance the neighbourhood was clothed with excessively thick tree jungle; and such shrubs and herbaceous plants as love shade were found abundantly intermixed with the Tea.

In concluding his admirable Report, Mr Griffith states his convictions, that the successful cultivation of the Tea Plant in Assam is certain, for the following reasons:—1. That the plant is indigenous to, and distributed extensively over, large portions of Upper Assam. 2. That there is a similarity of configuration between the valley of Assam, and two of the best known Tea provinces in China. 3. That there is a similarity between the climate of the two countries, both with regard to temperature and humidity. 4. That there is a precise similarity between the stations of the Tea Plant in Assam, and its stations in those parts of the provinces of China which have been traversed by Europeans. And, 5. That there is a similarity both in the associated and general vegetation of Assam and the Chinese Tea provinces situated about the same latitude.

In a late Number of our Journal we took occasion to report, that a few boxes of the Assam Tea had reached this country; that trial parcels of their contents had been somewhat extensively circulated over the country, and had afforded general satisfaction. To this succeeded an arrival of eight boxes, which were bought up at an enormous price; and we have now to add that, during the current year, a company has been formed in London for its cultivation; and so great was the avidity to obtain shares, that, before the projectors had time to call a public meeting on the subject, the whole of the shares had been subscribed for.

The late suspension of the trade with China, and the future difficulties which appear to threaten it, confer increased importance upon this subject. The last notice from the country we have seen intimates that there were plants in cultivation equal to the production of 100,000 pounds of Tea, if the means of manufacture were procured. Steps were being taken to remedy the deficiency of hands, by procuring families in numbers, on easy terms, to proceed and settle in the country, and a correspondence was opened with Singapore to obtain Chinese artizans conversant with the details of the preparation. As so large a quantity had in so short a time been procured, well-grounded expectations may assuredly be entertained, that, if the cultivation be prosecuted by private and public enterprise, a sufficiency of Tea will, in a very few years, be produced to render this country entirely independent of the Chinese market.

GEOLOGY.

EARTHQUAKES IN SCOTLAND.

It may not be uninteresting to put on record in these pages, that the month of October last was signalized in Scotland by the occurrence of an Earthquake, more generally and severely felt throughout the country than any other since the year 1755, the time of the great Earthquake of Lisbon. Nor ought we to speak of it as one Earthquake; for, although one was more violent than the rest, yet in various districts there were many, and they continued, more or less, for weeks. The southern declivity of the Grampian range, extending to the south-western parts of Perthshire, appears to have been the locality exposed to the rudest shocks, corresponding with the well-known fact, that the environs of Crieff and Comrie have long been liable to these subterranean phenomena. Without farther preamble we shall now introduce the testimonies of various competent witnesses, conveying far more vivid impressions than any general statements can do.

Crieff.—In one of the local newspapers we read—A series of Earthquakes took place last week (October 13—19) in Crieff and the neighbourhood, with a violence which has not been felt for many years past. One of these occurred about four o'clock on the morning of Thursday last, (the 17th,) and was distinctly felt throughout this and the upper portion of Strathearn. The shock generally resembled a smart but severe crash, accompanied with a tremulous motion, and loud, continued noise, not unlike distant thunder, but more hollow and deep in its tone. On Saturday, again, (the 19th,) no fewer than four shocks occurred during the day, one of which, about 3 P M., was very violent; so much so, that general attention was arrested by it, and many of the inhabitants ran into the street. Considerable excitement prevailed in the town: in some of the shops the bottles and crockery were reeling in the shelves, and in private houses similar effects among the furniture, &c. were very apparent. To the west, we hear the Earthquake was also very forcibly felt, although in no instance any eruption or damage has as yet been experienced.

As already hinted, however, the phenomenon was not confined to that locality, and the most widely extended shock having occurred a little after 10 P.M. on Wednesday the 23d, much general attention was directed to the subject. On this occasion the shock was felt quite across the island, from North-Berwick to Glasgow, and northward as far as Inverness.

Edinburgh and Leith.—In Edinburgh and Leith the Earthquake was but slight; having excited the attention of comparatively but few, and these residing principally in the northern and eastern parts of the city. Notwithstanding, there were many who, on the morning of the 24th, were full of the event, dilating upon the solemn impressiveness of the sensation, and the astonishment and alarm it excited in themselves and families. Here it was attended with little or no noise, and lasted but for a few seconds. In several instances it was accompanied with the cracking of furniture, and the rattling of crockery. In some parts of Leith, the bells of houses were set a-ringing, and the pictures on the walls were observed to move like a pendulum: the vessels in the docks were also noticed by several individuals to heave unusually.

North-Berwick.—From North-Berwick the following was transmitted by a correspondent of the Scotsman newspaper,—On Wednesday night last, about a quarter past 10 o'clock, a smart shock of an Earthquake was felt by a number of the inhabitants. The doors were shaken on their hinges, and the windows rattled, those who were in bed were moved as by the rocking of a suspension cradle, and those who were sitting were violently shaken, even the birds in the cages fluttered, and showed symptoms of alarm for a considerable time. A slight sensation was felt about five minutes afterwards: the first continued about three seconds, the latter not so long.

Dollar.—The following interesting account is from Dollar in Clackmannanshire.—The Earthquakes that have of late been agitating the south-western parts of Perthshire have been extending their alarming vibrations to our Arcadian vale. Since Saturday the 12th, repeated shocks, contemporaneous, I believe, with those at Comrie, have been felt, not only in the valley, but along the southern acclivities of the Ochill-hills. Those

mountain masses, that form the northern barrier of the vale of the Devon, seem to be light as a feather compared to the immense subterranean lever that makes them simultaneously quiver throughout all their exent. The most violent shocks we have here experienced took place on Wednesday the 16th, at half-past 2 in the morning, and last night, (that of Wednesday 23d,) at about a quarter past 10 o'clock. This last shock was the severest and most alarming of all. Families were put into confusion by it, and some left their houses in alarm. Sleep was banished for the night. To the writer of this account the sensation seemed as if two strong impulses upward—the second close upon but stronger than the first—were given to the ground, causing it to bound upward. The house seemed to reel, like a vessel mounting a lofty surge coming suddenly upon it. Half an hour afterwards a slighter shock was experienced.—We shall next quote from the Perth Advertiser.

Perth.—On Wednesday, between 10 and 11 P.M., one of those convulsive movements of the earth, which have occurred at Crieff and elsewhere, during the past fortnight, was distinctly experienced here, and continued for nearly a minute. Our *sanctum* shook as if it were about to tumble about our ears. Again, from

Monzie.—On Wednesday 23d, we had another Earthquake, more violent and alarming than any of the preceding. At 13 minutes past 10 P.M., we heard a sound like that of a numerous body of cavalry approaching at full gallop along the grassy sward. When this had continued a few seconds we felt two or more abrupt concussions, as if a solid mass of earth had struck against a body more ponderous than itself, and rebounded. The rattling of furniture, together with the subterranean thunder, and the reeling of what we had hitherto deemed *terra firma*, communicated at this moment a feeling of the terrific that must have made the stoutest heart quail. The sound passed off, as before, far to the East, carrying fear into other districts. In a number of houses the bells rang; one house of three stories, situated in Crieff, has been rent from the chimney-top half-way down the gable; we have heard that a number of corn-stacks have been thrown down. At Comrie, the consternation was such, that the people ran out of their houses, and many went to the meeting-house, where they continued till three in the morning, engaged in religious exercises. There was a second shock at 20 minutes to 11 o'clock, and a third somewhat later, but both inferior to the first. We read in the *Herald* of

Aberdeen.—About half-past 10 on Wednesday night, a shock of an Earthquake was felt in this city. The motion was not of that energetic and irregular character which usually distinguishes volcanic action, but of a gentle kind, producing a horizontal movement, not unlike the rolling of a vessel in an easy sea-way. It continued for about four seconds, and was attended with a low rumbling noise. From

Inverness.—On Wednesday night, about half-past 10 o'clock, there was the slight shock of an Earthquake here. It lasted only a few seconds and produced no serious effect.

Glasgow.—At the same hour, a slight shock was also felt in Glasgow, particularly towards the west end of the town. In Elm-bank Place the furniture in some of the houses was slightly shaken; and at the Broomielaw the vibration was in several places considerable. At Luss the shock was also felt accompanied by a noise resembling thunder. In no place did the shocks last more than a few seconds. Similar observations were made at Appin, Montrose, Dundee, Huntly, Turriff, Forres, &c., &c.

The weather, during the period embraced by these Earthquakes, was peculiarly wet, dull, and oppressive, and many entertain the idea that the former phenomenon was somewhat connected with the latter. A still stranger notion has gained ground in the localities principally involved, namely, that, previous to the occurrence of the shock, an effect is produced in the surrounding elements which tells upon the human frame so strongly as to prove a warning of the coming event. There appears, however, to be a total want of any legitimate ground for the entertainment of either of these opinions.

PROCEEDINGS OF THE BRITISH ASSOCIATION.

Introduction of the Alpaca Llama into Britain.—Samples and manufactured specimens of Alpaca wool, in imitation of silk, and without dye, as black as jet, were exhibited to the Zoological Section; and Mr Danson stated, that the animal producing it ought to be propagated in Great Britain and Ireland, especially in Scotland and Wales, being an inhabitant of the Cordilleras, a mountainous district of Peru. Importations have already taken place, to the extent of one million of pounds, and are likely to increase. There are five species of Llamas, of which the Alpaca has fine wool, six to twelve inches long, as shown by the specimens exhibited. The Earl of Derby has propagated the Alpaca in his private Managerie at Knowsley, and Mr Danson understood that Mr Stephenson, at Oban, in Scotland, has a few of these animals. Their wool would not enter into competition with the wool of the Sheep, but rather with silk. It is capable of the finest manufacture, and is especially suited to the fine shawl trade of Paisley, Glasgow, &c. The yarns spun from it are already sent to France in large quantities, at from 6s. to 12s. 6d. per pound, the price of the raw Alpaca wool being now 2s. and 2s. 6d. per pound.

The Salmonidæ—their Varieties, and Different Stages of Growth.—Mr Relph, who has been more than fifty years engaged in the Salmon-fishery, stated in a letter to the Section: "That in May 1819, there were 1700 fry marked at Kingsgate fishery, near Carlisle, and in July and August following, a quantity of Whitings or Herling were taken, coming from the salt water, bearing the same marks. These marks were made by cutting away the fin called the dead fin, just above the tail. In September 1821, a Grilse was caught bearing the mark, and weighing 7 pounds 6 ounces; so that, from the time it was marked, its average growth had been one ounce per week. There were also several Salmon taken bearing the mark, and weighing from 10 to 16 pounds.

Growth of Silk at Nottingham, made in 1839.—Samples of yellow and pure white cocoons, forming a portion of the result of this attempt at raising silk in England, were placed before the Zoological Section. They were exhibited in an undisturbed state, (though the Chrysalises had been killed,) upon the twigs where they had been spun by the Silk-worms. The food supplied to the worms spinning the white silk, owing to the lateness of the mulberry tree, was lettuce-leaves, for the first three weeks after hatching, and then they were fed entirely upon the mulberry leaf. Those producing the yellow silk were hatched 14 days later, and were fed on this latter food, which proved by much the most suitable, from the beginning. The hatching was of eggs procured from Italy; and this, and the subsequent processes of feeding and spinning, were conducted in a warehouse in the centre of the town of Nottingham, amidst the usual noise, bustle, and activity of a wholesale business of cotton goods, where the air would be in some degree tainted by the oily matter used in their fabrication; the temperature was kept at from 70° to 55°. The number was 10,000; and, owing to the very cold, late, and damp season, the circumstances were very unpropitious. Upon the whole, however, Mr Felkin, who conducted the experiment, considered it as perfectly successful; the cocoons placed in contact with those of this year's growth, received from the Milanese, being but slightly inferior in size, weight, or compact formation. The experiment shows, that the best silk may be procured wherever the worm is of the suitable variety, and fed on its congenial food, combined with ordinary skill and care in management. Whether this production can be carried on to profit in England, or even in Ireland, is doubtful, labour and land being probably too high, to compete with the present prices of silk; but that it could be so in the West Indies, and our new colonies in the Pacific, is unquestionable. Still more is the fact established, that the produce of this article might be greatly improved in quality, and indefinitely in quantity, in Hindoostan. There labour is cheaper than anywhere besides, and land unoccupied and waste, but perfectly suitable, for the mulberry is plentiful; so that, introducing it into the more elevated parts of the country, the whole world might be supplied from India, with raw silk, at half its present cost.

MISCELLANIES.

Liquid Leather.—A Dr Bernland of Larria, in Germany, is said to have discovered a method of making leather out of certain refuse and waste animal substances. A manufactory of this nature has been established near Vienna. No part of the process is explained, only it is said that the substance is at one time in a complete state of fluidity, and may then be cast into shoes, boots, &c.—*Bristol Mirror*.

Boa Constrictor.—The large Boa Constrictor at the Surrey Zoological Gardens lately cast his skin for the first time since his arrival in this country. It measured 22 feet in length, and 27 inches in circumference, and was thrown off almost entire in one piece. He fed immediately afterwards, and swallowed four Rabbits and a small Pig for his meal! He had not previously eaten any thing for five months.

Dr Johnstone is preparing for the press a "History of the British Sponges and Corallines," to be printed and illustrated in the same style as his History of the British Zoophytes, to which this new work may be considered as a supplement, and as completing his original design. It will contain a very full account of all that has hitherto been written on the subject; and an original figure of every species and remarkable variety will be given. Dr Johnstone intends, at the same time, to avail himself of this opportunity of adding many new figures of Zoophytes, contributed by his friends, and acquired by himself, since the volume on British Zoophytes was published.

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ZOOLOGY.

BRITISH QUADRUPEDS.—THE WILD CAT.

The genus *Felis*, which includes the Lion, Tiger, Leopard, and a great number of animals of inferior size, among which is the Domestic Cat, is characterized by four grinding teeth above, three below, on each side; the tongue rough, having its upper surface covered with horny pointed papillæ, directed backwards; the ears of moderate size; the body compressed, the tail long and gently tapering; and the claws curved, much compressed, very acute, and retractile. The Feline animals exhibit in their structure a peculiar adaptation to a life of rapine, combining extreme vigour with much patience and cunning. Their flexile spine, muscular and supple limbs, hooked and contractile claws, short jaws, of which the motion is exclusively vertical, long conical canine teeth, and thin-edged grinders, readily distinguish them from all other quadrupeds. In Britain, this genus is represented by a single species, much larger than the Domestic Cat, but scarcely formidable to man.

The Common Wild Cat of Europe, *Felis Catus* of Linnæus, in form and colouring resembles a large individual of the domestic race, of the grey striped variety, from which, however, it differs in having the body more elongated, the limbs longer, and the fur thicker. Another character resulting chiefly from the latter circumstance is presented by the tail, which tapers less, being in fact nearly as thick at the end as at the middle. The head is short, broad, convex, anteriorly somewhat triangular, with the snout small, the nostrils linear, the eyes large, the ears erect, somewhat pointed, and of considerable size. The mouth is rather small, and the palate is marked with eight transverse ridges. The incisors, six in each jaw, are very small, nearly even, the lateral larger. On the fore-feet are five, on those behind four toes; the soles padded and bare; the claws hook-shaped, and much compressed. The body is generally rather slender, and compressed, the tail long. On each side of the mouth are four rows of long mystachial bristles, which are white, with the exception of some of those of the upper row, they being black. A little behind the angle of the mouth is a pencil of smaller bristles, and a little above it another. The fur is thick, rather long, and soft; but on the muzzle and feet, as well as the ears, it is short. The teeth are white, the iris hazel, the snout dark flesh-coloured, and the bare pads of the soles black. The fur on the upper parts and sides is pale reddish-brown. Between the eyes commence four tortuous brownish-black lines, which pass over the occiput, and along the hind neck, gradually diverging and becoming broader; between the shoulder-blades commence three black lines, of which the two lateral curve, and are continued over the sides, while the other runs along the back, forming a broad undulating band, from which proceed bars of the same colour descending along the side. On the tail are nine blackish bands, the last much larger and darker. A narrow black line proceeds from the posterior angle of the eye, and another from a little beneath it, both terminating on the cheek a little behind the ear. The lips are blackish, but the hair on them, as well as on the chin, is yellowish-white; the lower part of the neck pale reddish-brown; then a pure white spot; the breast white, with roundish black spots; the abdomen reddish, and spotted with black; its hind part pure white, the groin and hind part of the thighs reddish. The fore and hind legs transversely barred with black; their hind part black; the claws yellowish-grey. The under fur is pale reddish at the end, and most of the long hairs are white at the base, then black, afterwards yellowish-red, with the tip black, The male measures three feet and a half in length, of which the head is five, and the tail fifteen inches. The female is much smaller. The colours vary considerably in different individuals.

This animal has long been extirpated from the cultivated parts of the country, being now confined to part of Wales, the hilly tracts of the north of England, the Highlands of Scotland, and some parts of Ireland, where it resides in the thickets, making its retreat to the fissures of rocks, or the cavities between fallen blocks of stone. It preys on Game, Hares, Rabbits, small quadrupeds, and birds of various kinds; lives solitarily, or in pairs; and, as it searches for food chiefly at night, is very seldom met with. It scarcely ever approaches human habitations, and is thus less destructive to poultry than the Marten or Pole-cat, although, on the other hand, it is said sometimes to destroy young Lambs. When caught, it exhibits the greatest ferocity, hissing and yelling like an enraged Domestic Cat, and, however long it may be kept in captivity, never becomes reconciled to it.

This species is by some supposed to be the original source of the domestic kind, while others think it to be entirely different. Many individuals of the Common Cat can scarcely be distinguished from the Wild in form and colouring, and, although the Tame Cat is never so large as the Wild, this probably arises from its not being sufficiently supplied with its natural food. In their anatomy the two kinds present much less difference than the Black-faced and Cheviot Sheep, or the West Highland and Short-horned Cows; and it is alleged that the Wild Cat sometimes breeds with the Domestic, although no authentic instances appear to have been adduced, in this country at least. The Wild Cat has often been called the British Tiger, but it merits no such distinction, being a simple Cat, and in no respect to be dreaded by a person wandering in its haunts, although, probably, if enraged, and prevented from retreating, it might put to flight many who would face a more dangerous foe.

DIFFERENT STRUCTURES OF THE SKIN IN DIFFERENT RACES OF MANKIND.

In our last Number we gave the results of M. Flourens' investigations into the Natural History of Man, as it regards the different races of the species which may be detected from the *character of form*, and which he estimates at the number of ten. In the same paper (Ann. des Sciences Nat.) he announces that he has made a discovery in the minute structure of the skin, which, after all the labour previously bestowed, we had thought was next to impossible, and which he maintains constitutes a difference as a *character of structure*. Most of our readers will know that the skin is usually described as consisting of three layers,—the innermost, true skin, or dermis; the external, scarf skin, or cuticle; and the intermediate or rete-mucosum, which was supposed to be the seat of colour, and which was stated to be scarcely distinguishable except in the black. M. Breschet's elaborate investigations, some three or four years since, whilst, upon the whole, confirming, somewhat modified these views. He maintained that the rete-mucosum is only the newest and softest layer of the epidermis,—that it is not strictly extra-vascular, as the absorbent vessels may be traced to its outer layers, as well as the ducts which convey the perspiration to the surface. He regarded the proper substance of the epidermis as hardened mucus, and imagined he discovered the apparatus which secreted the mucus, and the perspiration, sending out spiral ducts which penetrated the surface. *The organs forming the colouring matter of the skin he distinguished from the other two sets of glands;* and all these parts from the nervous papillæ, which are the organs of touch.

Dissatisfied with these views, we find M. Flourens making the following

statements :—"There are in the skin of the *white* race three distinct laminæ or membranes—the derm and two epiderms; and in the skin of the black race there is, besides the *derm* and the two *epiderms* of the *white* race, a particular apparatus—an apparatus altogether wanting in the man of the *white* race—an apparatus composed of two layers, the external of which is the *pigmentum*, or colouring matter of the Negroes. Hence, then, there is in the skin of the *black* race an apparatus which is wanting in that of the white race. The two races, therefore, form two essentially and specifically distinct races. These two races are not only distinct by a *character of form*, such as are the characters drawn from the cranium and face; they are so by a *character of structure*, by a special and very complicated apparatus which exists in one of the two races, and is wanting in the other. The *white* and the *black* race, then, are two essentially distinct races. The same is true of the *red* or *American* race. Anatomy discovers, under the second epiderm of the individual of the *red, copper-coloured Indian*, or *American race*, (for this race is designated indifferently by these names,) a *pigmental apparatus*, which is the seat of colour in this race, as in the black. M. Cuvier says of the American race, 'That although it has not yet been clearly reduced to any of the races of the Old Continent, it does not possess *at once a precise and constant character*, constituting it a particular race!' He would assuredly have thought differently had he known that the copper-red tint is owing to a special determinate apparatus, distinct from all the other parts of the skin. In considering, therefore, the characters of structure, there are three specifically and primarily distinct races. The white or *Caucasian*, the Negro or *Ethiopic*, and the red or *American*."

These are strong statements, in which are included a distinct claim to an important discovery, and a bold inference, deduced from that alleged discovery. It is with hesitation we demur at the conclusions of so distinguished a physiologist as M. Flourens, and yet we cannot help hesitating, especially after M. Breschet's statements, expressing the opinions of the best physiologists of the day, both as to the novelty of the discovery, and the accuracy of the conclusion.

NOTICE OF THE CHIMPANSEE, AND OF A NEW SPECIES OF MACACO.

At a late meeting of the Zoological Society, some interesting observations were made on the habits of a Chimpansee captured in the Bullam country by Lieut. Sayers, and on a new species of monkey, now, like the former, in the Zoological Gardens, described by M. Ogilby under the name of *Papio melanosus*, but which, in our opinion, is evidently a Macacus. We shall supply a short summary of these communications. The Chimpansee, observes M. Sayers, on becoming mine, was delivered over to a black boy, my servant, and in a few days became so attached to him as to be exceedingly troublesome, screaming and throwing himself into the most violent passion if he attempted to leave him for a moment. He evinced also a most strange affection for clothes, never omitting an opportunity of possessing himself of the first garment he came across, whenever he had the means of entering my apartment, which he carried immediately to the piazza, where invariably he seated himself upon it with a self-satisfied grunt; nor would he resign it without a hard fight, and on being worsted, exhibited every symptom of the greatest anger. Observing this strange fancy, I procured him a piece of cotton cloth, which, much to the amusement of all who saw him, he was never without, carrying it with him wherever he went, nor could any temptation induce him to resign it even for a moment. I adopted the following mode of feeding him:—In the morning he received a piece of bread about the size of a halfpenny loaf, steeped in water, or milk and water; about two, a couple of bananas or plantains; and before he retired for the night, a banana, orange, or slice of pine apple. The banana seemed to be his favourite fruit; for it he would forsake all other viands, and if not gratified, would exhibit the utmost petulance. On one occasion I deemed it necessary to refuse him one, upon which he threw himself into the most violent passion, and uttering a piercing cry, knocked his head with such force against the wall as to throw him on his back. His actions so alarmed me for his safety, that I gave up the contest: in the height of his passion, however, I never observed any disposition to bite, or otherwise ill treat his keeper or myself. Although he would never object to be caressed even by a stranger, yet I never saw him evince the slightest disposition to make the acquaintance of any other animal. At the time he came into my possession, I had two Patas Monkeys, and thinking they might become acquainted, I placed the Chimpansee in the same apartment, where he resided for five months, yet I never saw the least desire, on his part, to become even friendly; on the contrary, he showed evident anger and dislike at their approach. His cunning was remarkable. On all occasions where he thought he was unobserved, he would not fail to steal every thing within his reach, for no other apparent purpose than to gratify a propensity for thieving. In his habits, unlike the Monkey tribe, he was exceedingly cleanly. At the time of his purchase, this animal appeared to be about fourteen months old, and from what I could learn from the natives, they do not reach their full growth till between nine and ten years of age. Their height, when full-grown, is said to be between four and five feet; indeed, I was credibly informed that a male Chimpansee, which had been shot in the neighbourhood, measured four feet five inches in length. The natives say that, in their wild state, their strength is enormous, and that they have seen them snap boughs off the trees with the greatest ease, which the united strength of two men could scarcely bend. They are gregarious, and the natives affirm always travel in strong bodies, armed with sticks, which they use with much dexterity: they are also exceedingly watchful.

Macacus melanotus.—M. Ogilby states that the specimen (Papio melanotus, *Ogilb.)* in the Gardens was young, and said to have been brought from Madras. It has a considerable resemblance to the common Barbary species, (Macacus Inuus,) but differs in the blackish-brown shade which covers the upper parts of the head, neck, shoulders, and back. The tail is about an inch long, and perfectly naked. The individual has all the liveliness, good nature, and grimace of the young Magot. Were this animal really a Papio, it would form a singular exception, as the two known species of Papio (Mandrills, *Cuv.*) are confined to Africa. We have little doubt that it will prove on examination to be a Macacus.

PRACTICABILITY OF DOMESTICATING SEALS.

Whether the Seal might breed in captivity, and remain reclaimed from the wild state, is yet to be learned, probably in those excellent establishments, the Zoological Gardens. Almost all the instances of tame Seals, of which we have any account, belong to the *vitulina* species: the trials I have made on the rearing and education have been equally numerous on the Great as on the Common Seal. By far the most interesting one I have ever had was a young male of the *barbata* species: he was taken by myself from a cave when only a few hours old, and in a day or two became as attached to me as a dog. The varied movements and sounds by which he expressed delight at my presence, and regret at my absence, were most affecting; these sounds were as like as possible to the inarticulate tones of the human voice. I know no animal capable of displaying more affection than he did, and his temper was the gentlest imaginable. I kept him for four or five weeks, feeding him entirely on milk warm from the cow; in my temporary absence butter-milk was given him, and he died soon after. Another was a female, also of the Great Seal species, which we captured in a cave when about six weeks old, in October 1830. This individual would never allow herself to be handled but by the person who chiefly had charge of her, yet even she soon became comparatively familiar. It was amusing to see how she ascended the stairs, which she often did, intent, as it seemed, in examining every room in the house; on showing to her signs of displeasure and correction, she descended more rapidly and safely than her awkwardness seemed to promise. She was fed from the first on fresh fish alone, and grew and fattened considerably. We had her carried down daily in a hand-barrow to the sea-side, where an old excavation admitting the salt water was abundantly roomy and deep for her recreation and our observation. After sporting and diving for some time, she would come ashore, and seemed perfectly to understand the use of the barrow. Often she tried to waddle from the house to the water, or from the latter to her apartment, but finding this fatiguing, and seeing preparations by her chairmen, she would of her own accord mount her palanquin, and thus be carried as composedly as any Hindoo princess. By degrees we ventured to let her go fairly into the sea, and she regularly returned after a short interval; but one day, during a thick fall of snow, she was imprudently let off as usual, and, being decoyed some distance out of sight of the shore by some wild ones which happened to be in the bay at the time, she either could not find her way back, or voluntarily decamped. We had kept her about six months, and every moment she was becoming more familiar; we had dubbed her Finna, and she seemed to know her name. Every one that saw her was struck with her appearance. The smooth face, without external ears,—the nose slightly aquiline,—the large, dark, and beautiful eye, which stood the sternest gaze of the human, gave to the expression of her countenance such dignity and variety, that we all agreed that it really was *super*-animal.—(*Dr Edmonstone's Obser. on Seals.*

NOTICE CONCERNING A RAVEN.

As in one of the plates of the present Number, we have endeavoured to represent the universally known Genus Corvus, (Crows,) we had intended to have introduced some anecdotes illustrating their more remarkable traits. Other and more important matter has interfered, and we shall now restrict ourselves to the transcription of a few notes, kindly communicated by a correspondent, concerning a well known inhabitant of our city, in the shape of a Raven, which stood as the original of our representation. This bird goes under the appellation of *Arthur*, a name derived from the great captain of the age. He belongs to Mr Johnston,

Hill-House, near Holyrood, who has reared him from the nest, whence, near Inverleithen, he was taken upwards of twenty-three years ago. He, like many of his captive brethren, is celebrated for his talking propensities, and especially for the distinctness with which, when interrogated concerning the illustrious generals of our time, he pronounces the name of his great name-father, not only in his native dialect, good broad Scotch, but also, at the pleasure of his interlocutor, both in a pure English, and genuine Irish accent. We are likewise informed that he *barks* so successfully that his voice can scarcely be distinguished from that of a good watch-dog. He possesses, too, all the pugnacity of his species. At one time an Owl was made the companion of his solitude, which, after a few days endurance, he slew and devoured: a common Rook was next tried; and, for a few weeks, he seemed pleased with his associate, but it soon also shared the fate of the Owl. He has this peculiarity, that the second primary feather of both wings is of a pure white colour, so that he is pie-bald, a trait not very uncommon in his race, some of whom have been noticed wholly white. Another, and what we should consider a far rarer peculiarity, is his having shed, three years ago, the upper mandible of the bill. We are not aware that this occurs naturally in any bird, and hence we should suspect it to have been the result of some blow or bruise, often the occasion of such an occurrence in the nail. Arthur, however, was not known to have been the subject of such an injury. Whether his years will reach the limit of a century, as some Ravens are recorded to have done, our posterity alone are likely to ascertain.

SUPPOSED FORM OF THE DINOTHERIUM AND MASTODON.

Many of our readers may be surprised to learn, that from such a cranium as we represented in our last Number but one, and other fossil bones, any satisfactory conception could be formed of the general shape and appearance of the whole animal. But wonders far greater than this have been effected in fossil geology, insomuch that the late Baron Cuvier, or any accomplished anatomist of his school, could from any of the small bones of the body, or even from an insignificant fragment of one, ascertain what the animal really was,—its genus,—species,—and, if it belonged to none of the known ones, could, from these remains, form others new and distinct. This is, in fact, in the expressive words of Professor Whewell, "the great Cuvierian maxim, that from the fragment of a bone we can reconstruct the skeleton of the animal." This, however, is a wide field, on which we must not expatiate; and, in illustration of our position, we merely state, that the lineaments of the Dinotherium giganteum, and the Mastodon, as represented by Professor Kaup, are received with confidence by M. de Blainville and other Naturalists as close approximations to the truth.

Professor Buckland states, that the Dinotherium must have been the largest of terrestrial Mammalia, and Cuvier and Kaup calculate it must have measured 18 feet. With a sentence from the Oxford Professor's Bridgewater Treatise, concerning the remarkable tusks of the animal, we shall conclude this notice. "It is mechanically impossible that a lower jaw, nearly four feet long, loaded with such heavy tusks at its extremity, could have been otherwise than cumbrous and inconvenient to a Quadruped living on dry land. No such disadvantage would have attended this structure in a large animal destined to live in water; and the aquatic habits of the family of Tapirs, to which the Dinotherium was most nearly allied, render it probable that, like them, it was an inhabitant of fresh-water lakes and rivers. To an animal of such habits, the weight of the tusks sustained in water would have been no source of inconvenience; and, if we suppose them to be employed as instruments for raking and grubbing up by the roots of large aquatic vegetables from the bottom, they would, under such service, combine the mechanical powers of the pick-axe with those of the horse-harrow of modern husbandry. The weight of the head, placed above these downward tusks, would add to their efficiency for the service here supposed, as the power of the harrow is increased by being loaded with weights."

ELECTRIC EEL AT THE ADELAIDE GALLERY.

Mr Bradley, Director of the Gallery of Practical Science, has lately communicated the following letter to our contemporary the Magazine of Natural History:—"I feel persuaded that your readers will be interested in hearing that the *Gymnotus* I described on a former occasion is still living and thriving. Kept in a room daily frequented by multitudes of persons, with only a borrowed light from the sky-light, and never feeling the direct rays of the sun; confined in a vessel in which it cannot now stretch itself out at full length; kept warm by water artificially heated, and fed with fish not indigenous to the country it inhabits,—what must be the power of adaptation to external circumstances possessed by the animal, which admits of its not only living, but even growing and increasing in strength, under such total change of habits, food, and climate!

I believe you remember that when we first began to experiment on its electrical powers, we could only produce those phenomena which depend on the tension of the electricity, as the spark, &c., by employing secondary currents; now, on the contrary, we have discarded Henry's coil from our apparatus, and invariably succeed, not only in obtaining a direct spark, but even the deflagration of gold leaves, these being mutually attracted from a sensible distance, and burning on coming into contact: if this arise partly from increased skill in our mode of manipulation, it must also be assigned, in an equal degree, to the increased power of the Eel.

Nevertheless, convinced as I am that not even the vital power of this animal can long withstand so total a change in its natural habits, I should be very glad to transfer it to some institution, where, while it could enjoy fresher air, and direct light, it would meet with attention to temperature and cleanliness equal to what it has had from us; and in that case I see no reason why it might not be kept alive for years."

METEOROLOGY.

SHOOTING STARS OBSERVED, AUGUST 10, 1839.

In our Number for September last, we introduced the subject of Periodic Shooting Stars to the attention of our readers, and quoted certain observations made on the 10th—12th of August, by M. Boguslowski at Breslaw, M. Forster at Brussels, and Professor Powell at Tunbridge-Wells. To these we now add some interesting remarks published in November last by our celebrated astronomer, Sir James South. "The evening of the 10th of August was fine, and for a considerable time the sky was cloudless. Busied in my observatory, with my ordinary astronomical occupations, whilst the twilight was yet strong enough to render the leading article of the *Times* legible, though with some difficulty, a servant coming to me from a distant part of the premises put an early period to my astronomical work, by announcing that 'he had just seen the largest fire-ball that he had ever seen in his life.' A celestial globe being brought out on the lawn for the purpose of tracing their tracts, and a loud beating clock being set with that at the transit instrument, by which the instant of disappearance of any of these bodies might be noted, between 22′ after nine o'clock, and 2′ after midnight, 165 shooting stars were not only seen, but their flight among the fixed stars, and their disappearance to the nearest tenth of a second, registered. Between 5′ after midnight, and 29′ after one in the morning, 150 were seen. Clouds, which continued till day-light, prevented further observation. Of these the principal part resembled stars of the sixth magnitude, stealing from one part of the heaven to another. Many were as bright as stars of the first magnitude. Several had a brilliancy many times surpassing that of the planet Venus, whilst some few, apparently of a discal form, were not unlike the planet Jupiter, as seen with a magnifying power of fifty or sixty. These, as well as those of the two preceding classes, prior to their disappearance, frequently burst into thousands of intensely luminous points, the light produced being such as to excite the attention of even the most careless bystander. The directions which these fugitives took were very various, as was the extent of arcs they traversed; generally they took their course from the zenith towards the horizon, but in several instances they passed from horizon to zenith: some appeared when within ten or fifteen degrees of the horizon, and disappeared in it. Every part of the heavens teemed with them. The constellations, however, of Cassiopeia and Perseus, were most prolific."

BIBLIOGRAPHICAL NOTICES.

Remarks on the Development, Structure, and Diseases of the Teeth. By Alexander Nasmyth, F.L.S., F.G.S., &c. London, Churchill, 1839, pp. 180, with seven plates.

With much pleasure we hail the appearance of a work on the science of Odontology, by Mr Nasmyth, who, after having for a number of years directed particular attention to the subject, and contributed a number of excellent papers to various scientific institutions, is about to publish the result of his labours in a systematic treatise.

The portion of the work before us consists solely of an Historical Introduction to the science, commencing with the earliest notices in the writings of Herodotus and Hippocrates, and coming down to the present day; the author herein following a prevailing fashion in the plan of scientific works,—one which we regard as peculiarly open to criticism and condemnation. Mr Nasmyth has, at the same time, executed his task with ability, and manifests a thorough acquaintance with the subject. After gleaning the observations to be found in the works of Aristotle, Aretæus, Pliny, and Galen, and supplying the details to be found in the Arabian, and early Italian and French schools, including the doctrines of Vasalius, Eustachius, and Ambrose Paré, he proceeds to the new views promulgated by Malpighi, Leuwenhoek, Bertin, Winslow, and Hunter, —to the modern anatomical era, commencing with Bichat and Blandin, —to what has been done in Great Britain by Blake, Fox, and Bell; in France, by Tenon, the Baron and M. F. Cuvier, De Seres, and Rousseau; and in Germany, by Webber, Schreger, and Wagner. Of the recent la-

bourers in this field, Retzius of Stockholm is the most eminent; though Valentine and Raschkaw abroad, and Messrs Goodsir, Arnold, and Owen at home, have likewise rendered good service. These gentlemen, along with our author, by minute microscopic researches into the structure of ivory enamel, and every part of the teeth, not in Man only, but in the whole animal series, have opened up an entire new field of investigation, and displayed wonders of which we had previously no conception. Sixty pages of Mr N.'s volume are occupied with a summary of Retzius' Treatise, and twenty with a translation from Dr Raschkaw's Thesis. It also contains seven admirable plates; the many figures in the three first, copied from Retzius, and those of the others being original, and equally beautiful. We have room but for a single extract, which, in the author's words, will throw some light upon his plan. "Those who contemplate the teeth," he remarks, "merely as ornaments, or consider them in no other light than as the active agents at a feeding-trough, or as the formidable weapons of the wild tenants of the forest, will, doubtless, regard the details of Retzius as irksome and tedious; but he who, with ardour and admiration, tracks the steps of Nature through the regions of Zoology, will welcome with delight a full description of those new researches; he will recognise at once their importance, and cannot fail to be struck with the unostentatious manner in which a great mind has opened to the world a new field of exertion, foreseeing its value to the student of Geology as well as of Natural History. But I have been still further induced to publish the researches of Retzius, from having myself made numerous observations and experiments on the same subjects, which I hope will be found to illustrate some of them, and to carry out others to very interesting and original conclusions. The importance of the study of Odontology in a Zoological or Geological point of view, has induced me to form as complete a collection as possible of microscopic preparations of the teeth of the various classes, both living and extinct, of the animal kingdom. From these I intend, in the course of the present work, when treating of the structure of the teeth, to make a selection calculated to serve as an index of the type of any animal. This part of the work I think will prove of much use to the Geologist, in enabling him to state to what class of animals any tooth, or fragment of tooth, belongs."

Memoirs of the Wernerian Natural History Society for the Years 1831—37. 8vo, pp. 520, with 44 plates. Edinburgh, A. and C. Black, 1838.

Memoirs of the Wernerian Natural History Society for the Years 1837—38. Part I. vol. viii. with five engravings, 8vo, pp. 163. Edinburgh, A. and C. Black.

Having been somewhat late in our notice of the former of these volumes, we are glad to be urged to it by the appearance of the latter. The former consists of only three communications; the first two being Prize Essays of the Society, and the third a History of the Society from December 1831 to April 1838. The Prize Essays are most creditable to their respective and very rising authors: the former is on the *Geology of the Lothians*, with 35 coloured sections, and a geological map of the district, by Robert J. H. Cunningham, Esq.; the latter on *The Fishes of the District of the Forth*, with 67 illustrations in 28 plates, by Dr Parnell. Both are likewise published separately, and contain much information of a general as well as local nature.

Part I. of vol. viii. contains the following communications:—1. *Observations on the Distinctions, History, and Hunting of Seals in the Shetland Islands.* By L. Edmonstone, M.D.—2. *On the last Changes in the relative Levels of the Land and Sea in the British Islands.* By James Smith, Esq., of Jordanhill.—3. *On the Asteridæ of the Irish Sea.* By Edward Forbes, Esq.—4. *Meteorological Table for the Year* 1838, *kept in the Parish of Abbey St Bathan's, Berwickshire.* By the Rev. John Wallace. And, 5. *On the Geognosy of the Isle of Eigg.* By R. J. H. Cunningham, Esq. There is appended a list of the subjects proposed for honorary premiums by the Wernerian Natural History Society.

We have room only for a single remark on the first of these communications. Dr Edmonstone's paper is all that could be desired regarding the history and hunting of the Shetland Seals; his habits and opportunities affording him excellent occasions for investigation; but to his observations on their "distinctions," the first and not least important part of the Essay, we regret we cannot extend the same remark. He informs us there are only two species indigenous in Shetland,—the vitulina and barbata; but concerning the specific characters of the latter he is wholly silent. This is the more to be regretted, as recent investigations have led many to the conclusion, that the Great Seal occurring on the coasts of the British Isles is not the Bearded, but the Grey Seal,—not the barbata of Fabricius, but his gryphus. Dr E. speaks somewhat disparagingly of Fabricius as an authority; but that there is a distinction between these two Seals, which Dr E. identifies, admits not of a doubt. Let us hope that the intelligent author will supply this deficiency by personal examination, or by transmitting a few crania of the Haaf-Seal to our Museums, where the problem will soon be solved. On a previous page we have given a short extract as a specimen of this excellent Essay.

The Edinburgh New Philosophical Journal, Oct. 1839.

This number of the Philosophical Journal is peculiarly interesting. Its chief articles are a Bibliographical Memoir of James Watt by M. Arago, with Remarks on Machinery in relation to the Prosperity of the Working Classes, characterized by the distinguished Editor as the most important Eloge that Arago ever wrote; to this are added many Notes, and an Historical Account of the Discovery of the Composition of Water, by Lord Brougham;—the History of the Sternoptix Family of Osseous Fishes,—their Anatomical Peculiarities, and a Description of the S. Celebes, a new species, by Dr Handyside, an admirably drawn paper;—an interesting Communication on the Geographical Distribution of Plants;—Two Papers by M. Flourens, the former on the Natural History of Man, the latter on Mucous Membranes;—an Article, by Dr Newbigging, on Certain Circumstances affecting the Colour of the Blood during Coagulation;—On the Form of the Globules of the Blood in some Mammals;—a Curious Account of Violent Whirlwinds, resulting from the action of Large Circular Fires, by W. C. Redfield, Esq.;—on the Reproduction of the Virgularia mirabilis, by Sir J. Dalyell;—on Glaciers, by M. Agassiz;—Account of the Parallel Roads of Glen Roy;—a Detailed Account of the Proceedings of that excellent Institution, the Society for the Encouragement of the Useful Arts for Scotland;—Notice of New Publications, &c. &c. It cannot be perused without equal pleasure and profit.

Historical Statement of Duty performed by the Steam-Engines of Cornwall. By Thomas Lean and Brother. London, 1839.

This Treatise has been put forth at the request of the British Association for the Advancement of Science, and has been drawn up by Mr Lean and his brother, gentlemen admirably fitted to do justice to the subject. The vast difference between the common system of working steam-engines and the Cornish system may be learned from the following statement:—That five times as much work has been done by a Cornish steam-engine as by an excellent Boulton and Watt's engine on the common system; or that the same amount of work is done with one-fifth part of the expense of fuel;—a statement almost incredible, yet perfectly true.

The amount of work done by a steam-engine is called by engineers its "*duty*,"—a term first introduced by Mr Watt, in ascertaining the comparative merit of steam-engines, when he assumed one pound raised one foot high for the dynamic unit! Now, by this criterion, it has been found, that whereas one bushel of coals, in one of Boulton and Watt's engines, wrought in the common way, raised 20,000,000 of pounds one foot high, an engine on the Cornish system now raised with each bushel of coals 125,000,000 of pounds to the same height. The results of such improvements may be easily conceived. The saving of coal alone amounts, in the County of Cornwall, to L.80,000 per annum.

The means by which all this has been accomplished in Cornwall, and may be accomplished elsewhere, are the following:—By working the steam expansively to a degree unheard of elsewhere. This system was first introduced, in its fullest extent, in 1814, by Woolf, and the duty immediately rose from 20,000,000 to 50,000,000 of pounds. 2. By the introduction of the system of the conservation of heat; in 1827, from this cause, the duty rose to 67,000,000 of pounds; in 1828, the enormous duty of 87,000,000 of pounds was obtained; in 1832, so much as 91,000,000 of pounds of water were raised one foot high by a bushel of coals; and, in 1835, the careful application of the conservation of heat, and the expansion of the steam, raised the duty of Austin's engine to 125,000,000. Such results may prove an example to all practical engineers. Of the advantages to be derived from such a system, every one may be convinced who will take the trouble to examine this unpretending collection of valuable facts.—*Athenæum.*

MISCELLANIES.

Who would conceive that Saw-dust is susceptible of conversion into a substance bearing no remote analogy to bread: and, though certainly less palatable than that of flour, yet no way disagreeable, and both wholesome and digestible, as well as highly nutritive? This discovery, which renders famine next to *impossible*, deserves a higher degree of celebrity than it has obtained.—*Sir J. F. W. Herschel's Disc. on the Study of Nat. Phil.*

Death of Allan Cunningham, Esq.—Many of our readers will regret with us the death of the above named botanist and traveller, who died at Sydney, New South Wales, on the 27th of June, in the 48th year of his age, after a lengthened illness, contracted in New Zealand in 1838, during a botanical excursion, previous to his intended return to England with the results of many years' journeyings.

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EDINBURGH ZOOLOGICAL GARDENS.

We are happy to observe that the arrangements which have so long been pending in reference to the establishment of a Zoological Garden in Edinburgh are now on the point of being brought to a satisfactory issue, and that the Directors of the Association have found at Broughton Park a site which, from its vicinity to the city, exposure to the South, elevation, extensive view, abundance of water, and sufficiency of inclosure, presents many facilities towards its becoming a considerable ornament to the city, and a fashionable place of public resort.

Those who have witnessed the impulse which has been given to Zoological Science by the institution in Paris, at the *Jardin des Plantes*, and examined the accurate drawings and descriptions made from the animals there by MM. Geoffroy-St-Hilaire and Frederic Cuvier, or who, in our country, have rambled with delight over the extensive establishments of the Zoological Society, London, or of Mr Cross on the Surrey side, will require no encomium on our part in favour of these institutions. In fact, they are indispensable to Zoology, whether we regard the improved knowledge we thence obtain of the forms, dispositions, habits, distinctions, or structure of the several animals, or of the economical purposes to which these objects may, by domestication, become subservient. The number of distinct forms in the Animal World is so inconceivably great, so much obscurity attaches to specific distinctions in general, and so little pains have been taken, except at a very recent era, to develop those qualities which may become useful, agreeable, or ornamental to man, that a wide field yet remains open for investigation and enterprise. The Llama and Vicugna, whose fleeces possess intermediate properties between wool and silk,—the Tapirs and Peccaris, whose flesh might be used to greater advantage than that of the domestic Pig,—the Zebra, Dauw, Dziggtai, and other species of Equus, rivalling the common Horse and Ass for draught,—all the species of Cervus, Antilope, Capra, and Bos,—with the Seals, a tribe of animals as yet involved in much obscurity,—are among those species which would, in the first instance, afford, from their sizes and dispositions, the greatest facilities for domestication.

The taste for Zoological establishments has not been confined, in this country, to the metropolis. Liverpool, Manchester, Dublin, and Bristol, have shown that the provinces duly appreciate their utility; and if the impulse has not hitherto extended to Scotland, it was more from some indefinite notions of the great expense attending such establishments, and a few vague fears that the tropical animals could not survive a northern winter, (all now we trust exploded,) than from any disposition to undervalue the importance of these establishments. It is now generally admitted, that such an institution would tend greatly to attract strangers to the metropolis of Scotland, and form a most important auxiliary to its numerous elementary establishments. Of course, it mainly depends upon the support which the citizens are now prepared to give, whether the Gardens are to be laid out on an effective scale or otherwise, and we accordingly recommend all those having the public interest at heart to come forward with their subscriptions, donations of animals, or ornamental shrubs.

There can be no doubt that Edinburgh possesses advantages for the preservation of the Northern Quadrupeds and Birds, which other Zoological Gardens in this country do not enjoy, and we hope that the Directors will use every means to render this branch of Zoology as complete as possible. An extensive collection of British Birds would possess no ordinary interest. It is quite unnecessary that each provincial establishment should incur the expense of supporting a Barbary Lion, a Tiger, an Asiatic Elephant, or a Giraffe. The interests of science would not be impaired by our leaving these larger and more expensive animals to the metropolitan establishments; and we trust that the Directors of our Edinburgh Association will reserve their means for the elucidation of other objects not so well understood, as a wide field remains among the Mammalia and Birds of secondary size, to delight and interest the popular observer. In this way, much of the expense of a Zoological Garden may be spared, without diminishing its utility in any sensible degree.

The collection of the Association, though still in its infancy, presents many objects of undoubted interest. The Monkeys are second to none we have seen, excepting that unrivalled display in the *Jardin des Plantes*. Among others we observe, Cercopithecus fuliginosus, C. Sabæus, (var.) C. griseo-viridis, Semnopithecus Entellus, Macacus radiatus, M. Cynomolgus, M. Rhesus, Cynocephalus Sphinx, Ateles ater, (rarely seen in collections,) Cebus Apella, C. griseus, C. hypoleucus. The Carnivora, though defective for the reasons already given, include Ursus Arctos, (var. Americanus,) U. ferox, U. labiatus, Procyon Lotor, Nasua socialis, (var. grisea,) Meles Taxus, Herpestes Ichneumon, Viverra Genetta, V. Rasse, Canis (Chryseus) Australiæ, C. aureus, C. Vulpes, Hyæna striata, and Felis Leopardus, (male and female.) We have likewise noticed Sciurus cinereus, Dasyprocta Aguti, Cervus Elaphus, (var. Hippelaphus,) and several varieties of the Indian Bull, representations of which, drawn from the living animals, will appear in the course of this Work. Among the Birds, all of which we have not yet had leisure to investigate minutely, we notice Cathartes Aura, Aquila fucosa, Macrocercus Ararauna, Plyctolophus rubro-cristatus, *Briss.* Dromæus Novæ-Hollandiæ, Balearica pavonina, and a great number of smaller Psittacidæ, Incessorial, Accipitral, and Gallinaceous Birds.

We confidently hope that the British Government, which so liberally encourages the Botanical and Horticultural Gardens of Edinburgh, will also come forward in support of this excellent institution, and that the numerous individuals now in the Colonies, especially those who are connected with Scotland, will forward living specimens to our infant establishment. Our friends in the country are recommended to endeavour, by traps or nets, or by securing the young, or even eggs, to procure as many living British specimens as possible. To suppose that an object is uninteresting because it is common in *some* places, is a great, though very frequent mistake. How many persons have never seen a living Otter, Hedgehog, Mole, or Bat, how few have ever dissected one! Those proceeding to the Whale-Fishery are requested to entrap the young of the Northern Quadrupeds and Birds, the Walrus, and as many varieties of the Seal as possible,—there being no branch of Natural History in which accurate information is more to be desired.

PIEBALD NEGROES.

In submitting to attention a representation of a Piebald Negro, supplied by Blumenbach in his "Abbildungen Naturhist. Gegenstände," we shall introduce a few remarks on this phenomenon, interesting in itself, and throwing light on various important points of the physical history of our race. The conception of our readers as to the nature of the occurrence may be assisted by adverting to the not-unusual appearance of *Albinism*, which is precisely that change which most have noticed in *white* Rabbits and *white* Mice, and which also takes place in Man; in the swarthy Negro, as in the fair European. This *variety* may be readily propagated among the lower animals, and with equal facility among the lords of the creation, as has been witnessed in individual families, and, on a greater scale, in the Isthmus of Darien, and elsewhere. Now, in the case of Piebald Negroes, it would not be far from the truth to affirm that the affec-

tion is nothing more than a partial exhibition of this change, in so far as the skin is concerned.

But we must not indulge in such prefatory observations, and now remark that the phenomenon occurs naturally at birth, in the children of parents both of whom are black, or who are of different colours, one of them having an admixture of white blood; and also at a later period of life, sometimes without any apparent cause; and sometimes, again, as the result of a wound, or some other accident. We shall supply a few authorities and cases illustrating these several facts. "The children of Negro parents," says Dr Prichard, "are sometimes variegated, having their skin diversified with black and white spots, and part of their woolly hair white. They are commonly called Piebald Negroes. This variety is not very rare in the West Indies, and some examples of it have been brought to this country. The white spots have the same hue as the skin of a very fair European."

This general statement, resting upon the authority of one in every way so entitled to respect, we pass to the next modification alluded to. "A black man, servant to a gentleman, married a white woman who lived in the same family, and, when she proved with child, took a lodging for her in Gray's-Inn-Lane. When she was at her full time, the master had business out of town, and took his man with him, and did not return till ten or twelve days after this woman was delivered of a girl, which was as fair a child to look at as any born of white parents, and her features exactly like the mother. The Black at his return was very much disturbed at the appearance of the child, and swore it was not his. But the nurse-tender soon satisfied him, for, undressing the infant, she showed him the right hip and thigh, which were as black as the father, and reconciled him immediately to both mother and child." This case is to be found in the 55th Volume of the Philosophical Transactions, and rests upon the testimony of Dr Parsons, an eminent Naturalist of his day, who tells us that, when informed of the fact, he went to the place, examined the child, and found it true.

The next modification is where the change occurs in an adult Negro, and without any apparent cause. In illustration of this we abridge a case described by Dr Pinkard, as one of the greatest natural curiosities which was at the time to be seen in the West Indies. The woman alluded to was about thirty years of age, and, until the last six or seven years, possessed a completely sable skin, differing in no respect from other Negroes, "nor do her form and features now," adds the Doctor, "offer any thing remarkable, but, from the profoundest black her surface is growing perfectly white. She is of a good figure, and has been always regarded as of a very strong and healthy constitution. No probable cause is known, or even suggested, for the change, but, about five or six years ago, white spots appeared upon her extremities, and, from that time, she has been gradually losing the natural blackness of her surface. The change commenced in the feet and hands, the legs and arms, which have all now lost their sable hue, and are even whiter than those of Europeans. Her nose and ears are also white, and some patches are spreading upon the face, neck, and bosom, but her body still remains entirely black. The woman continues in perfect health, and regards the change as one of the greatest evils which could have afflicted her. She is a wife and mother, and her children differ in no respect from those of other Negroes."

Finally, the change frequently occurs after some wound or operation, of which the following, taken from the Transactions of the Edinburgh Medico-Chirurgical Society, is an instance. Samuel Herd, aged fifty, had an operation performed on him in January 1818, from which he perfectly recovered. Many months afterwards he came asking for something for his skin, as it was becoming white, and the other Negroes, he said, laughed at him. His bodily health was excellent. He states that after the operation, the cicatrix remained white, and much about the same time other parts became white also, especially the hands and feet. The whitening extended up the fore-arm, till now it is nearly all white. The same process is going on in the lower extremities; the feet, legs, thighs, and hips, being now almost all white; some white spots show themselves on the back and shoulders, and about half the breast is of the same colour. About midsummer 1819 there was a large white marking on the abdomen, and the scalp was nearly white, shining through the dark curly hair. In another year it is noted, the ears, eyelids, forehead, and nose, are changing colour very fast. The lips have a particular bright vermilion colour; the breast, abdomen, and back, are speckled, and the extremities were now of a natural white appearance.

A truly singular modification of this affection is mentioned by Dr Winterbottom, in his excellent account of the natives about Sierra Leone. "A case," says he, "occurred to me which may be regarded as an intermediate step in this phenomenon: it was that of a man, of a *mulatto* complexion, and much freckled, born of *black* parents, who had strong red hair, disposed in very small wiry curls over his whole head." Blumenbach mentions another instance of this, and Vonder Gröben several. It would be interesting to extend these remarks, but our exhausted space compels us to desist.

ON THE NESTS OF FISHES

In an early volume of the Edinburgh Philosophical Journal, there is a slight notice of Fishes' nests found on the coast of Berwickshire by Admiral Milne, but the species of Fish by which they are constructed is not mentioned. Mr Duncan of Eyemouth has ascertained that they belong to the Fifteen-spined Stickleback, (*Gasterosteus Spinachia* of Linnæus) —a fact confirmed by the Rev. Mr Turnbull, to whom the Berwickshire Club is indebted for specimens.

These nests are to be found in spring and summer on several parts of our coast, in rocky and weedy pools between tide-marks. They occur occasionally near Berwick, but seem to be more common near Eyemouth and Coldingham. They are about eight inches in length, and of an elliptical form, or pear-shaped, formed by matting together the branches of some common Fucus, as, for example, of the Fucus nodosus, with various confervæ, ulvæ, the smaller floridæ, and corallinos. These are all tied together in one confused compact mass by means of a thread run through and around, and amongst them, in every conceivable direction. The thread is of great length, as fine as ordinary silk, tough, and somewhat elastic; whitish, and formed of some albuminous secretion. The eggs are laid in the middle of this nest, in several irregular masses of about an inch in diameter, each consisting of many hundred ova, which are of the size of ordinary shot, and of a whitish or amber colour, according to their degree of maturity. The farther advanced are marked with two round black spots, which are discovered by the microscope to be the eyes of the embryo, at this period disproportionally large and developed. Masses of eggs, in different stages of their evolution, are met with in the same nest. It is evident that the fish must first deposit its spawn amid the growing fucus, and afterwards gather its branches together around the eggs, weaving and incorporating at the same time all the rubbish that is lying or floating around the nucleus.

For the safety of its nest and spawn, the Fish is apparently very anxious for a time. Some individuals were watched, by Mr Duncan and the Rev. Mr Turnbull, for some weeks, and it was observed that the same fish was always in attendance upon its own nest. During the time of hope and expectation, they become fearless, and will allow themselves to be taken up by the hand repeatedly. There can be no doubt that their object in remaining near the nest is to guard it against the attacks of such animals as might feel inclined to prey upon its contents.

Note.—Since the preceding notice was read to the Club, the Second Volume of Mr Swainson's Natural History of Fishes, &c. has been published; and I find in it, says Dr Johnstone, that these nests are said to be constructed by the *Gobies*, on the authority of Olivi. The question is worth further inquiry; but on mentioning this statement of Olivi's to Mr Maclaren of Coldingham, he assured me that he had seen and watched the Stickleback in the act of making the nests we have just described.

PRODUCTION OF TEA IN ASSAM.

A Report of the Government Tea Committee has recently been presented at Calcutta, and reached this country. It is drawn up by the superintendent, Mr Bruce, and is a most interesting and somewhat lengthy document, which, however, may be seen in full in the Edinburgh Philosophical Journal, whence we glean a few interesting particulars. "It gives me much pleasure," says Mr B., "to say that our information and knowledge, respecting tea and tea-tracts, are far more extensive than when I last wrote on the subject, the number now amounting to 120, some of them very extensive, both in the hills and on the plains. A reference to the accompanying map will show that a sufficiency of seeds and seedlings might be collected from our tracts in the course of a few years to plant off the whole of Assam; and I feel convinced that but a very small portion of the localities are as yet known. * * * Black tea and green are procured from the same plant, the leaves being plucked in a different state and manner. This has been proved beyond the shadow of a doubt, for I am now plucking leaves both green and black from the same tract and the same tree; the difference lies in the manufacture, and in nothing else." Mr B. calculates the produce of the year 1839 at upwards of 5000, and that of 1840 at upwards of 11,000 pounds.

It is often supposed, in this country, that the manufacture of Tea is a very simple process, which is easily effected, and can be performed as well half asleep as awake. This, however, is very far from being the case, as will appear from the following account of the preparation of the *Sychee* Black Tea. After the leaves have been gathered and dried in the usual way, they are beaten, and put away four different times; they are then put into baskets, pressed down, and a cloth put over them; when the leaves become of a brownish colour by the heat, they throw out and have a peculiar smell, and are then ready for the pan, the bottom of which is made red-hot. This pan is fixed in masonry breast high, and in a sloping position, forming an angle of forty degrees. The pan being thus placed, the leaves when tossed about in it cannot escape behind or at the sides, as it is built high up, but fall out near the edge close to the manufacturer, and always into his hands, so as to be swept out easily. The bottom being made red-hot by a wood fire, the operator puts a cloth to his mouth, to prevent inhaling any of the hot vapour. A man on the left of him stands ready with a basket of prepared leaves; one or two men stand on his right with shallow baskets to receive the leaves from the pan; and another keeps lifting the hot leaves thrown out of the pan into the basket that they may quickly cool. At a signal given from the Chinaman, the person with the basket of prepared leaves seizes a handful, and dashes it as quick as thought into the red-hot pan. The Chinaman tosses and turns the crackling leaves in the pan for half a minute, then draws them all out by seizing a few leaves in each hand, using them by way of a brush, not one being left behind. They are all caught by the man with the baskets, who, with his disengaged hand, continues lifting the leaves and letting them fall again, that they may quickly cool. Should a leaf be left behind in the pan by any accident, the cloth that is held ready in the mouth is applied to brush it out; but all this is done as quick as lightning. The man that holds the basket of leaves watches the process sharply; for no sooner is the last leaf out of the pan than he dashes in another handful, so that, to an observer at a little distance, it appears as if one man was dashing the leaves in, and the other as fast dashing them out again, so quickly and dexterously is this managed. As soon as one basket has received about four handfuls of the hot leaves from the pan, it is removed, and another placed to receive the leaves, and so on until all is finished. A roaring fire is kept under the pan to keep the bottom red-hot, as the succession of fresh leaves tends greatly to cool the pan. In China these pans are made of cast-iron, and if great care is not taken, they will crack in the cooling; to prevent which, one man keeps tapping the inside of the edge of the pan briskly with a wet broom, while another pours cold water in gently; thus it cools in a few seconds, and is ready for another batch of Tea. The leaves are rolled and tatched the same as the other Teas, and put into the drying basket for about two minutes. When a little dry, people are employed to work and press the leaves in the hand in small quantities, of about one and a half or two rupees weight at a time, for about half a minute; they are then put into small pieces of paper and rolled up. After this they are put into the drying basket, and permitted to dry slowly over a gentle fire for some hours, until the whole is thoroughly dry. This is said to be a very fine Tea, kept for high days and holidays; but tedious and laborious as the above process is, it is far from equalling in these respects some other kinds (especially the Greens) on which our space does not permit us to say any thing. With one other extract we must conclude this article.

"In speaking of the trouble and expense attending the second process of the Green Tea making, I beg to observe it appears to me, from what little I have seen of it, that machinery might easily be brought to bear. The Tea half made, (as previously described,) I am informed by the Green Tea Chinaman now with me, is put either into boxes or baskets, with bamboo leaves between; it then has to make, in this state, a long journey by land and water, and then to go one or two months in a boat by sea, before it reaches Canton, where it is laid aside for one or two months more, before it undergoes the second process, making in all about five months from the time it was first prepared—all that is required is to keep it dry. Now, if all this be true, which I have no doubt it is, I see no reason why we could not send it to England, and have it made up there. I rather see every thing in favour of such a plan, and nothing against it. After a year's instruction under Chinamen, it might be left to the ingenuity of Englishmen to roll, sift, and clean the tea by machinery, and, in fact, reduce the price of the Green Tea nearly one half, and thus enable the poor to drink good unadulterated Green Tea, by throwing the indigo and gypsum (by which Mr Bruce discovered it was coloured) overboard. At all events, the experiment is worthy of a trial, and the first step towards it would be to manufacture the Tea at Calcutta; or, perhaps, it would be better to let the China Green Tea makers go direct to England along with it, and have it manufactured there at once."

BIBLIOGRAPHICAL NOTICES.

Illustrations of British Birds.—By H. L. Meyer, London.

No branch of Natural History has been more successfully cultivated in this country than Ornithology, nor are any animals more generally interesting than Birds, which, from the facility with which they may be observed, the diversity of their forms, plumage, and colours, their wonderful migrations, and curious habits and instincts, afford pleasing subjects of observation to persons of every rank and age. Several works of considerable merit have accordingly been issued to the public, giving a more or less extended account of our native and migratory species; and, at the present day, the number is greater than at any previous period. Of these it will suffice to mention two on an extended scale, one remarkable for its beautiful engravings on wood, and the care with which the distribution of the species in the different districts has been sought out, the other remarkable for containing the only full descriptions of British Birds yet given, together with lengthened accounts of their habits, and many details respecting their anatomy. Mr Meyer's Work supplies a desideratum, in presenting coloured figures of sufficient size to give the distinctive characters.

In forming an opinion of this Work, we shall consider it, without reference to others on the same subject, simply as consisting of representations of living Birds. It in fact contains "coloured figures of the Birds indigenous to Great Britain, or that visit the British Isles in the course of their periodical migrations." These figures are generally accompanied with representations of the eggs, and sometimes the nests. The female is introduced when her plumage differs much from that of the male, and, in a few instances, the gradations of plumage as connected with age or season are depicted. The figures are drawn on stone, most of them reduced, the size of the work being royal quarto.

Examining the plates one by one in their systematic order, we pronounce the first figure, that of the Egyptian Neophron, very poorly executed, being deficient in spirit, in the form of the feathers of the neck, in the details of the bill, and the skin of the head. The Golden Eagle is better in these respects, but the form of the bill, and the curvature of the neck, and the proportional length of the toes, with the form of the scales, and especially the wing, which has the first quill erroneously the longest, are all defective. The White-tailed Sea-Eagles afford a pretty accurate idea of these Birds; the Osprey is moderately well represented, as is the Jer Falcon; the Peregrines are good, especially the adult; the smaller Falcons, as well as the Sparrow Hawk and Goshawk, are correct enough; and of the other Hawks some are good, and some indifferent. Of the Owls, one, the Snowy, is a wretched caricature, representing two ill-stuffed specimens stuck up in the snow, like monuments ill-designed. The Eagle Owl is not much better, but the small species are prettily done. The Shrikes, Thrushes, Accentors, Warblers, Wagtails, Pipits, Finches, Buntings, and in general the smaller Passerine Birds, are remarkably well executed, with some exceptions, however, such as the Bullfinches, which are among the poorest figures in the work, both as to drawing and colouring, and contrast in both respects with the Pine Bullfinches. The Grouse and other Gallinaceous Birds are tolerable, as are the Pigeons, but many defects might be pointed out in them, as well as in the Waders, which, however, are generally good. The aquatic Birds are less correctly drawn and coloured than the Passerine, and many of them are mere caricatures: the Black Guillemot and Gannet for example.

It would appear that most of the figures have been taken from stuffed specimens, of which not very many of the larger have been placed in natural attitudes. Some of the smaller figures, however, are very beautiful, and those of the Warblers and allied species are superior to any that we have seen. But if the work, like all other productions of the kind, be full of defects, it undoubtedly has the great merit of not containing a single figure that may not readily be recognised by a person acquainted with the originals. To the student it must prove of great value, for in every case it will enable him to determine the species, unless when a young bird or

female not represented may happen to present itself. The eggs are in general correctly delineated, although characteristic specimens have not always been selected. But it would require a series of the eggs of each Bird to enable the student to institute comparisons.

Comparing Mr Meyer's work with those of Mr Gould and Mr Selby, we should say that the figures are much more accurate as to form and colour than those of the latter Ornithologist, generally inferior, but sometimes superior to those of the former. As woodcuts, Mr Yarrell's figures are superior to the drawings and engravings of any of these three works, but we should greatly prefer Mr Meyer's, were our object to make out the names of our Birds by comparison. Were it not that the high price of coloured illustrations precludes their extended distribution, this work would be of great value to young Ornithologists, of which we are happy to learn many are fast springing up in all parts of the country. A work containing ample descriptions of form, colour, habits, and distribution, and correctly-delineated figures of the species of British Birds, not so highly priced as to be beyond the reach of persons in moderate circumstances, is yet a desideratum in our scientific literature.

"*History of the Berwickshire Naturalists' Club.*" 1839.—We have been favoured with a copy of "the Proceedings" of this most rational and intelligent association, for which we feel much obliged. It contains twelve communications, none of which are long, and all most creditable to their respective authors. In our present Number we have supplied a sample of these valuable productions, and purpose to enrich our pages with extracts not less valuable. This Club might serve as a model to other similar associations; and these unpretending proceedings are not more a proof than an incentive to individual improvement and social delight.

"*Iconografia della Fauna Italica.*" Di C. L. Bonaparte, Principe di Musignano. Roma, 1839.—The Fasciculi, Nos. 24 and 25 of the above work, have just reached us, and maintain the highly respectable character of their predecessors. In the former there are illustrations and descriptions of twelve individuals of the Fauna of Italy, and in the latter of twenty-one. These commence with two Bats, the *Vespertilio Bonapartii* of P. Savi of Pisa, and the *V. limbatus* of Küster, first described in the Isis, 1835; to these succeed an account of *Chlorospiza Incerta*, male and female, with two figures, the *Fringilla incerta* of Risso and Temminck; next follow of the Reptilia, five species of Frogs, and three of Toads, and, finally, of Fishes, three *Leucisci*, and the *Carcharodon Lamia*, the *Squalus Carcharias* of Risso. In the latter fasciculus, there is but one Bird, the *Gallinago Brehmi*, *Scolopax Brehmi*, Kaup, &c.; ten of the Lizard tribe follow, illustrated with twenty figures, arranged as *Zootoca*, *Acanthodactyli*, *Eremiæ*, *Phyllodactyli*, *Psammodromus*, *Notopholi*, and *Tropidosaura*; and, finally, nine Fishes, five of the genus *Barbus*, three of *Gobio*, and two *Raya Læviraja*. The descriptions appear to be drawn up with much care, not forgetting the synonyms, which are ample. The plates are good specimens of lithography, and the colouring very commendable. We especially admire the Reptiles and Fishes, doing credit to all concerned, not forgetting the artists of the great city of Rome.

"*Voyage dans L'Amerique Méridionale.*" Par M. A. D. D'Orbigny.—The 44th *Livraison* of this splendid work has also come to hand; and, whilst we occasionally cannot but be annoyed at the slowness with which it proceeds, the experience of our own work speaks in too emphatic terms of the countless difficulties which oppose. There are in this Number various titles and indices, which admit of no analysis; the remainder of the letter-press is occupied with Botany, comprehending the Algæ, Zoospermæ, and Florideæ; and there are six plates, (engravings,) the first beautifully depicting two Humming Birds, and the remaining Mollusca, than which nothing can be more satisfactory and beautiful. The work does infinite credit to the author and the French Government.

"*Manuel d'Ornithologie.*" Par J. C. Temminck. 2d Ed. 4th Part. Paris, 1840.—We hail with pleasure the concluding portion of this Manuel of M. Temminck, who, with all his wonted accuracy, has placed *au niveau des découvertes nouvelles* our information in this interesting department of Natural History. Having lately in our own Plates submitted to the attention of our readers several specimens of Partridges, we shall now, in the way of specimen, introduce the new information M. T. supplies upon two of the species. On the P. cinerea he remarks, "The indications we formerly supplied regarding the Migratory Partridge, (*P. de passage,*) and the mountain one being quite accurate, and having been since verified, these nominal species must be rejected. The Mountain Partridge may be, it is said, a cross between the Grey Partridge and the Red. Concerning this latter we are informed 'that it is found in Japan, and without undergoing the slightest difference either in form or the colours of its plumage.'" Our remarks, and others of a similar kind, have called forth something like a reproof from this great master of the science,—a reproof which each writer will apply to every one but himself, and to which all will do well to attend. "I have not here," says he, "introduced the innumerable citations, indications, and short descriptive phrases with which the periodicals, under the shape of Annals, Zoological Reviews, Proceedings of Scientific Associations, Acts, Memoirs, &c., abound, whether published in the Southern part of Australia, or under the ice of the North Pole, and which maintain a childish rivalry as to the priority of citation. When such productions are not accompanied with a figure, and that tolerably good, they only become the torment of Naturalists, and never fail to supply ample matter for inextricable confusion which feeds upon itself, and propagates wider and wider in methodical catalogues encumbering the *species* of generic groups. These indications only augment the obstacles to study, and will terminate in completely disgusting amateur Naturalists, who resort to this employment as a recreation from more severe occupations; it is very certain that these are not the means by which to render the science either more agreeable or popular."

"*The Naturalist's Library.*" By Sir W. Jardine, Bart. *Mammalia*, Vol. IX. Dogs. By Lieut.-Col. C. Hamilton Smith; with a Memoir of Pallas.—We regard this volume as highly creditable to the author, the Naturalist's Library, and the science of Zoology. The well-known author gives a view of the Diurnal Canidæ, the several groups of Canine animals which are provided with a circular pupil. He divides them into ten sub-genera or sections, including the true Wolves, Lyciscan Dogs, the Red Dogs, the Thoa Wild Dogs, Jackals, Dog-Foxes, Fennecs, Aguara Wolves, Aguara Dogs, and Aguara Foxes, and about forty species. He has gleaned from the records of the science, ancient and modern, whatever was most valuable; to this store he has added his own extensive observations in Europe, Asia, and America, and from the whole has formed a digest which cannot fail to be permanently esteemed by all Naturalists.

"*Magazin de Zoologie, D'Anatomie comparée, &c.*" Par M. F. E. Guerin Meneville.—The 7th Number, for the year 1839, of this elegant work has just appeared, and is occupied with a description, by M. Isid. Geoffroy-St-Hilaire, of three new genera of Birds sent from Madagascar by M. Bernier, a medical officer attached to the navy. M. I. G. designates them *Philepitta*, *Oriolia*, and *Mesites*; the first two supplying additional links to the already very extensive group of insectivorous Passerines, and the third allied to the Pigeons, Gallinæ, and Palmipedes. The three Birds are depicted in elegant coloured engravings, to which a fourth is added, with *details* of the *Mesites*.

"*Natural History and Illustrations of the British Salmonidæ.*" By Sir W. Jardine, Bart., &c. No. 1.—We are happy to learn that the second fasciculus of this work is in a state of preparation. We have examined the six plates which form the first Number, and consider them admirable, and we doubt not the remaining ones will maintain the same high character, doing credit to the zealous and indefatigable author. We are inclined to suggest, with due submission, that, were the price diminished, and the explanatory letter-press brought out in connexion with the superb plates, this work, so fraught with subjects of national importance and scientific interest, could scarcely fail to be as generally received, as we believe it is highly appreciated.

MISCELLANIES.

DISCOVERY OF MUMMIES AT DURANGO, MEXICO.

A MILLION of Mummies have lately been discovered near Durango, in Mexico. They are in a sitting posture, but have the same wrappings, bands, and ornaments as the Egyptians; among them was found a poignard of flint, with a sculptured handle, chaplets, necklaces, &c., of alternately coloured beads, fragments of bones polished like ivory, fine worked elastic tissues, moccasins worked like those of our Indians, bones of vipers, &c. A fact of importance is stated; that the necklaces are of a marine shell found at Zacatecas, on the Pacific, where the Columbus of their forefathers probably therefore landed from Hindostan or from Malay, or from their islands in the Indian Ocean.—*Silliman's American Journal*, April, 1839.

EXTRAORDINARY CIRCUMSTANCE.—A few days ago, a log of St John's yellow pine timber, cut up in the Greenock Patent Saw Mill, was found to contain a hive of bees in a most perfect state of preservation. The log was a root cut of 35 feet in length, and 26 inches square. It was about 140 years of age, as indicated by the annual fibres of the wood. The age of the tree, at the period when the bees seem to have taken up their abode in it, must have been from thirty to forty years, as all the timber beyond that age was perfectly sound and without perforation. The insects were found in drouses of various sizes, all the way up from the bottom of the tree to near the upper end, and each drouse was connected with the other by a small aperture, or passage, by which a connection was established between all the compartments of the hive. Bees in all stages of growth, and without any wings, were found in it, and the full grown bees, in a state of perfect preservation, presented an appearance exactly similar to that of our own honey bee after being destroyed by smoke. One of the cells filled with the bees still remains at the mill for the inspection of the curious in Natural History.—*Greenock Advertiser.*

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ZOOLOGY.

NESTS OF THE TERMES BELLICOSUS, (WHITE ANTS.)

The nests of Fishes described in our last Number would unquestionably excite the surprise of many of our Readers, and yet those of the Termes, (commonly but erroneously designated White *Ants*,) are probably still more calculated to awake attention and interest. The admirable instinct and ingenuity of the real Ant and the Bee are universally known, but those of the Termites, if possible, transcend them both. The tiny creatures to which we now claim a few moments' attention are about a quarter of an inch in length, and hence do not equal in dimensions some species of Ants, and twenty-five of them weigh about a grain, and yet they construct those wondrous edifices of which we are about to treat. The nests of one species are so numerous all over the island of Bananas, and the adjacent continent of Africa, that it is scarcely possible to stand upon any cleared and open space where one of these buildings is not to be seen within fifty paces, and frequently two or three are to be witnessed almost close to each other. In some parts near Senegal, as mentioned by Adanson, their number, magnitude, and closeness of situation, make them appear like the villages of the natives.

Each of these communities consists of one *male* and one *female*, who are generally the *common parents* of the rest, and of three orders of insects, apparently of very different species, but really the same, which, together, compose great commonwealths, or rather monarchies, if we may use the term. The different species of the genus resemble each other in form, in their manner of living, and in their good and bad qualities, but differ as much as birds in the manner of building their habitations or nests, and in the choice of the materials of which they compose them. There are some species which build upon the surface of the ground, or part above and part beneath, and one or two species, perhaps more, which build on the stones and branches of trees, sometimes at a vast height.

Of every species there are three orders: first, the working insects, which may be called *labourers*; next, the fighting ones, or *soldiers*, which do no kind of labour; and, last of all, the winged ones, or *perfect insects*, which are male or female, and capable of propagation. These neither labour nor toil, nor fight, being almost incapable of self-defence. These only, however, are capable of being elected Kings and Queens; and Nature has so ordered it, that these emigrate a few weeks after they are elevated to this state, to establish new kingdoms, or perish in a day.

These buildings derive their names from their appearance, which is that of little *hills*, more or less conical, generally much in the form of sugar loaves, and about ten or twelve feet in perpendicular height above the surface of the ground. These hills continue quite bare for some time; but in the second or third year, if not overshaded by trees, become covered with grass and other plants, like the surrounding soil. The exterior of these buildings is one large shell, in the shape of a dome, large and strong enough to inclose and shelter the interior from the vicissitudes of the weather, and the inhabitants from the attacks of natural or accidental enemies. It is always, therefore, much stronger than the interior building, which accommodates the interesting community. The hills at first are one or two, a foot or more high. Soon after, at a little distance, while the former are increasing in height and size, others are raised, and increase in number, widening at the base, till the lower works are covered with these edifices, which are raised highest and largest in the middle, until the intervals between the different turrets being filled up, a larger dome is formed.

The animals are not very curious or exact about these turrets, except in making them very solid and strong, and when, by their junction, the dome is completed, they take away the middle ones entirely, except the tops, which, joined together, make the crown of the cupola, and apply the clay to the internal works, or to additional erections. A notion of the strength of these hills may be obtained from the fact, that, when little more than half their height, it is the practice of the wild bulls to stand as sentinels upon them, whilst the rest of the herd is ruminating below. At their full height they are excellent places for outlook, and four men may be accommodated on the top of one of the hillocks.

As to the interior, the *royal chamber*, occupied by the *King* and *Queen*, appears, in the apprehension of the whole community, to be of primary importance. It is situated as near the centre of the building as possible, and generally near the surface of the ground: it is almost invariably shaped like an half egg. In the infant state of the colony, this apartment is not above an inch in length, but with time increases to six or eight inches, or more, being always in proportion to the size of the Queen. Its floor, perfectly horizontal, is in large hillocks, sometimes more than an inch thick of solid clay. The roof also, which is one solid and well turned arch, is generally about the same solidity; but, on the sides, where it joins the floor, is in some places not more than a quarter of an inch thick. Here are placed the doors, and these entrances will not admit any animal larger than the *soldiers* and *labourers*; so that the King and Queen can never possibly go out. The royal chamber, in a large hillock, is surrounded by innumerable quantities of others of different sizes, shapes, and dimensions, but all arched, some circularly, others elliptical or oval, which either open into each other, or communicate by wide and open passages. These apartments are joined by the magazines and nurseries. The former are chambers of clay, and are always well filled with provisions, principally gums, and the inspissated juices of plants. These magazines are intermixed with the nurseries, buildings quite different from the rest of the apartments, composed entirely of wooden materials conjoined together. They are invariably occupied by eggs and young ones, which are at first as white as snow. They are placed all round the royal chamber, and as near it as possible. As in process of time the Queen enlarges, her apartment must also be enlarged, and, as she now lays many more eggs, the small nurseries are broken down, and rebuilt at a greater distance, of larger size and in increased number. In the early state of the nest, they are not bigger than a hazel-nut, but in great hills are often as large as a child's head of a year old: they are inclosed in chambers of clay, like the magazines, but are much larger.

The arrangement in the interior is commonly according to the following plan: The *royal chamber* is near the centre, on a level with the ground, and directly under the apex of the hill. It is on all sides surrounded by the *royal apartments*, where the labourers and soldiers wait to guard and serve their common parents. These apartments extend a foot or more on every side round the royal chamber. Here the nurseries and magazines commence, and are continued on all sides, along with the galleries to the outward shell, reaching to within two-thirds of its height, leaving an open area in the middle, under the dome, resembling the nave of a cathedral: this is surrounded by three or four very large Gothic arches, which are sometimes two or three feet high next the centre, whence they

diminish as they recede, and are lost in the innumerable chambers and nurseries behind them. The great interior area supplies heated air all around. There are also great subterranean passages and galleries lined with the same thick clay, which ascend the outward shell in a spiral manner, opening into the dome, new turrets, &c. These sloping descents reach a depth of three or four perpendicular feet, and from them is procured the clay, which, being worked in the months of these animals, becomes almost as hard as stone. In this way the cities spread to a vast extent, so that, if you destroy all the nests within 100 yards of your dwelling, the inhabitants of those unmolested farther off will nevertheless carry on their subterranean galleries, and will invade you by sap and mine, so doing great mischief to your goods and property.—(*From Winterbottom's Native Africans.*)

ON THE NESTS AND HABITS OF THE MASON-SPIDER.

Having lately had an opportunity of examining the contents of a small box which contained specimens of Mason-Spiders and their nests, transmitted from Western Africa to the eminent keeper of the Museum of the Edinburgh University, we shall here supply a few remarks concerning these interesting objects. A label was attached, "Living Insects," a statement which, however true when the box was closed, was belied when it was opened. The examination was entrusted to the skill of some celebrated Entomologists, whose first object was to deposit their charge under the most favourable circumstances in a hot-house; they then supplied some living prey to the long confined animals, introducing several flies within the trap-door of the nest, but finding, as they anticipated, that no rancorous enemy devoured them, after a few days they proceeded to a more minute examination. The nests were two in number, the one much larger than the other. From the former the lid had been removed, whilst in the smaller it appeared in great beauty and perfection. Two spiders were also found, the smaller much decayed and injured, whilst the larger is yet reserved for more minute examination. Along with these, many fragments of flies were discovered, some of which had probably been introduced as food, but they were now so mutilated that their specific characters could not be ascertained. Both the spider and nests are rare and admirable specimens for the curious inquirer.

It is now upwards of eighty years since the existence of these interesting animals was brought under the notice of Naturalists by the Abbé Sauvages, in his account to the French Academy of Sciences, (see Hist. de l'Acad. Roy. des Sciences, 1758;) whilst M. Dorthes, another French Naturalist, and a Foreign Member of the Linnæan Society, in the year 1792, along with additional particulars as to their habits, published an exact representation of the animal. The same animal, (cæmentaria,) together with its nest, is figured, and a short account given in the Volume, "Insect Architecture," of the Library of Entertaining Knowledge. The best and most recent account of the Spider, however, is that of M. Audouin, contained in the Annals of the French Entomological Society. The name of the modern genus is Cteniza. One species occurs in the island of Naxos, (C. ariana,) another in Jamaica, (C. nidulaus,) which, along with its nest, is figured by Mr Kirby in his Bridgewater Treatise; a third at Montpelier, (C. cæmentaria,) a fourth, (Sauvagesi,) in Corsica, and a fifth, in various parts of New South Wales, is described by Mr Bennet in his Wanderings, (Vol. I. 328.) As the habitat of our specimen was so different from that of the foregoing, it is probably a new species, though it bears a close resemblance to the cæmentaria.

The following are a few extracts from Sauvages' account:—This Spider usually selects for her nest a place bare of grass, sloping in such a manner as to carry off the water from the roof, and on a firm soil, without rocks or small stones. She digs a gallery a foot or two in depth, and of a diameter, equal throughout, sufficient to admit of her easily passing. She lines this with a tapestry of silk, glued to the walls. The door, which is circular, is constructed of many layers of earth kneaded and bound together with silk. Externally it is flat and rough, corresponding to the soil around the entrance, for the purpose, no doubt, of concealment: in the inside it is convex, and tapestried thickly with a web of fine silk. The threads of this door tapestry are prolonged, and strongly attached to the entrance, forming an excellent hinge, which, when pushed open by the Spider, shuts again by its own weight. When the Abbé first discovered the nest, he attempted to open the trap-door with a pin, and was surprised at the opposition he experienced, and which he speedily ascertained arose from the efforts of the active inmate. When he at length so far overcame it, and peeped within, he perceived the little creature placed in that attitude, which was of all others the most favourable for effecting its object. Hence, it always closed the door as often as the Abbé opened it, and so the combat continued for a long time. When the Spider was at last overcome, it immediately darted to the bottom of the nest.

M. Dufour, another Frenchman, who has written on the subject, thinks that it is the female alone which constructs nests, the males, according to him, being usually found under stones. But in this assertion he seems to have overlooked the statement of M. Dorthes. "I have often," says this gentleman, "found the male and female in the same habitation, with about thirty little ones. This shows that this species is more social than many of its congeners, which mutually devour each other. If, however, a number of these Mason-Spiders are put into one vessel, and without food, they speedily attack and devour each other. It is only during the night," he adds, "that they hunt their prey, and construct their abode. If you fix with a pin the lid of their dwelling, you next morning find that they have opened a new door during the night; and if you remove the door altogether, you will find a new one next morning upon precisely the same position."

ON THE SPECIES AND HABITS OF THE VAULTING LEMUR, (GALEOPITHECUS.)

Frequent allusion has lately been made in this Journal to that singular animal, the Vaulting Lemur, which, about the size of a cat, is supplied with an investing membrane, springing from under the chin, extending down the arms to the fingers, thence along the sides to the toes, and terminating at the end of the tail, thus forming a parachute, whereby it takes enormous leaps. About six months ago we had occasion to describe it in the Animal Kingdom, (Vol. II. p. 2,) and, from the writings of Pallas, Audebert, Geoffroy, and others, supplied the most accurate information that has hitherto been collected. We stated that one species, the Red, (G. rufus,) was pretty well known, and classed other two as doubtful species. It would appear (Proceedings Zoological Society, 1838, p. 119) that during the last session, Mr Waterhouse, Secretary to the Zoological Society, laid upon its table several specimens of this animal, with the object of noticing certain characters which appeared to him to indicate the existence of two species. One is larger than the other, measuring about two feet in total length, the cranium extending to eleven and a half inches. The anterior incisor of the upper jaw is broad, and divided by two notches, into three distinct lobes; the next incisor, on each side, has its anterior and posterior margins notched; and the first molar (occupying the situation of the canine) has its posterior edge distinctly notched. This tooth is separated by a narrow space anteriorly and posteriorly, from the incisor in front, and the next molar behind; the temporal ridges converge towards the occiput, near which, however, they are separated usually by a space of about four lines. The other species is usually about twenty inches in length, with the skull 2″ 7‴ in length. It has proportionally larger ears and longer hands; the cranium is narrower in proportion to its length; the muzzle is broader and more obtuse; the orbit smaller; the temporal ridges generally meet near the occiput, or are separated by a very narrow space; the anterior incisor of the upper jaw is narrow, and has but one notch; the next, on either side, is considerably larger, longer, and stronger, and differs in having its edges even, as is true of the first false molar. All the teeth form a continuous series, each tooth being in contact with that which precedes and that which follows it. The most important difference, perhaps, consists in the much larger size of the molar teeth in the smaller skull, the five posterior molars occupying a space of 10‴ in length in the latter, whereas, in the larger animal, they only occupy nine.

These statements are important, and, more satisfactorily than any that have hitherto been presented, appear to indicate specific differences. We submit them to such of our readers as may have an opportunity of testing them. Mr W. proposes the names *Temminckii* and *Phillipinensis* for the two species, acting herein not so discreetly, we humbly conceive, as he might have done. For what, in that case, is to become of the G. rufus of Audebert, Geoffroy, Desmarest, and the whole host of systematic writers? Surely it is not to be blotted from our catalogues, or degraded from the place it has so long and familiarly occupied.

The same gentleman, at a previous meeting of the same excellent Society, supplied from the notes of Mr Cuming some details concerning the habits of these animals, which we subjoin. The Caguang, to employ a native name, is an inoffensive animal, inhabiting lofty trees in dark woods, and is known to feed upon the leaves of the Nanka or Jack fruit; it suspends itself from the upper branches of the tree by all its feet, which gives it a large appearance, as it brings them all four together. It flies heavily for about 100 yards on an inclined plane, but readily ascends the trees by its strong claws; it makes a weak noise similar to geese when at rest: when the calls of nature operate on the animal, it erects its tail and membrane up to the back part of the neck, which gives it a most singular appearance. They are easily taken by the natives throwing nets over them, or by cutting down the tree on which they are, and are seized before they can clear themselves of the branches. I never saw any of them attempt to bite. When the female has young she is very easily taken. They appear much attached to their young, which are always hanging at the breasts. Of late years great numbers of them have been taken for

the sake of their skins, which meet with a ready sale at Manilla. They are found on the islands of Bohol and Miodanado.

HABITS OF THE JAGUARS.

Mr Schomburgk, the enterprising traveller, having recently returned from his successful expedition in Guiana, has communicated to the London Zoological Society notices concerning various of the animals, which his circumstances supplied admirable opportunities of minutely observing. Of these we shall now present a few hints concerning the Jaguars, those formidable felines which are usually compared with the Royal Tiger of Asia. Mr S. alludes to two species or varieties. He agrees with former observers in stating that the larger is very numerous, and exceedingly daring, sometimes killing cattle within a few yards of human habitations, and caring very little for the fires which are made to prevent their encroachment. If one or a pair of these animals should take up their quarters in the vicinity of a cattle farm, scarcely a night passes in which they do not commit ravages. They do not eat much of any prey they kill, perhaps ten or twelve pounds, and principally of the breast; but they prefer killing fresh every time they are hungry. The smaller variety, sometimes called the Turtle-Tiger, is scarcely less destructive. They are of the same strong build as the greater, and much resemble it in the colours and markings, but are about a third less in size. In the vicinity of human dwellings they commit great havoc among domestic animals, hogs, sheep, goats, &c. being alike exposed to their attacks, though no authentic instance has ever been heard of their attacking man, whilst they boldly enter the house, and carry away the dogs from the fireside.

On arriving, in February 1837, at Curassawaka, Mr Schomburgk heard much complaint of a Jaguar that was prowling nightly about the settlement. This animal had carried away a young puppy from below an Indian hut. It then pilfered a good hammock, of which the natives were suspected; then a blanket; and still stranger thefts became more frequent, as saucepans, spoons, a table-cloth, and other things left about the huts. It was about this time that our traveller, having a good deal of writing, was generally sitting up till after midnight. "Although my hut," he observes, "merely an open shed, was at some distance from the settlement, and a servant, besides myself, its only inhabitants, we had been no otherwise disturbed by the Jaguar than from the noise of my dog, when our unwelcome guest prowled in the neighbourhood of the huts. I was thus one night sitting up at my desk, and had just put my loaded pistols, which had been lying on the desk, on a box at my left hand, thinking it too late to expect a visit from the Tiger. A short while after my eyes were directed to the outside of the shed, when I discovered an object, the real nature of which I could not make out from my hammock being in the way: holding forward the light, I discovered, to my great astonishment, the Jaguar standing four paces from me, and looking stedfastly at my proceedings. How long he had been there I know not; but before I had put down the candle, and seized the pistol, he had walked off slowly into the bush, and although I fired after him, I naturally missed him. A few nights after, I was awaked by something crawling under my hammock, and, supposing it to have been a dog which had been in quest of some pieces of biscuit which I had left on a plate, I gave the disturber of my rest a slap with the hand, when, lo! the animal cleared with one spring the chests and trunks which stood in its way, and rushed into the bush, displaying the spotted skin of the Jaguar. I freely confess that, at this discovery, the blood chilled in my veins. The marks of the Jaguar's paws, next morning, left no doubt as to the visitor; and we began to consider, not so improbable, the report of the Indians, as to who might have been the purloiner of the things which we had missed. A search was begun in the neighbouring wood: pieces of wool torn from the blanket, when dragged through the bush, pointed out the probable direction which the Jaguar had taken with its booty, and soon after the blanket itself was found, apparently no farther injured than by the rents which it might have got in being dragged along. The hammock was found in a quite different direction, and also the other missing objects, with the exception of the table-cloth. What could be the object of the animal in carrying them off? Shall we compare it to the thievish Magpie, or was it mere playfulness? Sometimes we were astonished by his feats of strength; but all our endeavours to rid ourselves of this unwelcome visitor proved fruitless."—(*Proceedings Zoological Society.*)

HABITS OF THE ROACH, LEUCISCUS RUTILUS.

The Roach differs considerably in its habits from its congeners. It frequents pools, canals, and gently running streams, such as those of the eastern counties of England, where it is exceedingly abundant. In Scotland it is of much less frequent occurrence, although plentiful in a few localities, such as the Edinburgh and Glasgow Canal. It usually moves about in small parties, sometimes in large shoals. Although it is held in little estimation as an article of food, on account of its insipid taste, which, however, is not so remarkable if it be taken from a running stream, it is much sought after by juvenile anglers, who prize number and quantity much more than the qualities of vigour and fine flavour, which please the mature fisher, who seldom uses the Roach unless as bait for pike or large perch. For this purpose the smaller individuals are best adapted.

Owing to the small size of the Roach's mouth, the bait and hook must not be large. Nothing answers better as bait than bread crumbs, or a paste made of flour and water, in portions about the size of a pea. As the mouth of the fish is very tender, care must be taken to prevent escape after it has been hooked, and much gentleness is required in order to bring a large Roach safely to the shore.

I have seen cocculus indicus used for the purpose of stupifying this fish, which may be easily caught with a bag-net on rising to the surface, forced by the action of the poison. Fish taken in this way are invariably found to have the swimming-bladder much distended with air. This vile mode of fishing, which is very properly prohibited by law, is, however, seldom resorted to.

The weight of the Roach varies from a pound upwards. Instances have been known of individuals weighing as much as five pounds, but it rarely attains half that weight. A specimen of twelve or thirteen inches in length, if in good condition, ought to weigh about a pound.

An individual, fourteen inches in length, procured in the neighbourhood of Edinburgh, may be described thus. Viewed laterally, it presents a somewhat oval shape, with the dorsal line much elevated, and forming a prominent ridge. The scales are of large size, arranged in eleven rows, seven and a half of which are above, the other three and a half below, the lateral line, which is formed of forty-three scales. The head, which is destitute of scales, is one-fifth of the entire length. The mouth is small, with the jaws of equal length; the tail is deeply forked. The whole fish is much compressed laterally, measuring only an inch and a half in breadth, while its greatest depth, immediately in front of the dorsal fin, is three and a half inches.

The colour of the back is dusky-green, with a tinge of blue; the sides are lighter, and the belly of a silvery white. The fins, as well as the irides, are of a tint varying from pale orange to bright red. The formula of the fins is—D. 13—P. 16—V. 9—A. 13—C. 19—B. 3.

Persian Sheep Dog.—Sir John M'Neill has lately presented to the Zoological Society of London, a Dog which is used by the wandering tribes in Persia to guard their flocks: it is a shaggy animal, nearly as large as a Newfoundland, and very fierce and powerful. The dam of the animal now in the Zoological Gardens killed a full grown Wolf without assistance.

METEOROLOGY.

ON THE EFFECTS PRODUCED UPON ANIMAL LIFE BY THE SEVERE WINTER, 1837–38.

In our last Number we supplied a short notice concerning the last part of the Proceedings of the Berwickshire Naturalists' Club, and intimated our intention of occasionally gratifying our readers with additional extracts. The following is an excerpt of a paper from the able pen of P. J. Selby, Esq. of Twizel House.

The severity with which the year 1838 was ushered in by the long continued frost during the months of January, February, and a part of March; the cold and long retarded spring, succeeded by a chilly and ungenial summer, as well as a late and deficient harvest, place the year 1838 upon our records as one of peculiar, though happily of unwonted character. Under circumstances of such a nature, and which it is more than probable may not again occur during the limit of the present generation, a few observations upon the effects of so severe a season, as connected with animal life, may perhaps prove not altogether uninteresting. It will be in the recollection of those who attended to the weather, that, up to the 5th of January 1838, the season, with the exception of the first week of the previous November, when we experienced a severe but cursory snow storm, had upon the whole been temperate and mild: this was particularly the case on Christmas, and two or three following days, when the thermometer ranged from 52° to 55°, at which time, I may remark, many of the Thrushes which still remained inland were heard recording in distinct and audible key, thus flattering us with the hope that winter had divested herself of her characteristic garb, and that these sweet carols were to be the prelude of an early spring. These halcyon days, however, were of short duration, as, on the 6th of January, frost set in, accompanied in this district by showers or falls of snow and hail, which, in consequence of the calm state of the atmosphere, fell level upon the surface. It thus continued falling at frequent intervals, more or less, for nearly a fortnight, when the snow had accumulated to the depth of ten or twelve inches over the whole surface of the country, the frost, at the same time, continuing to increase in intensity, till every brook and pool was locked up in ice and frozen snow. In consequence of this deep

covering, the birds, particularly those of the insectivorous tribe, or whose chief pabulum consists of worms and insects, soon began to feel the effects of famine; and blackbirds, redbreasts, hedge-sparrows, &c., were reduced, at a comparatively early part of the storm, to a deplorable state of weakness, and were daily found dead, or dying from the combined effect of hunger and cold. Many fieldfares also perished at this early stage of the frost, though the great body of this emigratory species, soon after the commencement of the storm, moved southwards; the thrushes also, which I have previously observed were singing at Christmas, entirely disappeared, a precaution I have observed for many years to take place in regard to this species, whenever a storm or frost of any continuance has occurred. I may remark, that, previous to the commencement of the storm, all the haws and other berries, which are the occasional food of the thrush tribe, had been devoured by them, so that no resource of this nature was left them to fly to when the frost first set in. About this period of the storm, that is, after a fortnight's continuance, the arrival of a great variety of the rarer kinds of water-fowl along the line of coast proclaimed the intensity as well as the wide extended range of the cold. Wild swans then made their appearance in flocks, and for two or three weeks several of these birds took up their residence in Buddle Bay, when, as may be supposed, their unwonted presence caused an active pursuit, and many individuals were shot. Among them, I may mention two that were taken alive, having been wounded, but only so as, in conjunction with their reduced condition, to incapacitate them for flight; these soon became very tame, and were afterwards placed by W. B. Clark, Esq. of Belford Hall, in a piece of water, where one of them continues to thrive, and now associates with a common goose; the other died during the course of the summer, apparently from the effects of some internal wounds it had received. Both of these were of the common or elk species, (*Cygnus ferus*,) nor did any specimen of *Cygnus Bewickii* come under my observation, though I am aware that a few individuals of this species were taken in other parts of the kingdom. In other districts of the country, and in the south of England, the destruction of these beautiful and noble birds was very great. Among the rarer species of water-fowl killed upon our coast, the following are deserving of notice. *Larus minutus*, (little gull,) near Embleton, the first instance, I believe, of its occurrence upon the Northumbrian coast. Several specimens, also, of the *Mergus albellus*, (Smew), in the adult male plumage, in which state it is considered a rare bird, were killed upon different parts of the coast; and of *Podiceps rubricollis*, far from a common species, I saw several instances. Many specimens of the different colymbi (divers) were also shot, and wild-ducks, widgeons, brent-geese, scaup-ducks, pochards, tufted-ducks, and golden-eyes, were very plentiful. Upon the southern coasts of England an equal or even greater influx of water-fowl took place, and the destruction, as may be conceived, was comparatively great. In Hampshire, I am informed, that a noble sportsman, who rented a small part of the coast expressly for the shooting of wild-fowl, killed, during the storm, the extraordinary number of 515 head of various kinds, among which were thirty-seven swans. This warfare upon the aquatic tribe continued for six or seven weeks, and it was not till the middle or latter end of March that the wild-fowl began to shift their quarters, or yield to that influence which directs their migratory movements to the higher latitudes on the first approach of spring. Before a thaw took place, many of our hardy indigenous and resident land birds also suffered from the intensity of the frost and the want of food; partridges and pheasants were found dead in every direction, and even the hardy muirfowl, upon the higher grounds, were many of them frozen to death. In Edinburgh, I am informed, that for weeks, after the first ten days of the storm, baskets full of partridges, and other game, were brought to the poulterers, which had died or been caught in a dying state, and, when taken into the hand, were found so reduced as to be a mere collection of bones or feathers. Four-footed game, also, did not escape with impunity, and during a great part of the storm, their only food, in this district, was the bark and twigs of such underwood and young trees as appeared above the snow. But it was not in those districts alone in which the snow lay deep upon the surface, that animal life suffered from the severity of the season, for I find that in Dumfries-shire, and other parts along the western coast, where the fall of snow was very trifling, and scarce whitened the surface, great mortality, nevertheless, prevailed amongst the feathered race, all access to food having been as effectually prevented by the stony hardness of the earth, as it was where the hoary covering hid every thing from view.

MISCELLANIES.

LINNÆUS' DAUGHTER.—HER DEATH.

Robert Bremner, Esq., in his very agreeable work, "Excursions in Sweden, &c.," has supplied an interesting account of his interview with the daughter of Linnæus, which is the more agreeable, as most biographers have stated that the family of the illustrious Swede became extinct as long ago as the year 1783. On reaching Upsal, he naturally inquired for the house of Linnæus, and for some time in vain; and, while looking dubiously for the object of his search, was invited in by a lady, who told him that he should see not only the house, but the daughter of Linnæus. This was a most unlooked for piece of intelligence. "On ascending the stair, however," he remarks, "our doubts were completely expelled. The lady who had first addressed us now spoke a little English, on discovering what country we belonged to, and ushered us into a neat little carpeted parlour, where we found the personage in question, Louisa Von Linné herself, seated on a high-backed arm-chair, in company with another lady. Her appearance was highly interesting, but indicated a degree of feebleness both bodily and mental, which her eighty-seven years but too amply justified. Her grey silk gown and crimped cap spoke of a bygone taste, but were in excellent keeping with her venerable age; while the tidy look of every thing about her indicated the unforgotten habits of order and cleanliness in which she had been trained. She attempted to rise when we approached, and seemed highly gratified in learning that we were all from such far countries, and had come in search of her father's house out of regard to his great name. Her speech is almost gone, but she still follows attentively all that is said. The sharp scrutinizing glance which she cast at each of us, ere she consented to give us a pinch from her silver snuff-box, was highly amusing. We might be relic hunters—such seemed to be the thought passing in her mind—and would not restore it. The extended hand was almost withdrawn—but a second survey removed her suspicion, and the antique implement made its circuit from one to the other of us, with all the reverence due to the name which it bore. Our visit evidently gave her great pleasure; it seemed as if she had never known the extent of her father's fame: she could scarcely understand how people from such distant countries could know or have heard aught about a Swedish professor. The other ladies were obligingly communicative, and mentioned that the fortune left by her father was so considerable, that she had been able to retain all her life the country seat purchased by him, which is so near, that she spends a great part of the year there. As we took her hand at parting, and felt the sands of life ebbing so fast that a few weeks might lay her by his side, we rejoiced that our idle visit had shed a glimpse of joy over the last hours of a great man's child."

From a late Number of the Athenæum, we learn that this lady died on the 21st of March 1839, at the venerable age of ninety, and that her fortune descended to two grand-daughters of the Swedish Botanist.

Dublin Royal Zoological Society.—The Dublin Zoological Society seems to be a very thriving institution, and in some degree owing, we doubt not, to its plan of frequently giving public and popular lectures upon the fascinating subjects embraced within its sphere. These lectures are delivered in the evening, in the Theatre of the Royal Society's House. At the second meeting for the season, the Archbishop of Dublin presided, and three discourses, if we remember right, were delivered. One of these was by Dr Houston, upon the Organs of Hearing in Man, as contrasted with those of Animals, a subject which he illustrated by numerous drawings and diagrams. Preparatory to a description of the individual organs, he made several observations on the nature and properties of sound, and the difference between air, water, and solids, as media for its transmission to the ear. As an instance of which, he stated in general terms, that a cannon fired at the North Pole would, supposing the sound to travel with its ordinary velocity, be heard at the South Pole in thirteen hours and twenty seconds, if conducted through air. It would go the same distance in three hours and twenty minutes if conducted by water, and if by wood, metal, or stone, it would reach that point in twelve minutes and twenty seconds, a velocity almost equal to that of electricity. Several interesting experiments were related by the learned Lecturer in proof of the conducting power of air, and other media.

Aerial Voyages of Spiders.—In our November Number we gave, in Mr Darwin's words, an account of a curious visit of these creatures to the vessel when nearly 200 miles from the coast of South America. We now present a not less singular invasion on the banks of the Indus. "I was taking a stroll," says the writer of a letter from Sukkur, dated September 17, "into the fields, when I found myself suddenly covered with a whole host of small and large spiders. On looking about, I observed that I was standing in the midst of a large cloud of these animals, who appeared descending in a filmy web of no small dimensions from the upper regions. Having extricated myself with some difficulty from their embraces, I took a position whence I could see about me, without being annoyed by them, and to my astonishment I beheld descending, maze within maze, and fold within fold, an innumerable host of spiders, all suspended and dancing on their numberless tiny threads, which were at times seen to glance in every variety of shade, amid the beams of the rising sun."

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THE DELIGHTS OF NATURAL HISTORY.

The charms associated with the study of Natural History have been expatiated upon by many, and, as might have been expected, most delightfully by those who have assiduously cultivated its extensive and varied fields. The following paragraphs so strikingly embody the innate and enraptured feelings of a meritorious and ardent lover of nature, that we cannot deny ourselves the pleasure of introducing them into our pages. There is scarce any study, says the anonymous but distinguished author, through which more quiet pleasure can be enjoyed than the study of Natural History. It forms a kind of back-garden to the crowded work-shop of busy life—a retreat, still, calm, and refreshingly green, into which one can occasionally escape from the smoke, and dust, and turmoil of ordinary occupation. It is a good breathing-place. We remember reading, some years ago, that remarkable book, Chateaubriand on Revolutions; and we still retain a vivid recollection of the chapter in which the writer addresses himself, from his own experience, to such unfortunate victims of popular convulsion as, stripped of their possessions, may have to wear out life as exiles in foreign countries. Get rid, says the writer, of the associations which lead you into the past—travel into a new field; acquaint yourself with the nature of Insects, study the properties of Plants, explore Rocks, analyze Minerals—forget yourselves and your misfortunes amid the inexhaustible wonders of Nature. But there is no need to restrict the advice, for it may suit those who live in their own country, and who have no signal misfortunes to deplore.

Dr Johnson could congratulate himself, in his seventieth year, that his curiosity was still as active as when he first awoke in the dawn of intellect. The love of novelty is inherent in man; it is one of the grand distinctions of his nature over that of the brutes, that he should go on adding idea to idea, and one species of knowledge to another; and, in accordance with this principle, there are, perhaps, few men who would not be travellers if they could. But in most cases the desire cannot be indulged. The great bulk of mankind are fixed down to some one particular locality; and the original feeling so wisely and beneficially implanted, becomes languid for lack of exercise. This, however, need not be, and there is no locality in which the love of novelty may not be gratified—in which we may not become travellers, and pass into a new field, not by changing place, but by changing, in our own minds, the relations of the place, by connecting it with some newly acquired science. The study of plants, of insects, of fishes, of birds, of quadrupeds, of minerals, and fossils, may be pursued in almost every locality; and the life must be very long, and its leisure hours very many, which can thoroughly exhaust even a limited district in connection with these pursuits. We question, too, whether the actual traveller ever feels the interest of novelty more thoroughly gratified, than he who travels into a new district without changing his ground. How wonderfully objects, before unnoticed, or but slightly regarded, rise into interest. How even the spiky leaves, and light florets of the thirty or forty varieties of the humble family of the grasses, which one meets with in his shortest walks, grow up into beauty and importance; how intently the eye follows the light happy creature that goes darting on its wings of gauze through the air, or flutters over the stream in which it had so lately pursued its first set of instincts as a denizen of another element; how much more completely the song of the bird fills the ear, and how its notes heighten and improve when the history of the little singer is known; what wonders open to the mind in studying the diverse characters, and the marvellous instincts of the beasts of the field, those instincts so very similar, and yet so very unlike the workings of the human intellect! Instinct and intellect seem the asymptotes of creation, ever approaching and never meeting. Above all, how powerfully does the science address itself to the imagination, which, passing from the present state of things, converts the often explored, but ever novel locality, into a rich museum of the remains of former creations. We find in this department the wildest fictions more than realized. The more prominent and well-known features of the scene become at once strange from their new relations with the terrific convulsions of an earlier time. A new sublimity invests the lofty mountain and the solitary valley; the one glows a high mass of molten fire, shot up from below by volcanic agency; the tides of a vast ocean roll irresistibly through the other. And then those strange shapes, that lived and moved in the hoar antiquity of the world—those mummies of the rock, whose very types have perished. We enter on the study, and find that the dragons and griffins and unicorns of what we may call a mythological Zoology, were unnatural inventions,—but, compared with the real existences of the geologist, not at all extraordinary ones. We become acquainted with forms the most amazing—with creatures that constituted the connecting links which united tribes and families apparently the farthest apart. We find the crocodile mounted in one instance on the paddles of the whale; in another, on the wings of the bat; we find the neck of the swan uniting the head to the body of the Saurian.

It is only in this late age of the world, that one of the simplest instincts of our nature seems to be settling on its proper objects. The true and the marvellous have hitherto been too much dissociated. We sought in science for the one, and in fiction for the other. But why is it that the child, simple and unsophisticated, is never pleased to find them apart,—that mere truth is nothing to it separated from the wonderful, nor the wonderful disunited from the true. The feeling arises from a right instinct, and, like every right instinct, has its legitimate object on which to rest.—"Witness" *Newspaper*.

THE CA'ING WHALE, A VISITANT OF THE IRISH COAST.

Although it might reasonably have been presumed that the Ca'ing Whale visited the Emerald Isle, yet it has only recently been ascertained to be a fact, on satisfactory ground, supplied in a paper lately published by that active Zoologist, William Thompson, Esq., Vice-President of the Natural History Society of Belfast, (Ann. of Nat. Hist. March 1840,) and entitled "Additions to the Fauna of Ireland." The very frequent occurrence of these animals in such immense herds, in the northern shores and islands of Scotland, and their occasional presence on the coasts of England, as at Torbay, and of France, as off Bretagne, left but little doubt they might be found on the Irish shores. Hence we are not surprised to learn, upon the authority of Mr Robert Ball of Dublin, that individuals of this species are occasionally driven ashore in large herds on the southern

coast of Ireland, and it is even a frequent occurrence in the month of June at Youghal. Here a herd of 75 came ashore a few years ago, of which the average size was from 11 to 18 feet, and one had attained the length of 22 feet. Again, when Mr T. was visiting the south islands of Arran, (off the coast of Clare,) in June 1834, accompanied by Mr Ball, a portion of the skeleton of a *Delphinus melas* was found by them on the beach. On this latter gentleman revisiting the same islands in the following summer, he saw the remains of a herd of these animals lying where they had perished. The inhabitants likewise speak of them as common.

A word, before concluding, on the appellation used by Mr Thompson, viz. *Delphinus melas*, Traill. *Deductor* is the more characteristic name; and although *melas* was first proposed by Dr Traill, yet it was the same distinguished individual who himself suppressed the old name and applied the new, so giving a preference in which he may very properly be indulged. It was in Nicolson's Journal the former name was applied, and the latter appeared in Scoresby's Arctic Regions, whence it has naturally but unfortunately been inferred that the new name had been applied by the illustrious mariner, though it was really by his friend Dr Traill. We agree with this very intelligent gentleman that this is the preferable specific name: and, with regard to the generic, as the genus Delphinus has become so numerous, amounting to scores, it seems necessary to adopt Lesson's division of Globicephalus, so making this whale the *G. deductor*.

ON THE SILVERY WHITE-HAIRED GOAT OF ANGORA.

A communication on the White-Haired Goat of Angora was, in the month of January last, read by Lieutenant Conolly to the Asiatic Society, of which we shall now supply a short account. The Angora Goat, peculiar to the Province of Asia Minor of that name, is invariably white, with long silky hair, of one sort only. If taken from the province, they are with difficulty kept alive, and always deteriorate, so as to be no longer recognizable. It is remarkable that the cats and dogs of this province have also long silky hair; the former over the whole body, the latter in the ears and tail only. This may arise from the nature of the country, which is hilly, and composed of chalk, and very dry; the vegetation, upon the whole, rather scanty, and the trees small. The Angora Goats are clipped annually, and yield from one to four pounds. The price of the ordinary sort is about 7d. a-pound, and the picked samples fetch 11d. The skin is exported to Constantinople, where it is dyed of various colours, and used chiefly for Turkish boots and slippers. The hair is exported either in a raw state, or in yarn, or manufactured into those delicate stuffs which are well known in Europe. Some of the fleeces are exported entire to Turkey, where they are used for seats for the religious doctors; and a few reach Europe, where they are valued as rugs and saddle-cloths. A good skin costs L.1 at Angora, and 30s. at Constantinople. The hair is carded by the women, and then spun. In this process it is well moistened with saliva before it is drawn from the distaff; and it is stated that in the melon season, the yarn is much better than that spun at any other time, because the melon imparts a mucilaginous quality to the saliva, which softens the hair. Before the yarn is used by the weaver, it is well saturated by *chireesh*, a liquor made from a root like a radish, brought from the neighbourhood of Konia. The process is a strange one, and was witnessed by Lieutenant Conolly. The yarn is stretched out on wooden frames, like the hempen lines of a rope-walk; and two men, with large bowls of chireesh, take mouthfuls of the liquid, and squirt it dexterously over the yarn in very minute showers; they are followed by others, who press the moistened yarn together, and then spread it out again, so that all the parts may receive a share of the chireesh. The yarn is made into gloves and socks by women, who knit so finely, that socks are sometimes sold at nearly 20s. a-pair. The exportation of the wool is very great, and the province is thereby much enriched.

DESCRIPTION OF THE WHITE ANTS.—(*Termes bellicosus.*)

In our last Number, we supplied a description of those most wonderful specimens of insect architecture, the nests or hills of the so-called White Ants; and we shall now add as condensed an account as we can of the wonderful little creatures themselves. We mentioned that, according to Mr Smeathman, (Phil. Trans. lxxi.) there were three classes in every community, the *workers*, the *soldiers*, and their majesties the *king* and *queen*. He conceives, moreover, that the workers are larvæ, the soldiers nymphæ, and the king and queen the perfect insects. In this opinion he coincides with Sparmann and others; but M. Latreille is inclined to think from what he observed in an European species, (T. lucifugus,) found near Bordeaux, that the soldiers form a distinct race, like the neuters among bees and ants, while the workers are larvæ, which, when they become nymphs, are supplied with the rudiments of four wings, which are fully developed in the perfect insect.

The *worker* is less than one-fourth of an inch in length, delicate and slender, having a distinct head, chest, and abdomen, with six legs, and is wholly of a brownish colour. The *soldiers* are much larger, being half an inch long, and equal in bulk to 15 labourers. There is, moreover, a remarkable difference in the form of the head and mouth; for in the worker the mouth is evidently calculated for gnawing, whilst in the other, the jaws are shaped like two very sharp awls, somewhat jagged, the head at the same time being larger than all the rest of the body put together, and quite horny, having jaws like crab's claws, so that they are incapable of any thing else than piercing or wounding. In the *perfect state* the insect varies in form still more than ever. The head, thorax, and abdomen, differ almost entirely from the same parts in the other two classes; and, besides, the creature is now furnished with four large transparent wings, with which, at the time of emigration, it is to wend its way in search of a new settlement. In the winged state they alter their size as much as their form. Their bodies now measure between six and seven lines, and their wings two and a half inches from tip to tip, and they are equal in bulk to about 30 labourers, or two soldiers. They are now also furnished with two large eyes, placed on each side of the head; whilst in the others they are not easily distinguished. It is in this form the animal comes abroad, with the first showers of the rainy season, which usually occur at night, and if the rain continues, the quantities which cover the surface of the earth, and particularly the waters, are astonishing; for their wings are persistent only for a few hours, and after the rising of the sun, not one in a thousand is to be found with four wings, and probably not a pair in many millions get into a place of safety, to fulfil the first law of nature, and lay the foundation of a new community.

The dangers of these insects are immensely increased by their almost innumerable foes, for all kinds of ants, and many other insects, as well as reptiles and birds, and man himself, are their implacable foe, devouring them, quite resistless, with the keenest relish. A few, however, do escape; and being found by some of the labourers, are elected the monarchs of new states: they are immediately inclosed in the royal chamber formerly described. After this, the work of propagation soon commences, and the labourers constructing the required nurseries carry the eggs, and lodge them safely on obtaining them from the queen.

It is about this time that the most extraordinary change commences in the appearance of the queen. The abdomen gradually extends, and enlarges to such an enormous size, that in an old queen it is increased to 1500 or 2000 times the bulk of the rest of her body, and 20,000 or 30,000 times the size of a labourer. When about two years old, the abdomen is about three inches in length, and sometimes it is found twice that size. It has now become one vast matrix full of eggs, and has a peristaltic motion, resembling the undulation of the waves, which continues incessantly, without any apparent effort of the animal, protruding eggs to the amount of 60 in a minute, or 80,000 and upwards in a day. These eggs are immediately removed from her body by the attendants, and are carried to the nurseries, some four or five feet distant, in a straight line, and consequently much farther by their winding galleries. Here, on being hatched, the young are attended, and provided with every necessary, till they are able to shift for themselves, and take their proper share in the ordinary labours of the innumerable community.

The Fruit Crows and Summer Birds.—The beautiful birds which are represented in the 2d Plate of this Number are inhabitants of South America, and most of them of the Province of Brazil. Here the Red-breasted Fruit Crow abounds, and although the Royal one is transmitted from its principal ports, yet it must be exceedingly rare, as few or no travellers have discovered it in its haunts: Hence, probably, it is only brought into these parts, and most likely from Peru or Chili. These birds are about the same dimensions as our own Crows, though more richly attired and ornamented. The Royal Fruit Crow has not only a splendid crest on its head, but a flaming beard of elegant feathers; whereby it is distinguished from all known birds. The Araponga Summer-bird was discovered by the Prince of Neuwied during his Travels in Brazil, where it is often perched upon the extremity of a dead branch, and is well known by its peculiar voice, not unlike the stroke of a hammer upon an anvil, or that of some not very harmonious bell.

BOTANY AND HORTICULTURE.

INJURIOUS EFFECTS OF OPIUM.

The injurious effect of eating and smoking Opium is unfortunately no longer a practice of some semi-barbarous people to which we can listen with indifference, but is one which is rapidly forcing itself upon attention from the results it is producing in the heart of our own population. We noticed some months ago, that Dr James Johnson mentioned in one of the Metropolitan Societies, that whatever diminution or abstinence in the abuse of ardent spirits was being effected in this country by the effects of Temperance Societies, was more than counterbalanced by the increasing indulgence in the use of Opium; and this not only amongst the most degraded of our people, but also among the wealthier classes, so that the attention of the various Assurance Companies was especially required to the point as affecting their prosperity and well-being. No warning of these fearful consequences can be more striking than that which is casually introduced by Mr Bruce, in his able Report on the Cul-

tivation of Tea in Assam, lately noticed in this Journal. If the British Government, says that lively writer, does not take active measures to put down the cultivation of Opium, and that quickly, the thousands that are about to emigrate from the plains into Assam will soon be infected with the Opium mania—that dreadful *plague* which has depopulated this beautiful country, turned it into a land of wild beasts, with which it is overrun, and has degenerated the Assamese, from a fine race of people, to the most abject, servile, crafty, and demoralized race in India. This vile drug has kept, and does now keep, down the population; the women have fewer children compared with those of other countries, and the children seldom live to become old men, but in general die at manhood, very few old men being seen in this unfortunate country, in comparison with others. Few but those who have resided in this unhappy land know the dreadful and immoral effects which the use of opium produces on the native. He will steal, sell his property, his children, the mother of his children, and, finally, even commit murder for it. Would it not be the highest of blessings, if our humane and enlightened Government would stop these evils by a single dash of the pen, and save Assam from the dreadful results attendant on the habitual use of opium? We should, in the end, be richly rewarded, by a fine healthy race of men growing up for our plantations, to fell our forests, to clear the land from jungle and wild beasts, and to plant and cultivate the luxury of the world. This can never be effected by the enfeebled Opium-eaters, who are more effeminate than women.

Dr Sigmond stated at a late meeting of the Medico-Botanical Society, some curious statistical facts upon the subject of Opium consumption in China. The principal inducement for the Chinese to smoke opium instead of eating it, as usual among European and Asiatic nations, arose from the facility and the rapidity with which the intoxication is produced when imbibed by the lungs into the system—it was conveyed with inconceivable quickness to every part of the body, and more especially to the brain, upon which its singular effects were most visible. Dr S. had found that calculations had been made as to the number of smokers, and the increase from the year 1820 had been prodigious. The presumed number of smokers in three years at that period was 365,569, and they consumed about 4287 chests; these had increased in twelve years from 1822 to 1835 to 2,039,998 smokers, when about 12,339 chests were consumed; and it was now believed that the number was not less than twelve millions. The average consumption of each person was about 17½ grains daily.

Remarkable Appearance of the Snake-Nut.—Mr Schomburgk of whom we have so often lately made honourable mention, sent home from Guiana, some years ago, a description and drawing of the Snake-nut, which was read to the Linnean Society. An individual who was unacquainted with this communication has lately, in a public paper, the Liverpool Mercury, expressed his feelings of surprise on the examination of the nut in terms which convey an accurate and vivid idea of its singular appearance. This extraordinary vegetable curiosity, he remarks, is a nut about the size of an ordinary walnut, nearly round, and of a fine brown hazel colour, and very light. When broken, the kernel is found to bear so striking a resemblance to a snake, that it is always called the *Snake-nut*. It grows in the marshes of British Guiana. Had we only examined one specimen, we should have taken it for a *lusus naturæ*,—a mere accidental resemblance to the snake, assumed by the kernel in shrinking; but the gentleman who favoured us with a sight of it has several of the nuts, and they are all alike; which circumstance, together with the name which has been given to it in the country where it is produced, proves that it is not a mere freak of Nature, but a regular natural production. The specimens of the nut we have seen were brought home by the Palmyra, which arrived lately in Liverpool from Demerara.

METEOROLOGY.

ON THE EFFECTS PRODUCED UPON ANIMAL LIFE BY THE SEVERE WINTER, 1837, 1838.—*Continued from last Number.*

Early in March the frost abated in rigour, and a slow thaw began to melt the vast accumulation of snow which had been drifted into the lanes, hollows, and hedge banks, by the severe and oft-repeated gales that had occurred during the two months' frost. Up to this period none of those indications which we had been accustomed to hail as the harbingers of spring had been observed, such as the song of the missel-thrush and the mavis, the cooing of the ring-dove, or the pipe of the golden-plover, which in usual seasons seldom fail to greet our ears with their welcome notes before February has advanced into the second week. On referring to my notes, I find it was not till the 5th and 6th of March that the peawit and golden-plover were first seen, or the carol of the lark heard; on the 7th the thrush and missel-thrush were in song, being a period later by nearly a month than any I can find in a register kept for many years past, and it was not till the 20th that the congregated flocks of the ring-dove began to disperse, or that they were heard cooing and exhibiting that peculiar flight which distinguishes the species at the time of pairing, and which in ordinary years seldom fails to occur before the 8th and 10th of February. It was now that the effects of this long-continued storm, so remarkable for the great degree of cold that accompanied it, became fully apparent; for instead of the host of birds that were wont to resort to our groves and plantations at this season, and whose "wood-notes wild" used to greet us in every direction, a few individuals or a solitary pair alone were to be seen, and where, a season or two before, a united concert of a multitude of thrushes might have been listened to on a calm mild spring evening, not more than two or three at far distant stations could now be heard; of our familiar attendant, the red-breast, few survived to pour forth their impassioned lay, as the diminished numbers of this favourite bird, even after the increase of the year, clearly demonstrates. The same may be said of the blackbird, whose mellow whistle was scarcely recognised during the spring and summer; and a like falling off was observed in regard to the wagtails, wrens, and indeed all the indigenous insectivorous species, which suffered to a much greater extent than the Conirostræ or Finch tribe, which, subsisting upon seeds and grains, found, if not ample, at least a sufficient quantity of food to support life in the stack and fold yards, where the others were perishing from the effects of hunger and cold. But the deficiency of the feathered tribe this year, I afterwards ascertained, was not confined to our indigenous or permanent residents; it extended to all those species which we call summer visitants, or which make our island their breeding resort and habitat during their Polar migration; for as the time of the arrival of the various species successively occurred, I found that throughout this district their numbers scarcely averaged a third of the usual supply, and this falling off not confined to a few particular forms, but extending to all the migratory species. The same was observed to prevail in the south of England, as, in a communication from Mr Yarrell, he mentions that the paucity of summer visitants had been generally remarked by those who interest themselves in ornithology and observations connected with it. The cause of this deficiency I attribute to the very cold and ungenial weather which prevailed not only throughout Britain, but over a great portion of the European Continent, at the time these birds usually undertake their periodical flights, and which, I imagine, stopped many on their course, and prevented that extended movement which, in ordinary years, permits their reaching our own and even higher latitudes. That their lessened numbers arose from causes which affected them during their winter sojourn can scarcely be supposed, as that portion of the year, it is now well ascertained, is passed by most of them in the warm region of the African Continent, or in those parts of Southern Europe where frost is scarcely known. Some few may undoubtedly have perished on the way, or from having advanced at too early a period into the north of Europe, where, in consequence of the chilling cold that prevailed, no appropriate food could be found, and thus died of hunger; but the more probable reason is, I think, that already assigned, viz. that they were stopped on their advance by the peculiarity of the season, and were compelled to remain and nidificate in lower latitudes than they are generally accustomed to do. Of the few which did arrive, it was observed that their first appearance was nearly a fortnight later than has generally been the case, upon an average taken from a register of some twenty years past. Thus I find that the *Willow Wren*, (Sylvia trochilus,) instead of the 16th or 18th of April, was not seen or heard before the 3d of May; the same in regard to the *Blackcap*, (Curruca atricapilla,) the *Tree Pipit*, (Anthus arboreus,) the *Winchat*, (Saxicola rubetus;) and the 13th of May had arrived before an individual of the *Fly-catcher* (Muscicapa grisola) was observed. Of the species just enumerated, a deficiency, such as I have already mentioned, was remarked; but I think it was even more striking in others, among which I may particularize the *Sedge-warbler*, (Salicaria phragmitis,) *Greater Petty-chaps*, (Curruca montana,) *White-throat*, (Curruca cinerea.) To this cold and long-retarded spring succeeded a short, and, with the exception of a few days in July, a moist and chilly summer, circumstances which affected not only the increase of animal life, but produced the more serious calamity of a deficient harvest. Fruits also did not ripen at all, or very imperfectly, and were devoid of their proper taste and flavour. In conclusion, I may add, that a great deficiency of the insect tribes was generally remarked, and, from having given a considerable degree of attention to the entomology of this district for some years past, I can confidently say, that in most of its great families or divisions the remark is correct, more particularly as it applies to the Coleopterous and Lepidopterous insects, upon a comparison with what was observed in 1835 and 1836, as well as years previous to that date.

PROCEEDINGS OF LEARNED SOCIETIES.

Linnæan Society.—At a meeting, December 17, the Secretary read a communication from M. Schomburgk, giving a description of the *Curata*,

rom the culm of which the Indians of Guiana prepare their famous blow-pipes, and concerning which Baron Humboldt, in his "Personal Narrative," regrets his inability to determine the plant from which they are obtained. It was at a settlement of the Indians near the river Emaruni that M. S. at last succeeded in obtaining positive information of the locality of these reeds, which he was informed were found on two lofty mountains, the one of which was pointed out to him at the distance of twenty miles. The other, however, lying more directly in his route, was visited by him in preference; it is seated at a day's journey from a Maiongcong settlement on the banks of the Cuyaca, from whence the natives showed the beaten track. After having ascended the mountain to the height of about 3500 feet above the Indian village, the traveller followed the course of a small mountain stream, on the banks of which the Curas or Curatas, as these reeds are called by the Indians, grow in dense tufts. They form in general clusters of from 40 to 100 stems, which are pushed forth from a strong jointed subterranean rootstock. The stem rises straight without knot or interruption, and preserving an equal thickness throughout, frequently to the height of 16 feet before the first branches are given off. The joints that follow succeed each other at intervals of from 15 to 18 inches: and the whole plant attains a height of from 40 to 50 feet. The stem when full grown is at the base about one inch and a half in diameter, or nearly five inches in circumference; but M. S. mentions having seen young stems, which, at the height of 20 feet, and with a thickness of scarcely one-fourth of an inch, afford no signs of articulation. The branches are only formed when the stem begins to increase in diameter. The full grown stem is of a bright green colour, perfectly smooth, and hollow within. The branches are verticillate, generally from three to four feet in length, and very slender. The leaves are linear-lanceolate, of a bright green above and glaucescent below. The entire plant is from 40 to 50 feet in height; but the weight of its innumerable branches causes the slender stem to curve downwards, so that the upper part generally describes an arch, which adds greatly to the gracefulness of its appearance. He estimates the height at which it grew as 6000 feet above the level of the sea; and its growth appears to be limited to the chain of sand-stone mountains which extends between the 2d and 4th parallel, and forms the separation of waters between the rivers Pavima, Merewari, and Orinoco. M. Schomburgk describes at length the process by which the blow-pipes are prepared, together with the mode in which other parts of the apparatus are supplied in order to render it available for its important uses, and the various modifications in its construction occurring among the different tribes. He adds also a particular description of the arrows and quivers in use among several of the native tribes.

Microscopical Society of London.—We are glad to perceive that this Society is thriving, and doubt not it will throw much light on those departments of Science it was designed to illustrate. It was formed on the 20th of December last, "for the Promotion of Microscopical Investigations, the Introduction and Improvement of the Microscope as a Scientific Instrument, the Reading and Discussion of Papers on New and Interesting Subjects of Microscopical Inquiry, the Formation of a Collection of Rare and Valuable Microscopical Objects, and a Library of Reference." The first meeting was held on Wednesday 20th January in 21, Regent Street. The President, Professor Owen, announced that since the Provisional Meeting on the 20th December, for the purpose of forming the Society, the number of members had increased to 110; and a farther addition of 29 names was announced in the course of the evening, making a total of 139 original members of the Society.

Mr Owen then read the first paper contributed to the Society, "On the Application of Microscopic Examinations of the Structure of Teeth to the determination of Fossil Remains,"—and exemplified the utility of the instrument in reference to the *Saurocephalus*, *Basilosaurus* of Dr Harlan, and the *Megatherium* of Cuvier.

Royal Irish Academy.—On the 9th of December, Mr Lloyd exhibited a specimen of Vegetable Flannel brought by him from Berlin, the nature of which Professor Erenberg has done so much to illustrate. He at the same time laid on the table of the Academy a specimen of a very similar substance, which he had received from Sir John Herschell, and which was found investing the rocks at the mouth of one of the rivers of Southern Africa. It resembles the other very much in external appearance, except that the fibres are coarser, and more compactly matted together. It appears to consist almost entirely of *conferva*, but apparently of a different species.

OBITUARIES.

Professor Blumenbach.—This venerable philosopher has at length paid the debt of nature, having died at the advanced age of eighty-eight years, at Göttingen, on the 22d of January last. Few individuals have ever enjoyed a wider or more merited reputation. In early life he visited Britain, and used often in his prelections to make interesting allusions to the men and things he here encountered. He was an ardent lover of science, and especially that portion of it which bore on the Natural History of Man. His work on Physiology has been translated, we believe, into nearly all languages, and acquired for him a wide-spread reputation; whilst as a lecturer he was not more esteemed than beloved, and will long be remembered by his countless pupils with the sincerest affection and regard.

Professor Richerand.—The well known Richerand has also lately departed this life. He long maintained a distinguished place among the eminent physicians of Paris, and was author of the "Nouveaux Elémens de Physiologie," familiar in its English translation to classes of readers far more numerous than are embraced by the circles of the profession.

Mr Davies Gilbert.—We have also on the present occasion to record the demise of that much respected individual Mr D. Gilbert, lately, for three years, President of the Royal Society, and an honorary and efficient member of many others. His labours for the promotion of science were unremitting. He was the founder of several societies; was the discoverer and early patron of the talents of Davy, and while in Parliament laboured assiduously in the advancement of all public works. Regret for such a man, exerting the power of his mind so advantageously and through so many years, must always be strong and sincere; but having attained the ordinary limit of human life, he sunk into the grave amidst the respect and esteem of all who knew him, and has left a name which will ever bear a prominent place amidst those whose lives and talents have been devoted to great and noble purposes.

MISCELLANIES.

Notice of Mr Gould in South Australia.—Letters, says the Athenæum of February 1st, received last week from Mr Gould the Ornithologist, announce his safe arrival at Sidney on the 3d of September. He is about to proceed into the interior. The result of Mr Gould's excursion to South Australia is a large collection of specimens, including 500 birds, and a considerable number of quadrupeds and insects, the product of three months' labour. During this time, which was in the depth of the Australian winter, our interesting Naturalist spent five weeks in the bush, without seeing a civilized being except his attendant; sleeping mostly in the open air, occasionally in a tent, or under a cart, but more commonly on the bare ground, with only a kangaroo skin for a covering: still he never had a cold, or the slightest indisposition of any kind: and he expresses himself especially thankful for the good health of all his party. "I have been enabled," he says, "to penetrate far into the interior of South Australia, through the kindness of Colonel Gawler and Captain Strut. My gratification on arriving at the belts of the Murray was almost unbounded, on finding not only numerous new species, but even new forms of birds: the botany of this part of Australia surpassing every thing I have seen:" and he concludes by saying—"If I am spared to return, I shall, I believe, be enabled to produce such a work as has never before been offered to the public." Mr G. has sent home his *spolia opima*, and the government have liberally allowed the cases to pass the custom-house unopened, an advantage important to the security of their contents.

Proposed Erection of an Observatory at Manchester.—We are happy to understand that a committee has been formed at Manchester, for the purpose of erecting an Observatory at Higher Broughton, near that town. It is obvious that, for the advancement of the sciences of astronomy and meteorology, by actual observation, there is required an apparatus by far too bulky for a private residence, and too costly for a private individual; such an object, therefore, can best be attained by co-operation and subscription: and it is proposed to raise the sum required for carrying the undertaking into effect by donations, and to support the institution by annual subscriptions. The estimated cost of the building is L.3000, and of the instruments L.2000, and there is to be a resident astronomer, with an assistant, whose duty it will be to observe and record the various phenomena of the heavens and the atmosphere, to keep up a correspondence with similar institutions, and to prepare for publication all such information and observations as, from time to time, it may be thought advisable to give to the world. The plans, we understand, have been submitted to, and approved by, Sir John Herschell, Professor Airy, and other distinguished men of science.

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ON THE EXTINCTION OF HUMAN RACES.

The following important suggestions are taken from a paper (in Longman's Chronicle, December 1839) of that distinguished Philosopher and Zoolcgist, Dr Prichard, and, like every thing proceeding from his pen, deserve the serious consideration of every student of Nature.

While other branches of Zoology are diligently cultivated, no degree of general attention, proportionable to its importance, is given to Ethnography, or the Natural History of the Human Races, and it appears desirable to call attention to this remark. Opportunities for pursuing this investigation are every day failing and disappearing for ever, a statement which cannot be made with respect to other subjects in natural history or general science. Perpetuity of existence, so far as our ideas of time extend, belongs alike to the smallest molicules of the unorganized world, and to those great masses which, revolving in the heavens age after age, have offered themselves to the view of countless generations. It is quite otherwise with all the productions of organic life, which exist only in a series of similar individuals, destined one after another to originate and decay, a destiny common alike to the lords of the creation and to the pot-herbs which contribute to their daily food. But the organized world is subject to another vicissitude. The tribes of which it consists have but a definite existence, determined by the conditions of external nature. When these have changed, it would appear that new organized tribes, adapted by their physical constitution to the new state of external circumstances, replace the old ones. It would be interesting to inquire, whether such changes have had any influence on the destiny of the ancient races of men? Certain it is, that many vast regions of the earth, if not the whole or the greater part of its surface, were formerly the abode of tribes which have long ago perished; and many of these races were different in physical character from those which at present exist in the same countries. Were the old races swept away by changes in climate and local circumstances which become incompatible with the conditions of their existence? This is a question for the solution of which no satisfactory data can be found.

Although it is uncertain to wnat causes the ancient depopuiation of great regions of the earth may be attributed, such catastrophes appear to have been of great extent. In the remotest parts of Northern and Eastern Asia, remains have been discovered which prove that nearly the whole of that great Continent was once occupied by human races whose very names have perished. Some of these nations appear to have made some progress in arts and civilization. Their tombs are found spread over the countries eastward of Jenisey. In these remote countries, such remains are in great numbers and of magnificent construction; they contain ornaments and various implements of silver, gold, and copper; there are girdles of the precious metals, bracelets decked with pearls. In the same tombs are fragments of earthen manufacture or porcelain. These are arguments which have satisfied the learned academicians of St Petersburgh, that such relics belonged to races of people long since extinct, who must have disappeared before the light of history dawned upon these countries; but we shall hasten to remark, that discoveries leading to a similar result have been traced through the New World, from the countries bordering on the Mississippi, where tombs are found containing skeletons of a different conformation from that of the present tribes, to the high table-land of the Peruvian Cordillera, where these strangely formed skulls are seen which deviate so widely from the usual form of human heads. Even in the islands of Polynesia, vestiges are discovered which have been referred to a former race of inhabitants; and, finally, there are facts which indicate that extensive countries in Europe were occupied by races of a different physical character from the present natives, in times which preceded the arrival of Celts and Goths, and other nations from the East.

And the extermination of numan races is still going on. Whatever were the causes which destroyed the ancient tribes, we know to what agency we are to attribute the similar fate of many nations who have perished since the historic age commenced. How many whole races have become extinct during the few centuries which have elapsed since the modern system of colonization commenced? The Guanches, the numerous people of the Canary Islands, now exist only in their mummies. It would be endless to recount the names of tribes and whole nations in America who have been extirpated by the Spanish conquerors of that country. The last race that was utterly destroyed was the Charreas, a most singular race of people, whose moral and physical character is briefly sketched by Don F. de Azara, but of whom we have no satisfactory account. The whole country now occupied by civilized nations in the New World was, three or four centuries ago, thickly peopled by native tribes. A similar process of extermination has been pursued for ages in South Africa, formerly the abode of numerous pastoral nations of Hottentots, a peaceable and inoffensive race, who wandered about with numerous flocks in a state of primitive simplicity, and whose descendants are now found in the miserable and destitute Bushmen, condemned to feed upon vermin and reptiles, and rendered savage and cruel by the wretchedness which their conquerors, misnamed Christian, have entailed upon them. Wherever Europeans have settled, their arrival has been the harbinger of extermination to the native tribes: Wherever the simple pastoral tribes come into relations with the more civilized agricultural nations, the allotted time of their destruction is at hand.

Now, as the progress of colonization is so much extended of late years, it may be calculated that these calamities, impending over the greater part of mankind, if we reckon by families and races, are to be accelerated in their progress; and it may happen that, in the course of another century, the aboriginal nations of most parts of the world will have ceased to exist. In the meantime, if more civilized nations think it not their duty to interpose and save the numerous tribes of their own species from utter extermination, it is of the greatest importance, in a philosophical point of view, to obtain much more extensive information than we now possess of their physical and moral characters. A great number of curious problems in physiology, illustrative of the history of the species, and the laws of their propagation, remain as yet imperfectly solved. The psychology of these races has been but little studied in an enlightened manner; and yet this is wanting in order to complete the history of human nature, and the philosophy of the human mind. I cannot conclude this paper, says Dr Prichard, without making an appeal to the members of the British Association in behalf of an attempt, which has been lately set on foot by individuals, prompted by the most generous sentiments, to do something more than merely to record the history of the perishing tribes of the human family, and to take up seriously the consideration whether anything can be done effectually to prevent the extermination of the aboriginal tribes.

ON THE DEVELOPMENT AND GROWTH OF SALMON.

The development and growth of the salmon, or, in other words, the history of salmon fry, as must be known to many of our readers, has for many years been regarded, by all competent judges, as a most difficult, vexatious, and nearly interminable subject. Nor has it been considered less important than difficult. The subject of the Salmon Fisheries is very much involved in it, one of national importance, which, of late years, notwithstanding repeated parliamentary interference, has fearfully declined. Nothing can be more clear than that, until the true history of the salmon and its fry has been accurately made out, legislation must proceed in the dark, and its enactments will probably not only be wide of the mark, but most decidedly injurious.

This long and vexatious question, we rejoice to announce, has at length been brought to a close; and that not through the united labours of our associated and able Naturalists, but by the steady and unaided investigations of Mr John Shaw, a most respectable individual in the employment of his Grace the Duke of Buccleuch at Drumlanrig, who, in the face of considerable *unscientific* opposition, pursued the even tenor of his way, by the simple but satisfactory method of experiment. He has discovered and proved that the small river fish, so well known throughout Scotland, under the name of parr, and in various localities throughout the Empire as pinks, brandlings, samlets, fingerlings, gravellings, &c. &c., and scarcely more known than disesteemed as of little or no intrinsic value, are nothing less than the young of the true salmon, *Salmo salar*. That this is a real discovery need scarcely be demonstrated, inasmuch as nearly all the most recent Ichthyological writers, and other Naturalists, have, up to the present time, been, we believe, unanimous in their opinions regarding the specific differences between these parrs and the young salmon fry. We might quote in detail the authorities of Wilson, Yarrell, Jardine, Parnell, and many others on this point, but we shall adduce the words of one only of these distinguished Naturalists, and this merely as a specimen of the rest. "I consider the parr not only distinct, but one of the best and most marked species we have, and that it ought to remain in our systems as the Salmo Samulus of Ray." It is this universally received opinion that Mr Shaw has had the ability and good fortune to overturn —to the satisfied conviction of those that, a few months ago, were most opposed to his views—leaving, so far as we know, not a lingering doubt behind; and hence a rich reward to his persevering assiduity, leading probably to public profit, as it abundantly has to his private honour; one proof of which is to be found in its having led the Council of the Royal Society of Edinburgh to come to the unanimous decision of bestowing upon him its Keith Biennial Medal, for the most important communication presented within the period—an award honourable to the donors, and still more to the receiver.

Of this discovery, we shall now present a concise view. The author must have been engaged with the investigation for a period of some five or six years, as he first published some of his views as far back as July 1836, in the Edinburgh Philosophical Journal. In December 1837, his first paper on the subject was read to the Royal Society of Edinburgh, and his second in December 1839. Instead, however, of attempting to analyze any of these communications in chronological order, we shall produce, in a few words, some of the abundant evidence he has supplied.

Familiar with the breeding-beds in the river Nith, Mr Shaw first removed some salmon spawn which had been deposited and fecundated in the usual way, and placed it in artificial ponds, which he had constructed with great care, and which he effectually guarded against every thing like foreign mixture. This afforded him an excellent opportunity of examining the development of the spawn, and of tracing the future history of the young fish; and he found that these little creatures of his ponds were in every respect the same as the parrs of the river.

This was the first proof that the parr was nothing else than the genuine fry of the young salmon; but, as there remained something like ground for scepticism, he next thought of so regulating the spawning process, that no suspicion or doubt could remain as to the authenticity and purity of the breed. He accordingly secured a great female salmon in the act of spawning, and isolated her in a pool at the river side; from this pool he cut a trench, which he made to communicate with an artificial bed, hollowed out by himself. The sides of the female, thus isolated, were now gently pressed, the spawn floated along the trench, and rested in the artificial bed. This effected, a great male salmon was next introduced into the pool; his milt was in like manner shed, flowed along the same trough, and reposed in the same bed. After a while, this fecundated spawn was removed to the experimental pond, was maintained free from all subsequent contamination, and its future history, from the ovum and for many months, demonstrated that it was a parr, agreeing with the common river ones, and in nothing distinguishable from them. Hence the inference was conclusive that the young of the salmon was really the parr.

But the parr being the young of the salmon, it must needs follow that with age these parr will assume the appearance of salmon, and this Mr Shaw has most effectually demonstrated. In his experimental ponds he detained the parr, and noted their successive changes. Whilst yet undistinguishable in appearance, and allowed by all competent judges to be genuine parr, he killed and preserved some to serve as objects of comparison, and found that after a given time, the whole remaining fry changed its dress and its habits, and now could be regarded by no one as the previously considered distinct species of parr; but, on the other hand, was acknowledged by all to be genuine young salmon, in their silvery migratory livery. The effects of the surrounding temperature on this change were all carefully noted by Mr Shaw, but our space forbids us to state them. Suffice it to note, that the spawn deposited the end of January left the ova only on the 10th of May, the very day on which large shoals of salmon fry were descending towards the ocean. These shoals have generally been regarded as the spawn of the same year, whereas they were far advanced in their second year's growth.

But this is not all. Every one who has attended to the habits of salmon is aware that during the process of spawning, the adult female is frequently attended not by the adult male, but by the tiny parr, whose milt during the while is copiously flowing in due proportion to that of the female spawn. Mr Shaw conceived that this might be proof, however singular the occurrence, of the identity of the species; and this he determined to subject to the test of experiment. Accordingly, he repeated, in an isolated pool, with the adult female salmon and the parr, the experiment which has already been related of the adult salmon. The milt of the parr, thus brought into contact with the spawn of the salmon, was removed from the artificial bed into the experimental pond, and was found in the course of months to exhibit precisely the same appearances, first, of true parr, and then of genuine silvery salmon fry, as the others had done. In the view that here there was not complete identity of species, this latter brood would be considered hybrid, and, according to the generally received notions, mules or neuters, and so incapable of propagating their kind. This point also has been investigated by Mr Shaw, and, finally, one of those, by possibility, hybrids has been made to play the part of the true male salmon, and the acknowledged genuine parr, and with precisely the same result, so that his progeny has been as distinctly, as in the other cases, first, the true parr, and then the undisputed young salmon. To conclude, we must state that Mr Shaw has not omitted to collect the spawn of the female salmon before it was subjected to any of the fecundations above alluded to, and has placed it in an experimental pond, and with the result which he and others would anticipate, viz. that it never manifested the slightest appearance of vitality.

We feel we are still far from having completed the account of the interesting particulars which we have heard and read as connected with Mr Shaw's important investigations, and to which we would again gladly return; but we are equally sure that though we cannot have exhausted the interest of the reader, we have far exceeded the usual limits we allow to any, even the most interesting subject.

ON THE SEALS OF THE OUTER HEBRIDES.

The following observations, made by Mr Kenneth Fergusson, a native of Harris, have been transmitted to us by Alexander M'Rae, Esq. of Askernish, South Uist.

Two species of Seal are to be found on the shores and in the sounds of the Long Island, or Outer Hebrides. One of them occurs in the open sea, principally among the rocks in the Western Ocean, but also about rocks distant from the shore on the eastern side of the islands. This kind, in the language of the country, which alway designates an animal by a term expressive of some remarkable trait in its form or character, is named *Tabli-bhiast*, or Ocean-beast; the other is named *Biast-caolis*, or Channel-beast, from its frequenting the narrow sounds.

The first is much the largest, and, when full-grown, of a dirty or dull whitish colour. When young, the pile is about two inches and a half long, and fine or woolly; that of the old animal is shorter, thinly set, and strong. The woolly pile is shed when the animal is about three months old. These Seals have their young about the first days of November, or a little earlier, and bring them forth on shore, selecting uninhabited grassy islands, such as Tabhocer, near Canray, Causamal, and another rock also named Tabhocer, both off the west coast of North Uist, as well as many similar islands along the western side of the Outer Hebrides. From its place of birth the cub never ventures until able to shift for himself, which he is supposed to do in about a month, although this is not certain. During this time, they are to be found in great numbers on such rocks as those described; the males, and those which have no young, among the rest. Advantage is taken of this circumstance, and they are slaughtered with clubs, great numbers being frequently obtained. At this time the young are about the size of a Cheviot lamb in November, that is, three feet or so in length. In a month after, they are

of the size of a ewe of the same breed; and, when they have obtained their full growth, they are about nine feet long, and seven feet in girth. It is not said whether they keep in pairs, for the support or defence of their young. Two individuals, a male and a female, the male distinguishable by his darker colour, were reposing on a rock in the middle of June. A person, having quietly approached in a boat, wounded one in such a degree that, when afloat, it was unable to dive. The other came to its assistance, swam by its side, and supported it, and succeeded in carrying it off, the sportsman being alone in the boat, and having no more shot, which you know is sometimes as scarce in Harris as in the wilds of Canada. Of this larger sort the head is disproportionately large when the animal is young, but better proportioned when old; only it always remains coarse, as a grazier would sav; somewhat flat in front, with an abrupt bend near the nose.

The smaller Seals which frequent the narrow sounds bring forth their young in the mouth of June, going ashore for the purpose. But the cub seems to be able to betake itself to the sea soon after birth. It continues with its mother about a month. This cub is at first about the size of a young lamb, being two feet in length when extended, slender, and of a greyish-blue colour, with a whitish tinge; the head very small. The pile becomes dingy, and in about a year is cast, when a beautiful blueish pile appears. When full-grown, this Seal is about six feet in length, and five in girth. The cub of the other or large Seal is of a white colour, with a large head, as already mentioned; whereas the cub of the small sort is blueish, with round, well proportioned, or, as a grazier would say, fine head.

Seals have only one cub at a time. There are two teats about the middle of the body. The udders extend along the body on each side, becoming narrower at the ends. The milk is white and thick. The stomach is of an oblong shape, becoming more slender below, taking a considerable bend, and tapering away into the intestine, which is narrow and of great length. It is seldom that any thing is found in the stomach. Fergusson, however, killed one in the act of eating a fish. The fibres of the heart are remarkably distinct, and appear to be convoluted in various directions. The lungs and windpipe do not seem to differ much from those of a sheep, but the liver is formed of various portions, all, however, connected. There is a gall-bladder; and the bladder for urine is like that of other quadrupeds. Such are the particulars related by Kenneth Fergusson.

Having resided several years on these islands, we may be allowed to state that the small Seal is the *Phoca vitulina* of Linnæus, Desmarest, Jenyns, Bell, Hamilton, and others. The large species is the Grey Seal, *Phoca Gryphus* of Fabricius, or *Halichœrus Gryphus* of Nilsson and Bell.

On the change produced on man's temperature, by passing into different latitudes.—During the recent voyage of the French discovery ship, *La Bonite*, MM. Eydoux and Souleyet made an extensive series of accurate observations upon the temperature of man and animals throughout the wide range of latitude they traversed, the results of which have been laid before L'Academie des Sciences, by M. de Blainville, and which lead to the conclusion that man's temperature increases in advancing into a warm latitude, and diminishes when he retires into a cold;—while, at the same time, the change is quite as small as our preconceived ideas would have led us to believe.

The observations were made upon ten of the crew of *La Bonite* of different ages and temperaments, but all subjected to the same regimen, and nearly to the same occupations. They began in the month of August 1836, while the vessel was at Rio-Janeiro, and were continued every day at the same hour, 3 p. m., till the ships arrived in France in November 1837. The number of observations amounted to 4000. The temperature of these individuals fell very gradually in passing from warmer into colder regions; and rose much more rapidly when, on the contrary, they returned from these cold latitudes into the torrid zone: and the double change is much more marked in some individuals than in others. The mean temperature exhibited by these men when examined at Cape Horn, when the external temperature was at the freezing point, showed only an approximative difference of one degree, to the mean temperature they gave in the Ganges, near Calcutta, with the thermometer standing at 104°. Hence it follows, that a variation of 72° of external temperature produces in man's body a variation of temperature amounting to only one degree.—(Annales des Sciences Nat. T. IX. 190.)

On the habits of the water-shrew.—(*Sorex Fodiens.*)—D. W. B. Clarke, now in Edinburgh, has lately published, in our esteemed contemporary, "The Magazine of Natural History," an interesting account of the Habits of the Water-Shrew, which we shall introduce into our pages. D. Clarke informs us, that whilst walking by the side of the river Gipping, between Ipswich and the village of Sproughton, he observed several of these animals in a dyke that runs parallel to the river. These little creatures were in such rapid motion on the water, that its surface was thrown into a state of quick undulation, though the dyke was at least four feet wide. At times they would be upon the surface, moving at a rapid rate between the blades of the aquatic plants, then they would dive, and for a while remain beneath, but always, on returning to the top, displaying the greatest rapidity in their movements. Whilst above water, they were constantly repeating their faint, though shrill, tremulous squeak, which appeared expressive of pleasurable sensations.

On visiting the spot the following evening, I had an opportunity of remarking the movements of these little creatures on land. I found beneath a slightly hanging bank, and close to the water side, a long gallery, which, though in a great measure naturally formed, yet had been greatly improved by the Shrews, as a convenient viaduct between one hunting place and another. The grasses and other plants had been removed, as well as here and there small portions of earth, in order to render this passage as commodious as possible. The passage was mostly above the water level, but at intervals there were depressions where the water passed over its floor. It was evidently the common property of the shrews, as several were continually running backwards and forwards, along its whole extent, and ultimately taking to the water, swimming up and down the ditch, diving, and performing curious evolutions in search of their insect prey. They swim upon, and under the surface of the water with equal rapidity; and when beneath, the hair upon their bodies so completely repels the water, that the entangled air gives their bodies the brilliancy of silver, as they pursue their course. On emerging from the water their coat appears quite dry, but this is further insured by the little creature shaking itself on landing. When travelling along the gallery, a tremulous shriek is always heard when two shrews pass each other; and the same thing occurs, though not so invariably, in their movements in the water. When a shrew secured an insect it quitted the water, and ascending a convenient stone, or projecting root of a tree, or other similar body, at its leisure devoured its prize, steadying it with its fore paws, whilst it nibbled, apparently with the greatest enjoyment, one or other of the extremities. I once traced a pair of shrews into a small hole in a bank by the side of the ditch, where I had been in the habit of driving them, and in attempting to secure them, I carefully removed the earth, when I found that although the entrance was scarcely larger than just to allow two shrews passing together, yet it led into a very spacious vestibule, with numerous galleries, so extensive there was no possibility of ascertaining their full extent, without removing the greater portion of the bank. These animals are much infected with parasitical acari.

Mr Schomburgk on the Species and Habits of the Armadilloes of Guiana.—While ascending, says Mr Schomburgk, a hill, at the foot of which our tents were pitched, the Indians set the savannahs on fire. A general bustle of those who had remained in the camp soon attracted my attention. I saw the men armed with bows and arrows, and, accompanied with their dogs, under full cry in pursuit of some game. The chase was of short duration, and, on reaching the spot where the pursuers had come to a stand, I found that an Armadillo of gigantic size, which, no doubt, had been chased by the flames from its retreat, had caused the commotion. It was lying a round misshapen mass, its head partly buried under its armour, the feet drawn together, and its body pierced by numerous arrows. It offered not the slightest resistance to its tormentors, whom I desired to end its sufferings by a heavy stroke of a club. Mr S. now left the carcase with the full intention of returning and minutely examining it; his disappointment, accordingly, was great when he presently found it was cut up by the Indians, and boiled for the sake of its oil. Two men were required to carry it, and Mr S. estimated its weight at from 110 to 120 pounds; its height was about three feet, its length five and a half. Its tail was about fourteen or sixteen inches long, and its root nearly as thick as a man's thigh, tapering very abruptly. The middle one of the five toes of the fore-foot was seven and a half inches in length. In size it greatly surpasses the largest Giant Armadillo known, (*Dasypus giganteus*, Desm.,) though Mr S. does not mean to assert it is a different species from the *giganteus;* yet its enormous size will attract the attention of naturalists and geologists to the fossil genera. A specimen of the genuine *giganteus* is alluded to, which weighed 70lbs. The third species is the *D. encoubert* of Desmarest, with six or seven bands; a fourth, the *D. Peba*, Desm., the most common in Guiana, about 18 inches long, and the tail as much. Fifth, the Savannah Armadillo is the *D. villosus*, Desm. The Indians say it occasionally feeds on carrion; and both the shell and body are covered with hair. The *D. tatouay* is the sixth, with twelve or thirteen moveable bands; and the *minutus* is the last, its body being ten inches long, covered with numerous brown hairs.

All these resemble each other in their habits and appearance; and their form, number of claws, and dentition, supply the Naturalist with the specific distinctions. They all burrow, and their general food appears to be worms and insects; they sometimes commit depredations in the provision grounds, and the Indians agree in asserting that the Giant and Savannah species feed on carrion. When about to bring forth, the mother is said

to make a nest in the burrow, and gives birth to from seven to nine young, which are blind. They afterwards follow the mother, who, whilst the young are still helpless, never ventures to leave her hole by day. They feed generally by night; but, from the circumstance that we have secured several in the daytime walking about, it may be concluded that hunger forces them sometimes to go in search of food during the day. Their walk is swift, but they can neither run, leap, nor climb. If pursued, therefore, without being able to reach their hole, they roll themselves up and submit to their fate without defence. The smaller species are eaten by the Indians, and considered a delicacy. The Arawaak Indians are the only tribe whom I have ascertained eat the Giant variety. The common species is esteemed by many Creoles, and its flesh is white and tastes like a rabbit; hence we may suppose they receive no mercy. When pursued far from their retreat, they begin digging a fresh burrow, and, when half buried and laid hold of by the tail, it is so difficult to pull them backwards, that they often make their escape with the loss of this appendage. Their pursuers, aware of this, avoid dragging the tail with all their force, while some one tickles it with a small stick, upon which it relinquishes its hold and is secured.—*Ann. of Nat. Hist.* V. 32.

Eagle Ray of Yarrell, (*Myliobatus aquila*, Cuv.,) a native of the British Shores.—"Mr Travis, surgeon, of Scarborough," says Pennant, "had, in the summer of 1769, the tail of a Ray brought to him by a fisherman of that town; he had taken it in the sea off the coast, but flung away the body." To what species, says the intelligent reporter, this tail belonged, has never been satisfactorily determined. Pennant himself believed it to belong to the species called by the Brazilians *Iaberete*, but the editor of his work, published in 1812, referred it to the Raia aquila of Linnæus, which is said to be a native of the Mediterranean. Dr Turton omitted it in his Catalogue of the British Fauna; and in the works of Dr Fleming, and of Messrs Jenyns and Yarrell, it stands among the doubtful or undetermined species, the two latter expressing a belief that the tail might be referred to the Raia Giorna with as much probability as the R. aquila; and, consequently, Mr Yarrell has given a figure of both these species, to enable future inquirers the more readily to determine the question, should an opportunity occur for doing so. Aware of these particulars, it was with no ordinary delight that I received a perfect specimen of the Raia aquila in September last, which had been found that morning on the shore of our bay (Berwick) near Spittal. It was quite fresh and in fine preservation; and proves, as I think, that the conjecture of Mr Travis' fish being the aquila is perfectly correct. There is, at all events, now no doubt that this species is a native of our seas. The extreme breadth of this specimen was 21 inches; from the snout to the insertion of the tail, 13; length of the tail, 21½.—Dr Johnston.—*Proceedings of Ber. Nat. Club, p.* 205.

METEOROLOGY.

ON THE NATURE OF METEORS.

As bearing upon this point, we shall notice very shortly, first, a communication which was made by Sir J. Herschell to the Royal Society on March 21, 1839, and which has recently been published. A "meteor," we are informed, exploded on the 13th of October in the Cold Bokkweld, Cape of Good Hope, with a noise so loud as to be heard over an area of more than 70 miles in diameter, in broad daylight, about half-past nine A.M. It was seen traversing the atmosphere, north-east of the point, where it exploded, 60 miles, of a silvery hue, the air at the time calm, hot, and sultry, the barometer at Worcester standing at the lowest point of the range. The explosion was accompanied by a noise like that from artillery, followed by a fall of pieces of matter, portions of which fell or were dispersed to the distance of five miles from each other. Some falling on hard ground were smashed, others in moist ground plunged into the earth, and one piece is reported to have made a hole three feet broad, and sunk deep. It is stated to have been so soft as to admit of being cut with a knife when it first fell, and hardened subsequently. The original solid mass was estimated at five cubic feet, viz. being the sum of all the portions which fell to the ground. A portion of this stone was analyzed by Dr Faraday, and did not remarkably differ from other aërolites.

Contrasted with this meteoric stone, we allude next to the occurrence of a very different meteor, in an opposite quarter of the globe, viz. in North America, as described by Professor Loomis, Ohio, (Silliman's Journ. XXXV. for April 1839.) On the evening of May 18, 1839, a very remarkable "meteor" was seen throughout most of the northern part of the United States, and a considerable district of Canada. It attracted general attention from its size, brilliancy, train, length of path, and slowness of apparent motion. Observers, almost without exception, pronounced it the most remarkable meteor they ever saw. This led Mr Loomis to make numerous inquiries, and careful investigations, concerning it, some of which we shall shortly state. The meteor was seen throughout all the north of Ohio, in Michigan, in the states of New York and New Hampshire, and in various parts of Canada. From calculation, the height, when first seen, appears to have been 28 miles; at the time of explosion, 32 miles; and, at an intermediate point, 35 miles. The length of the path was 218 miles, and the apparent average velocity 30 miles a second; its absolute diameter three-quarters of a mile. No noise attended. Mr L. adds, "This meteor must have consisted of matter exceedingly rare, and of very feeble cohesion. During nearly its entire route, new portions of matter were continually detaching themselves from the main body, and this finally divided itself into a large number of fragments. We have, perhaps, no means of forming any precise estimate of its density, yet it is doubtful whether it exceeded that of atmospheric air. The light was, without doubt, produced by combustion. The meteor, by rapid motion through the upper regions of the air, generated heat sufficient to set itself on fire, and it was probably consumed in the course of 10″. Nothing is learned to have fallen to the earth from the meteor, and the appearances were those of a body entirely consumed by combustion." In conclusion, Mr L. compares this meteor with the known phenomena of shooting stars, and is of opinion that the meteor of the 18th of May did not essentially differ from the ordinary shooting stars, except as to magnitude. For reflections we have no space, and may safely leave them with the reader.

BIBLIOGRAPHICAL NOTICES.

Illustrations of the Breeds of the Domestic Animals of the British Islands, consisting of a series of coloured Lithographic Prints, with descriptive Memoirs. By Professor Low. Longmans.

Though the first number only of this work has come to hand, yet we are solicitous to lose no time in presenting it to the favourable regard of our readers. The high character of the intelligent Professor, and the enterprise of the eminent publishers, raised our anticipations high as to the execution of the work, and they have in no degree been disappointed. This number, as is proposed of the others, consists of four plates, with coloured figures of from four to eight animals, or more. The originals, by Mr Sheils, form a part of the beautiful collection of the paintings of the Agricultural Museum of the College of Edinburgh. They are drawn on stone by Fairland, from coloured drawings by Nicholson, and do the highest credit to all concerned. In this number, there is one representation of the wild or white forest breed, two of the Pembroke breed, and four of the West-Highland, all, as it appears to us, excellent; together with separate memoirs of these breeds, giving full details of their natural history, their peculiar valuable properties, and how they may be improved, if possible, in some circumstances, and injured, as is frequently done, in others. The Professor's account of the wild white breed we consider admirable, and the whole work cannot fail to be highly esteemed by the Naturalist as well as the Agriculturist. We strongly recommend it to our public libraries, to the stock farmer, and to the many enlightened and honourable gentlemen, who are desirous of widening the channels of our native industry.

The Naturalist's Library, conducted by Sir W. Jardine, Bart. Entomology. Vol. VI. Bees.

We feel happy in being called so soon to notice the appearance of another volume of this beautiful and interesting miscellany,—one on Bees. It is occupied chiefly with our common Honey-Bee, insisting largely on its anatomy and physiology, the peculiarities of the several classes of the hive, also of their architecture, swarms, diseases, foes, together with the practical management of the apiary. This portion, we are led to understand, is from the pen of Mr Dunbar, the incumbent of Applegarth, a well known cultivator of natural history, whose tastes have led him peculiarly to study the wonderful doings of these tiny insects. This part of the volume is replete with original and valuable matter, and pleads strongly for the humane and enlightened treatment of these interesting beings. The other portion, upon the wild and foreign species, is from the elegant pen of Mr Duncan, and well maintains the character of that author's esteemed writings. The whole is illustrated by thirty-six coloured engravings, in which, in addition to many species of bees, the foreign ones, larger and more gaudy than our own, we have illustrations of their anatomical structure, their cells and hives, and their enemies, whether mammals, birds, or insects. Finally, we have a portrait of the illustrious Huber, from an original in the possession of his sister, along with a short memoir. Altogether, it forms a truly interesting volume, and will not be esteemed the least popular of this very popular series.

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INDEX TO THE JOURNAL, (VOL. II.)

Africa, animals of Southern, 18
Animal substances, preservation of, 4
Antarctic expedition, 32, 34
Antelope, the Sahle, 13
Ants, notices of the White, 49, 54
Arago on lightning, 7, 24
Armadilloes, notice of the, 59
Azara's account of the Little Marten, 10
Azara's quadrupeds of Paraguay, 16

Bees, nests of, 48
Beetle, burying, monstrosity in, 6
Bellamy, Mr J. C., contributions of, 1
Berwickshire Naturalists' Club, 48
Birch, the white, 8
Bloodhounds, 21, 26
Blumenhach, death of, 56
Boa Constrictor, 40
Boie's classification of birds, 2, 5
Bonaparte's Iconografia, 48
Buffaloes, described, 9
Butterflies, shower of, 32

Camelopard, Capt. Harris' account of the, 18
Canary, talking, 10
Caoutchouc, 15
Carburetted hydrogen gas, 35
Carpenter's Physiology, 31
Cat, the wild, 41
Caterpillar's lace, 20
Caverns, subterranean, 24
Chickens, hatching of, 10
Chimpansee, 42
Cotton, 7
Crabs, 4
Crossbill, common, 21
Cunningham, (Allan,) 44

Dendritic forms of minerals, 35
Dinotherium giganteum, 34, 43
Dog, Persian sheep, 51
Dogs of Paraguay, 13
D'Orbigny's voyage, 48
Dunbar and Duncan, on bees, 60

Eagle-Ray of Yarrell, 60
Earthquakes, 7, 39
Eccaleobion, 10, 38
Edinburgh New Philosophical Journal, 44
Eels, viviparous, 20
Eggs, hatching of, 10, 38
Electrical eel, 43
Electricity, 11
Embalming, M. Gannel's mode of, 4
Emu, description of the, 17
Ewe, breeding of a, 20

Falling stars, 31, 43
Fishes, nests of, 46
Flora of London, 7
Flourens, on the races of Man, 38, 41
Fowls, common, anecdote of, 10
Fox, description of the Common, 37
Fruit-Crows, notice of the, 54
Fruits, method of preserving, 4

Galvanic telegraph, 32
Geology in Russia, 24
Gilbert, Mr Davies, 56
Giraffe, birth of a, 23
Goat of Angora, 54
Guerin Meneville's Magazin de Zoologie, 48

Hamilton Smith's Natural History of Dogs, 48
Harris', Capt., African Sports, 18, 23, 30
Highland and Agricultural Society, 36
Hippopotamus, account of the, 30
Howler, Red, notice of, 74
Hurricane, effects of a, 27

Iceland, birds of, 19
Jaguar, habits of the, 51
Jardine's (Sir Wm.) British Salmonidæ, 48
Johnstone's (Dr) British Sponges and Corallines, 40

King of the Vultures, account of, 14

Lean on the Steam Engine, 44
Leather, liquid, 40
Lemur, notices of the Flying, 30, 50
Linnæan Society, proceedings of the, 28, 55
Linnæus' daughter, 52
Lithography, origin of, 24
Llama, wool of the Paco, 40
Low, on the Domestic Animals, 60

Macaco, new species of, 42
M'Gillivray's British Birds, 32
Macroscelides, new species of, 33
Marten, account of a Tame Pine, 37
Marten, description of the, 33
Mason Spiders, nests of the, 50
Mastodon, form of the, 43
Megatherium, 15
Meteoric paper, 27
Meteors, nature of, 60
Meyer's British Birds, 47
Microscopical Society, 56
Mummies, Mexican, 48

Nasmyth on the Teeth, 43
Natural History, delights of, 53
Naturalist, the, 32
Neill's Fruit, Flower, and Kitchen Garden, 28
Norwich, sketch of the Natural History of, 3, 6

Observatory at Manchester, 56
Opium, effects of, 54
Otter, a new, 14
Otter, description of the, 33
Otter hunt, 58
Oxen described, 9

Parchment, new, 16
Partridge, 23
Paving with wood, 35
Peacock, vanity of the, 23
Peter Parley's Tales, 12
Pigeons in Petersburgh, 6
Pisa, meeting at, 28
Plants, respiration of, 20
Pritchard on Human Races, 57

Raven, notice of a, 42
Reproduction of Plants, 36
Rhubarb, Giant Goliath, 23
Richerand, death of, 56
Rivers, drying up of, 27
Roach, habits of the, 51
Rock-Salt, threads of, 35
Rook's Bill, singular development of a, 3
Royal Irish Academy, 56

Salmonidæ, growth of the, 40, 58
Sawdust for food, 44
Sea-ware used as food, 30
Seals, domestication of, 42
Seals of the Outer Hebrides, 58
Shoe, structure of the, 28
Silk, growth of, 40
Snake-nut, 55
Spiders, aerial voyages of, 34, 52
Sponge, nature of, 15
Springs, intermittent brine, 11
Stereography, notice of, 36
Sugar from beetroot, 16
Summer-birds, notice of the, 54
Swallow, Rough-winged, 6
Swallows, anecdote of, 27

Tea of Assam, 47
Tea plant, 15, 39
Temminck's Manuel, 48
Temperature of Man, 59

Vaccination, 36
Vampire, living, 29
Viola lactea, 7

Walrus in Britain, 22
Water-Shrew, habits of the, 59
Weasels, attacks of, 37
Weasels, description of the, 29
Wernerian Society, memoirs of the, 44
Whale, the Ca'ing, 53
Winter, effects of a severe, 51, 55
Wolves in Russia, 10
Woodcock, breeding of the, 19
Woodpeckers, tongue of, 25
Wren, description of the Common, 5

Zoological Gardens of Edinburgh, 45
Zoological Society of Dublin, 52

LIST OF THE WOODCUTS.

1. Singular Development of a Rook's Bill,..... 3
2. New Otter from Demerara, (Feet and Tail,).....14
3. Heads of the Crosshill,.....21
4. Apparatus of the Tongue of Woodpeckers,.....25
5. Elements of the Tongue in Birds,.....25
6. Teeth of the Flying Lemur,.....30
7. Cranium of Dinotherium giganteum, (Stenograph,).....34
8. Piebald Negro, (Stenograph,).....46

DIRECTIONS TO THE BINDER.

The Binder will place the Titles, &c., in the following order:—

I. Title of the Journal.

II. The Edinburgh Journal of Natural History, and of the Physical Sciences.

III. Index of the Journal, with the List of Woodcuts.

IV. Title of the Animal Kingdom.

V. The Animal Kingdom of the Baron Cuvier.

VI. List of the Plates.

VII. The Plates, arranged according to the List.

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THE

ANIMAL KINGDOM

OF THE

BARON CUVIER,

ENLARGED AND ADAPTED TO THE PRESENT STATE OF

ZOOLOGICAL SCIENCE.

ILLUSTRATED AFTER THE ORIGINAL DRAWINGS

OF

AUDEBERT, BARABAND, CRAMER, D'ORBIGNY,
EDWARDS, GEOFFROY-ST-HILAIRE, GILPIN, HUET, MARÉCHAL, NITSCHMANN, OUDART,
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M.DCCC.XL.

THE

ANIMAL KINGDOM.

THE FIRST CLASS OF THE VERTEBRATED ANIMALS.

MAMMALIA—MAN AND BEASTS—Continued.

THE CARNASSIERS OF CUVIER.

SYNONYMS.

Les Carnassiers.—Cuv. Reg. Anim. I. 110.
Carnassiers.—Ham. Smith, Syn. p. 53.
Feræ, (Raubthiere.)—Voigt. Thierr. I. 105.
Carnivora, (Fleischfressende Thiere.)—Schinz Thierr. I. 150.

The Carnassiers form a large and varied group of unguiculated Mammalia, possessing three kinds of teeth, like Man and the Quadrumana, but having no opposable thumbs on the fore extremities. They (all) feed on animal substances, and more exclusively in proportion as their molars are more trenchant. Those which have their molar teeth partly tuberculous feed more or less also upon vegetable substances, and those having them studded with conical points derive their subsistence chiefly from Insects. The articulation of the lower jaw, directed crosswise, and compressed like a hinge, admits of no horizontal movement, and confines the motion of the jaw to opening and shutting.

The cerebrum, still rather furrowed, has no third lobe, and, as in the succeeding divisions, does not cover the cerebellum. Their orbits are not separated in the skeleton from the temporal fossæ. The cranium is narrowed, and the zygomatic arches are remote and elevated, to give more volume and strength to the muscles of the jaw. The sense of smelling is most perfectly developed in them, and their pituitary membrane is generally extended over very numerous bony laminæ. The fore-arm can still rotate in most of them, although with less facility than in the Quadrumana, and they never have thumbs on the fore-limbs capable of opposing the fingers. Their intestines are not capacious, on account of the substantial nature of their food, and to avoid the putrefaction which flesh would undergo from remaining too long in an elongated canal.

In other respects, their forms, and the details of their organization, vary much, and draw along with them corresponding variations in their modes of life, to such an extent that it becomes impossible to arrange the genera in one group. It becomes necessary to form several families, which are differently related to each other, according to these multiplied variations.

M. Cuvier accordingly divides his Carnassiers into the families of Cheiropteres, Insectivores, Carnivores, &c.; but as there are many and strong objections to this arrangement, as he himself was aware, we prefer adopting the views of other first rate authorities, and consider the Chiroptera as a distinct order.

ORDER III.—CHIROPTERA.

MAMMALIA WITH FOUR DISTINCT UNGUICULATED LIMBS; THREE KINDS OF TEETH; NO MARSUPIAL BONES; THE LIMBS UNITED ON EACH SIDE BY A MEMBRANE.

SYNONYMS.

Chiroptères ou Alipèdes.—Dum. Zool. Anal. p. 11.
Les Cheiroptères.—Cuv. Reg. Anim. I. 111.—Desm. Mam. p. 107.
Chiroptera and Galeopithecus.—Fisch. Syn. Mam.—Temm. Mon. Mam. I. pref.
Primates, (in part.)—Linn. Gmel. I.
Volitantia, (Flatterfüsser.)—Illig. Prodr. 116.

CHARACTERS OF THE ORDER.

General Form adapted for flight or vaulting.
Memeranes extending between the four limbs and the fingers of the anterior pair.
The Mammæ pectoral, *cole libero pendulo*.
The Clavicles very strong. The Shoulder-blades broad.
The Fore-Arm incapable of rotation.

The Chiroptera have still some affinities to the Quadrumana, *par leur verge pendante*, and in their mammæ being placed upon the breast. Their distinguishing feature consists in a fold of skin arising from the sides of the neck, extending along their four feet and their fingers, which sustains them in the air, and even permits such of them to fly as have their hands sufficiently developed for that purpose. This arrangement requires strong clavicles and scapulæ, in order that their shoulder may have the requisite solidity; but it is incompatible with the rotation of the fore-arm, which would have enfeebled the force of the jirk necessary for flying.

These animals have four large canines, but the number of their incisors [and molars] varies. For a long time they have composed two genera, [through the progress of science now become two tribes,] according to the extent of their organs of flight; but the second requires many additional subdivisions.

TRIBE I. GALEOPITHECUS.—VAULTING CATS.

The Galeopitheci differ from the other tribe with which they are associated in this respect, that the fingers of their anterior extremities, which are all supplied with sharp claws, are not lengthened out, but are like those of their posterior extremities; so that the membrane, filling up the interval between them, and extending to the sides of the tail, can do little more than discharge the office of a parachute. Their canines are indented and short, like their molars. Above they have two incisors, which are also indented, and widely separated from each other; in the lower jaw they have six, deeply grooved or pectinated, a structure which is quite peculiar to themselves. These animals live upon trees, in the Indian Archipelago, and pursue Insects, and perhaps Birds: were we to judge from the wasting which their teeth undergo through age, we should infer that they also lived upon fruits. Their cœcum is large.

The Flying, or, more properly, Vaulting Cat or Lemur, forms the solitary genus of this tribe, which in many respects constitutes a connecting link between the Lemurs we have left, and the Bats. It has not the hands of the Quadrumana, and differs in other striking particulars. It is distinguished, again, from the Bats, in that in these latter there is not a fold of skin between the toes, whilst the hind-feet of the Galeopitheci are palmated, as are their fore-feet. Besides, the alar membranes of the Bats do not commence before the shoulders, whilst those of the Vaulting Lemurs proceed from the neck, at the angle of the jaw. Lastly, the toes of the anterior extremity, in the Galeopitheci, are not much larger than those of the posterior, whilst in the Bats the fingers are prolonged to five or six times the length of their toes. The Vaulting Lemur uses its hind-legs a good deal like other Quadrupeds, and its fingers and toes are nearly of the same relative length as in the Monkeys. The flying membrane of the Galeopithecus is not naked, as is common in Bats, but covered on both sides with fine and soft hair like that of the Mole. The females have two prominent mammæ, which are pectoral. The dental apparatus clearly manifests that these animals are frugivorous, though it is also alleged they can eat flesh and insects, like the Hedgehog.

GENUS I. GALEOPITHECUS.—VAULTING LEMURS.

GENERIC CHARACTERS.

The Hands and Feet moderately developed, also the Toes; all supplied with strong and crooked Nails.

The Dental Formula $^{2}\left|\begin{matrix}2+C+(1\ F+4)M\\3+C+(1\ F+4)M\end{matrix}\right.=\frac{16}{18}=34.$

The Vaulting Membrane covered with hair both above and beneath.

The Mammæ two. Pectoral.

Habitat, the Indian Archipelago.

GALEOPITHECUS RUFUS.—THE RED VAULTING LEMUR.

Syn. Galeopithecus volans.—Shaw, Gen. Zool.
Lemur volans.—Linn. Gmel. I. 44.
Felis volans ternatea.—Seb. Thes.
Colugo and Oleck.—Native names.
Lemur volans.—Pallas, Act. Ac. Sc. Pet. 1780.

Icon. Galeopithecus rufus.—Audeb. des Galeop. pl. 1.
Galeopithecus rufus.—Griffith's Cuvier, II. 158.
Galeopithecus variegatus, (Geoffroy.)—Audeb. des Galeop. pl. 2.
Lemur volans.—Schreb. XLIII.
Felis volans ternatea.—Seb. Mus. tab. 58.

SPECIFIC CHARACTERS.

The Fur is reddish-grey above, reddish below, and variegated and spotted with different coloured greys when the animal is young.

Inhabits the Moluccas and Indian Archipelago.

The Red Vaulting Lemur is about the size of a Cat. Its head resembles that of the Lemurs, but the muzzle is more arched; its eyes are large, and at a considerable distance from each other; the ears are small, naked, oval, and black; the nose also is black. The anterior extremities are long, and very slender; the fore-arm is more clothed with hair than the arm; the sole of the foot is naked and black; the toes are about an inch long, flattened on the sides, and united by a membrane; the nails are curved into a half circle, and are strong, much compressed, and pointed. They somewhat resemble those of the Cat, and, as in this animal, appear to be habitually concealed. In the posterior extremities the thigh is more clothed than the leg; the toes and nails are like those already described. The tail is not so long as the body and head taken together. The membrane rises from under the chin, proceeds to the nails of the anterior extremity, then to those of the posterior, and unites at the extremity of the tail. The robe which covers the head, back, and upper part of the membrane, is smooth, and of a deep and lively red colour; that of the chest, abdomen, and arm, is brighter and rough. The teeth are said to be anomalous, and are variously described by authors. We subjoin that of M. Desmoulins:—There are six incisors in the lower jaw, the intermediate four of which are much sloped; the two central have eight pectinated furrows, the next nine, and the third five; the external are both less sloped and less indented. The next tooth resembles a molar on its posterior surface; it has also two distinct roots, but has a triangular point in front. To this succeeds another, which before its principal projection has one small heel, and behind it three, disposed triangularly. Four molars succeed, the first of which is twice the length of the others. In the upper jaw there are also five molars, the four last of which very much resemble each other; the one anterior to these has two principal points in a series, and is very strong at its base; the tooth before this (answering to the canine) is very long, triangular, and has three distinct indentations. In the intermaxillary bone there are two teeth, the posterior of which resembles the canine which succeeds it. These incisors are early and frequently lost.

These animals almost constantly reside on trees, where they hang during the day, suspended by their hind-legs from the branches: they move with difficulty on the earth's surface; but climb trees with surprising facility, and spring from one to the other, supported, as by a parachute, in their passage by the membrane spread round their body. They are crepusculous, and active only during the twilight.

The Colugo was first described by Bontius in his History of Java. He informs us it is found in Guzerat, is gregarious, and feeds chiefly on fruits. Camelli, in his enumeration of the animals of the Philippine Islands, published by Petiver in the Philosophic Transactions, says, its length is three spans, and that the young adhere to the teats of the parent, even in flying, by their mouth and claws. Their flesh is said to have a disagreeable odour, but, notwithstanding, it is eaten by many of the islanders with much relish.

DOUBTFUL SPECIES.

1. Galeopithecus variegatus (Audeb. des Galeop. pl. 2.—Geoffroy, in Mag. Encycl. Desm. No. 134) appears to be nothing more than the young of the preceding.

2. Galeopithecus Ternatensis, (Seba, Mus. tab. 58, Geoffroy.) This species was introduced into our catalogues by M. Geoffroy, upon the imperfect description of Seba. It was observed in Ternate, one of the Moluccas.

TRIBE II. VESPERTILIONIDÆ, Gray, Lesson.—Gen. Vespertilio, Linn.—BATS.

The tribe of the Bats comprehends various and numerous families, all closely associated. Throughout the whole the fingers of the anterior extremity are much prolonged, and enveloped in a membrane usually naked, forming true wings; the thumb is considerably apart, but not opposable, and is armed with a claw; the posterior extremities are weak, furnished with five equal toes; there are three sorts of well characterized teeth.

A striking peculiarity has lately been pointed out in the osteology of the superior extremity, so remarkably employed in this tribe, which must not be omitted. We allude to the existence of a particular bone, placed behind the articulation of the arm with the fore-arm, and presenting in this joint an arrangement altogether parallel to that of the patella in the knee-joint. This bone, analogous to the olecranon process, and which may be designated the patella of the anterior extremity, is not, we believe, found in any other of the Mammalia, not even in the Galeopitheci; whereas it exists in the Insectivorous as well as in the Frugivorous Bats, although in some of the former it is rudimentary.

FAMILY I. FRUGIVORA.—FRUGIVOROUS BATS.

Syn. Meganycteres.—Latreille, Reg. Anim.

CHARACTERS OF THE FAMILY.

The Molar Teeth with flat and slightly crested crowns.
The Index with three phalanges, and usually with a nail.
Inhabit the East Indies, the East Indian Archipelago, New Holland, Isle of France, Africa.

These Bats, as implied in M. Latreille's designation, are usually of larger dimensions. In the present state of the science they form a considerable number of genera, upon which we shall make a few remarks.

Being frugivorous, their dental apparatus differs somewhat from that of the other Bats. Their molars, instead of being studded with tubercles and acute points, exhibit an elongated crown, smooth, or limited to its possessing a small crest on the edges, especially the exterior one. This character is remarkable, inasmuch as it is intermediate between those of the Carnivora and Herbivora, properly so called, and is found in this group alone, where it undergoes some modifications. As to the canines and incisors, they very much correspond in their arrangement, direction, form, and usual number, to those of the Monkeys, with one striking exception. The wings of these Bats are usually neither so broad nor so long as those of the Insectivora; and generally they arise more from the back than the flanks. Another striking peculiarity is, that the fore-finger is always provided with all its phalanges, and (with only one exception, we believe) is terminated by a small nail; whilst in the Insectivora it wants, as in the other three fingers, both the nail and its phalanx. As to the interfemoral membrane, it is always but slightly developed, and usually completely rudimentary.

The membranes, then, in the Frugivora, do not possess the same extent of development as in the succeeding family. No more do we find in their avenues to sensation those membranous prolongations which are destined at one time to augment their sensibility, and at another time to diminish it; in other words, those oral and nasal coverings, whose presence produces so grotesque and striking an appearance.

This family is essentially frugivorous; though, as a Dog may eat bread, so the species belonging to it may accustom themselves to devour small Birds, perhaps, and other animal matters. Their gape is usually small. They live chiefly on mellow fruits; they also consume flowers. Most of them are nocturnal, and impatient of the light of day, while others, again, are all alive and active even under the direct rays of the sun. They produce but one at a birth. Finally, they live in numerous troops, some upon trees, others among rocks, and others in old ruined buildings. It was in the great pyramid that Geoffroy-St-Hilaire discovered in Egypt the species which bears his name.

The Frugivora are unknown in America and Europe. They abound on the Continent of India, in its Archipelago, in Egypt, Senegal, the Cape, and even in New Holland.

(A.) Tail-less Roussettes, (Roussettes sans queue.)

GENUS I. PTEROPUS.—ROUSSETTE BATS.

Syn. Les Roussettes.—Cuv. Reg. Anim. I. 113.
Pteropus.—Briss. Reg. Anim.—Illiger Prodr.—Geoffroy-St-Hilaire, Ann. du Mus. tome XV. 86.

GENERIC CHARACTERS.

Head prolonged, straight, conical. Muzzle slender. Incisors vertical. Interfemoral Membrane slightly developed. Fore-finger generally with a claw.

The Dental Formula $^{2}\left|\begin{matrix}2+C+(1\ F+4\text{ or }5)\ M\\ 2+C+(1\ F+5\ )\ M\end{matrix}\right.=\frac{16\text{ or }18}{18}=34\text{ or }36$

The Roussettes have trenchant incisors in each jaw, and molars with flat crowns. These grinding teeth have generally two longitudinal and parallel furrows, which are worn down by detrition. Hence, these Bats live chiefly on fruits, of which they destroy large quantities; yet they do not miss an opportunity of pursuing Birds and small Quadrupeds. These are the largest known Bats, and their flesh is eaten. They inhabit the East Indies.

Their membrane is widely sloped off between the thighs, and they have no tail, or a very small one. Their index finger is one half shorter than the middle one, and bears a third phalanx, and usually a small nail, which is wanting in the other Bats. The other fingers have only two phalanges. Their muzzle is simple, their nostrils separate, the ears middle-sized, without operculæ, and their tongue papillate, the papillæ being curved backwards. Their stomach consists of an extremely elongated and unequally bulging sac. They are found only in Southern Asia, the East Indian Archipelago, Bourbon, and Isle of France, New Holland, Van Diemen's Land, and Africa.

1. PTEROPUS EDULIS.—EDIBLE ROUSSETTE.

Syn. La Roussette noir.—Cuv. Reg. Anim. I. 113.
Pteropus edulis.—Geoff. Ann. Mus. XV. p. 90.—Desm. Mam. No. 137.
Vespertilio vampyrus, (in part.)—Linn. Gmel. I.
Roussette edule, ou kalong.—Temm.
Icon. Temm. Mon. Mam. II. pl. 35, fig. 1, (head.)—I. pl. 15, fig. 1, 2, (cranium,) 3, (teeth,) 4, 5, 6, (of the young.)
Pteropus Javanicus.—Horsf. Zool. Jav.
Ternate Bat.—Penn. Quadr. II. pl. 103.

SPECIFIC CHARACTERS.

The Hair on the muzzle, cheeks, and throat, dark brown; on the sides of the neck and upper part of the head bright red; a transverse reddish band, and a black band, between the shoulders.
Inhabits the Sonda Islands, Java, the Moluccas.

The Edible Roussettes remain during the day suspended in large numbers from the trees. The inhabitants are obliged to protect their fruits with nets, on account of the devastations of these Bats. Their cry is loud, and resembling that of a Goose. They are taken by means of a bag, hung for that purpose at the end of a pole. The natives find the flesh delicate, but Europeans dislike it, on account of its strong odour of musk.

The Edible Bat is the largest known species, and taking the lead of the others, we shall be somewhat more ample in the details. Its forms are

slender; its body prolonged; its muzzle long; and the membranes used in flying broad and extended. The robe on the upper part of the body is close, from the hairs throughout a part of their course adhering to the skin; it is always very short, and the skin may be seen beneath. In the young the fur is longer, and quite free, a difference depending upon the age of the individuals. The lower parts of the body are most clad, and the hair is here somewhat curled. The ears are long and pointed. The interfemoral membrane unites the limbs to the coccygial region; it is broad at the knee, and forms a large angle: that of the wing, besides being broad, is also very long; the whole is perfectly black in the adult, and of a brown colour in the young. The incisors in the upper jaw are uniform, and regularly placed, which is scarcely the case in the inferior maxilla: there is no small anomalous tooth in the upper jaw, and four molar spaces; below there is an anomalous tooth, and five molar spaces. As to colour, the muzzle, cheeks, and throat, are of a deep chestnut, while the side and back of the neck are of a bright red; a reddish band, accompanied with another of a blackish hue, extends between the shoulders, and forms the limit of the red marking of the neck, a peculiarity which distinguishes this from all the other species. The back is of a dark chestnut colour, or greyish-black, as are also the posterior extremities; the chest is chestnut coloured, the abdomen dark-brown, or, more generally in the adult, perfectly black. Of the sixty specimens which enrich the Leyden Museum, only three, according to Memminck, extend from the tip of one wing to that of the other as much as four feet ten inches, (French,) and two to nearly five feet. This nearly corresponds with the dimensions reported by Dr Horsfield of those in the Museum of the Honourable the East India Company. "In adult subjects, the extent of the expanded wings is full five feet, and the length of the body one foot. In the specimen I have before me, the extent of the wings is five feet, two inches. The smallest specimen in the Museum has an expansion of three feet and ten inches across the wings: all the others measure nearly five feet. The length of the arm and fore-arm together is fourteen inches; the naked thumb projecting beyond the membrane measures two inches; and the claw, which is strong and sharp, has an extent of nearly an inch long in its curvature."

Though inclined to agree with Messrs Geoffroy and Temminck, that Horsfield's *Javanicus* is a mere variety of the present, yet the Doctor's account of the habits of this animal is so excellent that we shall borrow freely from it. It is extremely abundant in the lower parts of Java, and uniformly lives in society. The more elevated districts are not visited by it. Numerous individuals select a large tree for their resort, and suspending themselves with the claws of their posterior extremities to the naked branches, often in companies of several hundreds, afford to a stranger a very singular spectacle. A species of Fig-tree, resembling the *Ficus religiosa* of India, which is often found near the villages of the natives, affords them a favourite retreat, and the extended branches of one of these are sometimes covered by them. They pass the greater portion of the day in sleep, hanging motionless: ranged in succession, with the head downwards, the membrane contracted about the body, and often in close contact, they have little resemblance to living beings, and, by a person not accustomed to their economy, are readily mistaken for a part of the tree, or for a fruit of uncommon size suspended from its branches. In general, these societies preserve a perfect silence during the day; but if they are disturbed, or they contend among themselves, they emit sharp piercing shrieks, and their awkward attempts to extricate themselves, when oppressed by the light of the sun, exhibit a ludicrous spectacle. In consequence of the sharpness of their claws, their attachment is so strong, that they cannot readily leave their hold, without the assistance of the expanded membrane; and if suddenly killed in the natural attitude during the day, they continue suspended after death. It is necessary, therefore, to oblige them to take wing, if it be desired to obtain them during the day. Soon after sunset they gradually quit their hold, and pursue their nocturnal flights in quest of food. They direct their course, by an unerring instinct, to the forests, villages, and plantations, occasioning incalculable mischief, attacking and devouring indiscriminately every kind of fruit, from the abundant Cocoa-nut of the meanest peasantry, to the most delicate productions cultivated by the chiefs. By the latter, as well as by the European colonists, various methods are employed to protect the orchards and gardens. Delicate fruits, such as Mangoes, &c., as they approach to maturity, are ingeniously secured by means of a loose net or basket, skilfully constructed of split bamboo. Without this precaution, little valuable fruit would escape the ravages of the Kalong.

There are few situations in the lower parts of Java, in which this night wanderer is not constantly observed. As soon as the light of the sun has retired, one animal is seen to follow the other at a small but regular distance, and this succession continues uninterrupted till darkness obstructs the view. The flight of the Kalong is slow and steady, pursued in a straight line, and capable of long continuance. Its chase forms occasionally an amusement to the colonists and inhabitants, during the moonlight nights, which at Java are uncommonly serene. He is watched in his descent to the fruit trees, and a discharge of small shot readily brings him to the ground. The natives of many of the Islands often employ for their capture a net at the end of a long pole. They eat it; and consider the flesh, which is white, delicate, and very tender, as delicious, whilst its peculiar flavour disgusts most Europeans: for it has a very strong smell of musk, produite par leur urine, qu'ils répandent lorsqu'on les inquiète. When wounded or irritated, they utter a sharp cry like that of the Goose.

2. PTEROPUS JUBATUS.—MANED ROUSSETTE.

Syn. et Icon. Pteropus pyrrhocephalus.—Meyen, in Nov. Act. Acad. Cur. vol. XVI. pl. 45 and 46, (cranium.)
Roussette à crinière.—Temm. Mon. Mam. II. 59.
Pteropus jubatus.—Esch.[1] Zool. Atl. pl. 16.

SPECIFIC CHARACTERS.

The Hair uniform deep reddish-brown; on the face black.
Inhabits the Island of Luzon.

This species, bearing a considerable resemblance to the previous one, may properly be characterized as new, not having hitherto found its way into the catalogues, native or foreign, of our most recent systematic works. M. Temminck, in his second volume, has recently given an account of it, deriving his materials from the memoirs of Messrs Eschscholtz and Meyen, quoted below.[2]

The Maned Bat has the chest, belly, and the whole back, of a very deep brown colour, and this colour is not limited between the shoulders by a transverse band, as in the former species: all the neck, however, is covered with a broad reddish-brown collar, which runs to a point upon the upper part of the back. The whole face is black, and covered with short hair; the crown of the head and occiput are of a shining orange-yellow colour, whilst there is a bright brown spot beneath the ear; the ears are almost naked, about an inch long, with the apex roundish. The breadth of the interfemoral membrane is an inch, and decidedly keel-shaped, though the descriptions do not indicate whether the membrane surrounds the coccygial region, or leaves this bone free from the membrane. The eyes are of a pale red colour. In this Roussette the molars are stronger, wider, and more approximated, than in any other species. The upper jaw has no vestige of a false molar; there is a very small one in the lower.

These large Bats are found in the Island of Luzon, the principal of the Philippines, where they cover the trees with their numerous troops, and have been compared to nests suspended from the branches. They are sometimes seen to fly during the day, but more frequently they are habitually hid under the foliage during sunshine. They are frugivorous. Their flesh is tender, and much esteemed, having a great resemblance to that of Frogs. It is esteemed by the Spaniards as well as the islanders, a remark which Temminck extends to *all* the Bats he describes.

3. PTEROPUS EDWARDSII.—EDWARDS' ROUSSETTE.

Syn. Pteropus Edwardsii.—Geoff. Ann. du Mus. XV. 92.—Desm. Mam. No. 138.
Roussette d'Edwards.—Temm. Mon. Mam. II. 61.
Pteropus medius, (Roussette intermedienne.)—Temm. Mon. Mam. I. 176.
Icon. Great Bat from Madagascar.—Edw. Birds, pl. 180.

SPECIFIC CHARACTERS.

Ears broad and long. Membranes attached near the spine. No transversal markings. Coat bright red. Back chestnut. Abdomen light brown.
Inhabits Madagascar, India, Ceylon.

Edwards' Roussette is of smaller dimensions than that of our first named species, a remark which applies to all the features of the face; the ears, however, are both broader and longer. The side membranes are attached nearer to the spine than in the edulis, which, of course, makes the back narrower; the transversal bands are here likewise wanting. Whatever variety occurs in the coats of these Bats generally, the face is always

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[1] Esch. Zool. Atl.—Zoologischer Atlas enthaltend Abbildungen und Beschreibungen neuer Thierarten wahrend des Flottcapitains von Kotzebue Zeveiter Reise um die Welt, in den Jahren 1823—1826, von Dr Friedr. Eschscholtz. Berlin, 1829—1833.

[2] *L'Atlas Zoologique*, par M. Eschscholtz, 4°, *cacher avec une figure*. Memoire par M. Meyen, *Nov. Acta Phy.-Med. Acad. Cæs. Leop. Nat. Curios.* tome XVI. p. 604.

darker than the neck, so as often to be quite black, though usually it is of a very deep chestnut hue; whilst black or dark brown pervades the extremities.

Temminck informs us, that this is the only one of the larger species, in which *the old males* have a bunch of unctuous hairs, proceeding from a common centre, at the side of the neck; though it is not so apparent as in the smaller kinds, since the bushy hairs do not differ in colour from the others, and they are all of the same length. He also remarks, that those from Madagascar differ from those obtained in the Indian Peninsula and Ceylon only in having the face blacker, and the orange hue upon the neck more conspicuous.

Edwards, to whom these immense sized Bats were more a novelty than they now are, seems to have been shocked at the appearance of this "Great One;" and, after insisting on the accuracy of his drawing, tells us, that from it "an idea of this Fiend may be formed." He adds, that when wounded by a gun they are very fierce, snapping at, and biting those who offer to take them. He was also informed that they dipped into the sea for fish. Major Sykes, in his very recent work, "Catalogue of the Animals of the Deccan," (*Dukhun*,) remarks, that there the animals of the same troop differ remarkably in their external markings. "The native Portuguese," he continues, "are the only individuals who eat this Roussette, but I can certify that its flesh is delicate, and free from all disagreeable flavour."

4. PTEROPUS FUNEREUS.—FUNEREAL ROUSSETTE.

Syn. Roussette funèbre.—Pteropus funereus.—Temm. Mon. Mam. II. 63.

Icon. Temm. Mon. Mam. II. pl. 35, fig. 4, (head.)

SPECIFIC CHARACTERS.

The Head small. The Ears large. The Interfemoral Membrane deeply divided, and of equal breadth at the coccyx and feet.

The Hair varying in colour from dark brown and grey to black.

Inhabits the East Indian Archipelago.

The dimensions of the Funereal Roussette are smaller than those of the Edulis, and the head is proportionally much less, whilst the ears are larger; the interfemoral membrane is very deeply divided, and of equal breadth at the coccyx and feet; this membrane is covered with hair above, and at its base only below. There is no anomalous molar in the upper jaw, where the incisors are broad and uniform, whilst they are small and in pairs beneath. The robe is very dark, short, rough, and somewhat frizzled and shining on the back; the alar membranes are well clad above, as is the interfemoral, which is, however, bare near the foot, and also near the coccyx underneath. The following markings, varying probably according to age, and the season of the year, have been enumerated by Temminck: 1. Quite black, except at the back of the neck, where there is a slight deep chestnut marking. 2. Shining black on the lower parts of the head; dull black on the back, with a meagre coat; bright red on the occiput and nape of the neck; and dark chestnut on the sides of the neck. 3. Face, neck, and chest, quite black, belly dark brown; nape dull brown; back olive brown. 4. Under portions quite black; sides of the neck chestnut; nape very bright golden red; back, ash-grey. In the young, whose covering is more copious, it is of a uniform dark brown, except at the nape and neck, which are of a dull brown. This species has never been previously characterized or precisely distinguished from the two preceding, with which it may easily be confounded. Hence the necessity for details.

The habits of this animal do not differ from those of the other larger kinds. The superb Leyden Museum possesses twelve specimens derived from four islands of the Indian Archipelago, namely, Timor, Amboyna, Borneo, and Sumatra. Those of Timor and Borneo are, in their markings, precisely similar.

5. PTEROPUS PHÆOPS.—BLACK-FACED ROUSSETTE.

Syn. Roussette à face noir.—Pteropus phaiops.—Temm. Mon. Mam. I. 178, II. 65.

Icon. Temm. Mon. Mam. II. pl. 35, fig. 3, (head,) pl. 36, fig. 1, 2, (cranium,) and 3, (teeth.)

SPECIFIC CHARACTERS.

The Body stout and short. The Muzzle long. The Ears short and pointed. The Interfemoral Membrane broad on the tibia, rudimentary along the coccyx.

The Hair varying from brown to bright yellow and red.

Inhabits Macassar and Amboyna.

The Black-faced Roussette is of the same dimensions as Edwards'; its body is stout and short; the muzzle long; the eyes further removed from the nostrils than from the ears, which are short and pointed; the interfemoral membrane is broad on the tibia, but narrow along the coccyx, and, reduced to a rudimentary state, is scarcely seen, hid by the long hair. There is no anomalous molar in the upper jaw; in the under it is isolated, and flat on the crown; the incisors above are small and regularly placed, but in the inferior maxillary are crowded and compressed by the canines. The face is of a deep black colour; the rest of the head, the neck, and shoulders, a pale yellow; the cheek, a bright golden-red; and the hairs in every other part of the body have a twofold colour, being brown at their base, and bright yellow at their points. The wings approximate to each other on the back to within half an inch; and in the old of both sexes the back is quite naked; in the young it is clad with black and shining hair.

It inhabits Macassar in the Island of Celebes; also Amboyna.

6. PTEROPUS POLIOCEPHALUS.—GREY-HEADED ROUSSETTE.

Syn. Roussette à tete cendrée.—Pteropus poliocephalus.—Temm. Mon. Mam. I. 179, II. 66.

Icon.

SPECIFIC CHARACTERS.

The Hair on the head dark grey; on the shoulders rosy chestnut; elsewhere grey above; yellowish beneath.

The Interfemoral Membrane rudimentary. The Coccyx free, hairy. The Ears pointed and naked.

Inhabits New Holland and Van Diemen's Land.

The size of this Roussette is somewhat less than that of our first species, the Edulis, and its body is shorter and stouter. The interfemoral membranes are reduced to a mere rudiment; the coccyx is free, and covered with long hair; the robe is abundant over the whole body, and over the extremities; the incisors of the lower jaw are somewhat separated from each other; the ears, of moderate dimensions, are pointed and quite naked. All the upper parts of the head, the cheeks, and throat, are of a dark ash-colour, mixed with some black hairs; the ash-colour shades off into grey towards the crown of the head, and a longitudinal band of this tint appears on the chanfrin. The whole of the nape, shoulders, and a part of the front of the neck, are of a beautiful rosy chestnut hue; this colour is separated by a dark ash-coloured band, which extends over the rest of the body; all the back and chest present a mixture of ash-coloured and black hairs, somewhat lighter on the crupper and outer sides of the hind-feet, and approximating to yellow, which colour, of a deeper tint, pervades the abdomen, and the inner side of the feet; the fore-arm and adhering part of the membrane are clad with brown hair. The markings of the female agree with those of the male; her dimensions being somewhat less.

The habitat of the Ash-headed Roussette is New Holland and Van Diemen's Land; its habits exactly correspond with those already related.

7. PTEROPUS CHRYSOPROCTUS.—GOLDEN-NECKED ROUSSETTE.

Syn. Roussette à Croupion Doré.—Pteropus Chrysoproctus.—Temm. Mon. Mam. II. pl. 67.

Icon. Temm. Mon. Mam. II. pl. 35, fig. 2, (head.)

SPECIFIC CHARACTERS.

The Hair on the head bright golden-red; on the back chestnut; blackish beneath.

The Interfemoral Membrane broad at the heel; rudimentary at the coccyx.

Inhabits the Moluccas and New Guinea.

This species was introduced to the notice of Naturalists in the year 1838, by M. Temminck, from four specimens obtained by Messrs Macklot and Müller, in their voyage to the Moluccas and New Guinea. Its *native country* is Amboyna, where it feeds upon mellow and succulent fruits, whose fibrous portions are rejected, so that it taps and enjoys the fruit, without swallowing the pulp, or devouring the harder parts.

Its dimensions are somewhat less than No. 4, the Funereal. The interfemoral membrane, somewhat broad at the heel, slopes away, and is nearly rudimentary, so that at the coccyx it is hid under the fur; the ears are straight and pointed; the upper incisors are broad and free, the under are small, and in pairs; there is no false molar in the upper jaw; that of the lower one is short and obtuse. The robe generally is long, rough, and frizzly; upon the back it is silky, smooth, and shining; the muzzle is covered with a few transparent hairs. The *adult male* is chestnut-coloured round the eyes and on the chin; the head, all the neck, and the chest and shoulders, are of a very lively golden-red colour; the back, as far as the loins, of a shining dark chestnut; the lumbar region, the coccyx, and

femur, are chestnut, passing into blackish on the abdomen, and near the humerus; the membranes are black. The *female* differs from the male in having the back of a shining black colour, the loins of a lively chestnut, and the inferior parts dark chestnut.

8. PTEROPUS MACKLOTII.—MACKLOT'S ROUSSETTE.

Syn. Roussette de Macklot.—Pteropus Macklotii.—Temm. Mon. Mam. II. pl. 69.
Icon. Temm. Mon. Mam. II. pl. 35, fig. 5.

SPECIFIC CHARACTERS.

The Hair on the back brick red; elsewhere yellow or brown.

The Ears large and naked.

An Odoriferous Gland, covered by a bunch of coarse hairs on each side of the neck, in the male only.

Inhabits the Moluccas and New Guinea.

This species, like the former, has not hitherto been introduced to the notice of the English reader. It rests upon the same respectable authority as the preceding, the late M. Macklot having published an account of it.

The expanse across the wings is less, in proportion to the length of the body, than in Edwards' Roussette, (No. 3,) though it is not so short and stout as in some which have been enumerated. The interfemoral membrane is of medium breadth, extending along the tibia and femur, and uniting round the coccyx, the membrane only being partially hid by the fur. The ears are large and naked. In the male there is a great bunch of coarse oily hairs upon the side of the neck, covering an odoriferous gland beneath; the upper incisors are uniform and well set, the lower are small and crowded; there is no false molar in the upper jaw, but a large obtuse one in the lower. The robe is long and silky, supplied with woolly hairs at the inferior parts, whilst those of the back and extremities are short and shining; the lower side of the membrane, from the flanks to the extremity of the fore-arm, is clad with a thick woolly covering.

In the *adult male* the crown of the head and the nape are pale yellow; the cheeks and throat, brown; the chest, golden-brown; abdomen, chestnut; sides of the neck and shoulder, golden-yellow; all the back and the extremities are covered with shining brick-red hair; the membranes possess the colour of a faded leaf. The *adult female* differs much from the male. It wants the oily apparatus; the crown of the head and nape are of a dull pale yellow, and this colour, shaded with a little brown, pervades the neck, cheeks, and throat; the chest is in a great degree bare; all the inferior parts of the body are of a dull yellowish-brown, whilst the back is of a beautiful pale and shining yellow. The females are often larger than the males.

9. PTEROPUS DASYMALLUS.—THE WOOLLY ROUSSETTE.

Syn. Roussette Laineuse.—Pteropus Dasymallus.—Temm. Mam. I. 180.
P. Rubricollis.—Sieb.[1] Spicil. Japon. p. 13.
Icon. Roussette Laineuse.—Temm. Mon. Mam. I. pl. 10.

SPECIFIC CHARACTERS.

The Hair brownish or yellowish; very long and woolly.

The Interfemoral Membrane rudimentary. The Coccyx free. The Ears small, pointed, and naked. The Membranes covered with hair, except the metatarsal.

Inhabits Japan.

The general dimensions of this Roussette are smaller than Edwards'; and the wings smaller, in proportion to the body, than the rest of the genus. The interfemoral membrane is rudimentary along the posterior extremities, and wanting round the coccyx, being only visible at the heel, and hid elsewhere under the thick fur; the ears, too, are small, pointed, and very much concealed; the upper incisors are large, uniformly and regularly set; the lower are small and in pairs, having no anomalous tooth behind the upper canine, but a broad and bilobed false molar behind the lower one; in all, there are four molars above, and six below. The coat is very woolly, and long throughout; the side membranes are clad both above and below; all the extremities are covered with long hair, leaving the metatarsal bones alone covered with a naked membrane; those on the region of the coccyx are long.

The face and summit of the head, the cheeks, and regions of the ear, are brown, mixed with grey; the front and side of the neck, the nape, and all the posterior portion of the neck and shoulders, are of a dull yellowish-white; all the other parts of the body are of a deep brown, the points of the hairs being ochrous. The ears are naked, the points alone being visible. The membranes are dark brown.

The habitat of this species is Japan, where, according to M. Siebold, it bears the name of *Sabaosiki*.

10. PTEROPUS URSINUS.—URSINE ROUSSETTE.

Syn. Pteropus Ursinus.—Kittlitz.
Roussette à pieds Velus ou Ursine.—Temm. Mon. Mam. II. p. 70.
Pteropus Pselaphon.—G. Tradescant Lay, Zool. Journ. IV. 457.
Icon. Roussette à pieds Velus ou Ursine.—Temm. Mon. Mam. II. pl. 37.

SPECIFIC CHARACTERS.

The Hair grizzly black, long and bushy.

The Interfemoral Membrane rudimentary. The Ears very short and pointed. The Membranes and Fingers covered with hair.

Inhabits the Bonin Islands, near Japan.

The first account of this animal was supplied by Mr Tradescant Lay. It was noticed by him in the Island of Bonin, at the time that the Blossom Frigate, commanded by Lord Byron, lay in that station. He was greatly struck with the very great contraction of the pupil under the influence of the solar ray. We extract the following particulars from his interesting account:—"In this blind condition it climbs trees, groping its way up to the topmost branches, where, after extending its claws to learn whether there be another sprig within reach, still higher than its present situation, it quietly drops its weight upon the hind claws, and there composes itself to rest, apparently with as much felicity as a traveller feels after descending some perilous height. When captured it was often observed to sneeze. When thirsty, it descends a tree on the margin of the rill, and after sipping a little refreshment, re-ascends the trunk, and takes its departure from the branches. It is not a bad swimmer. Those which were taken on board the frigate and confined did not discover any sign of fear, and ate, without repining, the fruit that was given them; and on their being set at liberty, they climbed to the highest part of the rigging, and there found a convenient place for repose."

The great intolerance of light is a character which is common nearly to all Bats; and hence the name *pselaphon*, (alluding to its powers of touch being superior to those of sight,) proposed by Mr Lay, is very far from being specific. The name *Ursinus* was given by M. Kittlitz, who circumnavigated the globe in a Russian vessel. Mr Lay mentions that this species sucks the juice without devouring the pulp of fruits.

This species has a close resemblance to the preceding. The most characteristic differences are to be found in the form of the cranium, in the fingers being covered with hair, and in the length and colour of the robe. The dimensions are somewhat larger in this species, but this is a character not to be depended on. As in the Woolly Roussette, the ears are very short, pointed, and scarcely appear beyond the thick fur with which the whole body, the membranes, and even the feet, are clad. This last character is the more remarkable, as it not only serves, at first glance, to distinguish the two species, but also as specially characterizing this one from all others; none besides possessing hair upon the metatarsal region nor upon the fingers. The interfemoral membrane surrounds, in a very rudimentary state, the whole of the coccygeal region; it is totally hid by the long fur, and is only visible at the heel. The cranium is large, bulging, much contracted between the zygomatic arches, which are much stronger and wider than in the preceding species, and the superciliary ridges are more perfect; the muzzle is shorter and broader; the teeth are the same.

The fur is longer than in the Woolly Roussette, and consists of two kinds, one very bushy, like cotton, and the other very long and silky; the inner part of the membranes, as well as the feet, are abundantly supplied with these hairs. The whole of the cottony fur is of a sooty-black colour; the pubic region and the fingers are deep chestnut; the whole of the silky hairs have their points greyish, which gives to the whole robe a grizzly black appearance; the head is quite black, as are all the extremities.

11. PTEROPUS VULGARIS.—COMMON ROUSSETTE.

Syn. La Roussette vulgaire.—Cuv. Reg. Anim. I. 114.
Pteropus vulgaris.—Geoff. Ann. Mus. XV. 92.—Temm. Mon. Mam. I. 182, II. 74.
Vespertilio Vampyrus.—Linn. Gmel. I.
Icon. La Roussette.—Buffon, Hist. Nat. X. pl. 14, copied in Schreb. Saügth. pl. 44.
Roussette Vulgaire, (Jeune de l'année.)—Temm. Mon. Mam. II. pl. 38.

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[1] Sieb. Spicil. Japon.—A. Siebold, Dissertatio de Historia Naturalis in Japonia statu, etc., cui accedunt Spicilegia Faunæ Japonicæ. Batav. 1824.

SPECIFIC CHARACTERS.

THE HAIR brown, varying to red and yellow, thick and coarse.

THE EARS small and pointed. THE INTERFEMORAL MEMBRANE short, concealed.

INHABITS Isle of France and Bourbon.

The Common Roussette is about the size of the European Squirrels, and the expanse across the wing somewhat less than in the smaller specimens of Edwards' Bat. The ear is small and pointed. The appearance of the teeth very much corresponds to that described of the Macklotii, (our No. 8,) although the canines are not quite so strong, more acute and approximated, and the incisors are smaller. The interfemoral membrane is short, and entirely hid under the hair of the coccygeal region. The fur is thick and coarse. In the *old males* the great dark brown space which covers the shoulders runs down the spine to an obtuse point, the rest of the back is brownish-yellow; the abdomen and chest are of a dark reddish-brown; the pubic region and the arms of a lighter hue. In the *aged females* there is a broad black band runs down the centre of the back, which strikingly contrasts with the pale colour of the sides; the head is a pale brown; the throat, chest, and abdomen, a deep chestnut; the extremities, yellowish-brown. The young, of a year old, have the body and members well covered with long and downy fur, generally smooth, but somewhat curled round the neck; the head is yellowish-grey, mixed with silky hairs of a deep brown; the nape, sides of the neck, and chest, are covered with a downy fur, more or less curled, and of a rust-red colour, livelier at the chest than the shoulders; the chest, a part of the abdomen, and the back, are sooty-black, mixed with grey silky hair.

As to its habitat, Temminck gives the Isles of France and Bourbon as certain. It is also *said* to be found in Madagascar, and *perhaps* in Africa. Its flesh is eaten freely, and is generally considered very agreeable, the young being preferred. Its habits are like those of its congeners.

12. PTEROPUS RUBRICOLLIS.—RED-NECKED ROUSSETTE.

Syn. LA ROUGETTE.—Cuv. Reg. Anim. I. p. 114.
ROUSSETTE À COU ROUGE.—PTEROPUS RUBRICOLLIS.—Geoff. Ann. Mus. XV. 93.
ROUSSETTE ROUGETTE.—P. RUBRICOLLIS.—Temm. Mon. Mam. I. p. 183.

Icon. LA ROUGETTE.—Buff. Hist. Nat. X. pl. 17.

SPECIFIC CHARACTERS.

THE HAIR very copious; red on the neck; yellowish on the head; dark brown on the chest.

THE EARS small and concealed. THE INTERFEMORAL MEMBRANE rudimentary and concealed.

INHABITS Islands of Bourbon and Madagascar.

The name, Red-necked Roussette, is unfortunately chosen, inasmuch as the great majority of the genus have this character. A broad golden-red collar, however, is in this one sufficiently conspicuous; the head, and all the upper parts of the body, are of a yellowish-brown, mixed with silky hairs of bright yellow; chest, dark brown: the inferior parts are more grey than the back, but varied in the same manner. The dimensions of this species are half those of our first species. The incisors are more approximated, the middle ones being contiguous; in the lower jaw, again, they are in pairs. The ears are small, and hid under the fur; the interfemoral membrane is rudimentary, and also hid. The robe is downy, very curly, long, rough, and very abundant.

This species is usually stated to inhabit the Islands of Bourbon and Madagascar. It must be distinguished from the P. rubricollis of Siebold. (See our species 9.)

13. PTEROPUS ALECTO.—THE GREAT-WINGED ROUSSETTE.

Syn. ROUSSETTE ALECTO.—PTEROPUS ALECTO.—Temm. Mon. Mam. II. 75.

Icon.

SPECIFIC CHARACTERS.

THE BODY stout and short. THE ALAR MEMBRANES comparatively very large. THE INTERFEMORAL MEMBRANE rudimentary. THE EARS naked, short, and pointed.

THE HAIR mostly black, mixed with chestnut.

INHABITS Celebes.

This species, observed by Temminck in the Leyden Museum, has very recently been described. It is remarkable for its stout short body; for the very great extent of the wings in proportion to the size of the trunk; and, finally, for nearly the total want of the coccygeal membrane, where only a fold of the skin is to be found. The alar membrane rises from the sides, so making the clad portion of the back the broader. The upper incisors are in pairs; the lower are crowded together. The robe is short, coarse, and downy. The head, front of the neck, and lower parts of the body, together with the shoulders and back, are perfectly black; the eyes and circumference of the face are very deep chestnut; the nape and sides of the neck, bright chestnut; the ears are naked, short, and pointed. The regions of the arm and fore-arm are clad beneath with a fine black fur.

The individual which supplied this description was taken in the Island Celebes.

14. PTEROPUS PALLIDUS.—THE PALE ROUSSETTE.

Syn. ROUSSETTE PALE, ou FEUILLE MORTE.—PTEROPUS PALLIDUS.—Temm. Mon. Mam. I. p. 184, II. 77.

Icon.

SPECIFIC CHARACTERS.

THE HAIR brownish, varied with grey and white.

THE EARS short and round. THE MUZZLE short and obtuse. THE MEMBRANES clear brown. THE INTERFEMORAL MEMBRANE united to the coccyx, and concealed.

INHABITS Island of Bonda, also Sumatra and Malacca.

This Roussette is of medium size, being equal in dimensions to an Edulis a year old. The muzzle is short, and somewhat obtuse; the eyes more distant from the ears than from the point of the nose; the ears are short and round; the interfemoral membrane united to the base of the coccyx by a rudiment half a line broad, and entirely hid under the fur; all the membranes of a clear brown colour. The upper incisors are separated; the lower are crowded, the lateral ones being larger than the others. There is no anomalous molar in the upper jaw, but four true ones; in the lower there is an anormal tooth and five molars, the last very small and contiguous. Its coat is very short, and composed of brown, grey, and white hairs; the nape, shoulders, and collar, are of a bright rust-colour in adults, and of a paler red in the young; the whole of the back is covered with close, smooth hair, of a pale brown colour, produced by a mixture of brown and white hairs. The head, throat, sides, and abdomen, are of the colour of a decayed leaf. There is no difference in the markings of the sexes, but the young are paler. This species, then, is distinguished by having no small false molar in the upper jaw, but three large and one small one; by its brown hue, like that of a dead leaf, and its small ears, rounded at the point. No varieties of marking have been discovered on the whole number that have been examined: it is also remarkable for the small extent of the cutaneous membrane that adheres, the membrane of the back being connected with the muscles to the extent of only three or four lines.

The Pale Roussette inhabits the Island of Bonda, where it is very common; also Sumatra and Malacca.

15. PTEROPUS KERAUDRENIUS.—KERAUDREN'S ROUSSETTE.

Syn. ROUSSETTE KÉRAUDREN.—PTEROPUS KERAUDRENIUS.—Quoy et Gaim. Zool. de l'Uran.[1]—Temm. Mon. Mam. I. 186.

Icon. ROUSSETTE KÉRAUDREN.—Quoy et Gaim. Zool. de l'Uran. pl. 3.

SPECIFIC CHARACTERS.

THE HAIR on the back close, brown, and black; on the nape frizzly, reddish-yellow.

THE MEMBRANES deep black. THE ALAR commencing near the median line. THE EARS and INTERFEMORAL MEMBRANE small.

INHABITS Marian Islands.

We owe the discovery of this Roussette to the Naturalists of Captain Freycinet's expedition, who named it from M. Kéraudren, Inspector General of the French Marine. Messrs Quoy and Gaimard report that they fly about in bright day, and suspend themselves in the trees where they build their nests, in holes, and even among rocks. They have but one young at a time, which clings to the mother even when flying. The total length of this Bat is from seven to nine or ten inches; the expanse from wing to wing reaching to about twenty-five. The interfemoral membrane of this Roussette is rudimentary at the coccyx, where it is completely covered with hair; the ears are short, and roundish; the wing arises at a small distance from the median line of the

[1] ZOOL. DE L'URAN.—Voyage autour du Monde sur la Corvette l'Uranie, et la Physicienne par M. Freycinet. Zoologie par MM. Quoy et Gaimard. Paris, 1824.

back; the thumb is very long. All the membranes are of a deep black colour. The incisors are equal, and symmetrically arranged; there is a small anormal tooth in the upper jaw, and a larger one in the lower, with four molars above, and five below. The fur lies close on the back, and is brown; it is more copious, and somewhat more curled, on the nape of the neck and inferior parts. The hairs on the middle of the back are nearly black, but mixed with a few ash-coloured, whilst on the sides of the back, towards the limit of the portion covered with hair, there is a long band in form of a cross, the ash-colour of which predominates over the black. The whole of the nape, as well as the shoulders, are covered with a frizzly fur of a pale reddish-yellow, which half collar terminates in a point at the sides of the chest. The head and throat are a very deep fawn brown; the chest has a russet tinge, and all the other inferior parts are black, mixed with grey hairs. The ears are very small, and somewhat rounded; the long coccygeal hairs hide the rudimentary membrane with which it is surrounded. Temminck states that he has seen individuals in which the yellow collar is of a lighter colour, and others in which it is ash-coloured.

This species has been found only in the Marian Islands.

16. PTEROPUS DUSSUMIERI.—DUSSUMIER'S ROUSSETTE.

Syn. Roussette Dussumier. — Pteropus Dussumieri. — Isid. Geoff. in Belanger, Voy. aux Indes Orient. p. 98.—Temm. Mon. Mam. II. 76.

Icon.

SPECIFIC CHARACTERS.

The Hair of the face and nape brown; on the chest russet brown; on the back and abdomen a mixture of brown and white.

Inhabits Amboyna and the Indian Continent.

M. Isidore Geoffroy-St-Hilaire has supplied a description of this Roussette discovered in the Continent of India by the distinguished Naturalist whose name it bears. The face and throat are brown; the abdomen and back with a mixture of brown and white hairs; those on the back lie close. The upper part of the chest is russet brown; and the sides of the neck, and all the space on the posterior aspect of the body, from the ears to the insertion of the wings, are of a reddish fawn colour. The reddish marking of its throat, and anterior part of the neck, distinguish it from the previous species, (Kéraudren's.)

Amboyna and the Indian Continent are considered its native regions.

17. PTEROPUS VANIKORENSIS.—THE VANIKORO ROUSSETTE.

Syn. Roussette de Vanikoro.—Pteropus Vanikorensis.—Quoy et Gaim. Zool. de l'Astr. p. 77.—Temm. Mon. Mam. II. 78.

Icon. Roussette de Tonga.—Quoy et Gaim. Zool. de l'Astr. pl. 9, Male.

SPECIFIC CHARACTERS.

The Hair, on the neck and shoulders, yellowish-red; on the back grey.

The Membranes dark brown. Interfemoral Membrane narrow and much sloped. The Head large. The Muzzle short and cylindrical. The Ears long, black, and pointed.

Inhabits Vanikoro.

The Roussette of the Vanikoro Island, according to Quoy and Gaimard, is about the size of Kéraudren's, (No. 15.) It differs from it, however, in having a shorter muzzle, which is most conspicuous in the crania. Its robe is lighter in colour and less silky; its head less black; and its collar or cloak, fawn-red, descends further on the back. The head is large, the forehead rounded; the muzzle large and cylindrical; the nostrils well separated, the ears long, black, and pointed. The muzzle and cheeks are of a reddish-brown colour, which becomes darker on the crown. The occiput and sides of the neck, as well as the shoulders, are of a yellowish-red, and all the back brown mixed with grey. The under part of the neck is reddish-brown; the abdomen is brown, with some hairs longer than others and whitish; those of the arm are long and sleek; on part of the fore-arm there is a scanty wool of a deep red colour. The membranes are of a brown, almost black; the interfemoral is narrow, and much sloped. The nails of the feet appear smaller than usual.

In Vanikoro, where it is called *Lequébé*, it does not appear to be very abundant.

18. PTEROPUS TONGANUS.—THE TONGA ROUSSETTE.

Syn. Roussette de Tonga.—Pteropus Tonganus.—Quoy et Gaim. Zool. de l'Astr. p. 74.—Temm. Mon. Mam. II. p. 79.

Icon. Roussette de Tonga.—Zool. de l'Astr. pl. 8.—Female and white variety, cranium and teeth, &c.

SPECIFIC CHARACTERS.

The Hair, on the abdomen, brown; on the shoulders bright red; on the back black.

The Muzzle black. The Ears black and pointed. The Interfemoral Membrane sloping towards the heel. The Membranes brown.

Inhabits Tonga-tabou, one of the Friendly Islands.

Quoy and Gaimard are again our only authorities for this Roussette. They report it to be of medium size between Kéraudren's and Dussumier's. Its collar does not quite meet in front as in the former of these. The abdomen is brown, somewhat red, and without any mixture of white hairs. The wings are lighter; the muzzle, differently coloured, is more pointed, which imparts a fierce look to the animal. The back of the head, and as far down as the shoulders, is of a bright red; the cheeks and muzzle are sombre red, becoming still darker upon the middle of the head; the back is almost black; the throat and abdomen of a deep brown, with a few reddish markings. The hair on the posterior part of the body is long, thick, and abundant; that of the nape is somewhat shaggy, whilst that of the back is silky and lies close; that on the abdomen is coarser and more woolly. The muzzle is black, as are the nostrils. The ears are black, of medium size, and rather pointed. The long hairs about the mouth and eyes are also black. The arms and thighs are thinly clad with short hair. The superbrachial membrane is covered in front with a few soft hairs; the interfemoral, acutely sloping, extends to the heel; the thumb and its claw are proportionally larger, and that of the fore-finger is also strong; all the claws and membranes are brown.

The individual from which the above description was taken was a young one, as was also another characterized as a white variety. In this latter there is a close general similarity, extending even to the character of the fur. The chief differences are in the colour. That of the abdomen is light red; the ears, nails, and membranes, are of a pale yellowish-white. The teeth are as in Kéraudren's.

These Roussettes were found in great abundance upon the Island of Tonga-tabou, one of the Friendly Islands group. They peculiarly delight in the Casuarina tree, where they assemble in hundreds. They fly about in bright day, and in spite of the intensity of the light, as has already been remarked of several other species.

19. PTEROPUS GRISEUS.—THE GREY ROUSSETTE.

Syn. La Roussette Grise.—Pteropus Griseus.—Geoff. Ann. Mus. XV. 94.—Temm. Mon. Mam. I. 187, II. 81.

Icon. La Roussette Grise.—Geoff. Ann. Mus. T. XV. pl. 6.

Roussette Grise.—Temm. Mon. Mam. I. pl. 11, II. pl. 35, fig. 6, (head.)

SPECIFIC CHARACTERS.

The Alar Membranes commencing very near the mesial line. The Interfemoral Membrane small in the members, and partly concealed at the coccyx. The Ears very short and pointed.

The Hair brown, varied with red and grey.

Inhabits the Island of Timor.

The Grey Roussette is about seven or eight inches long, and measures two feet across the wings; the ears are very short and pointed; the side membrane rises from very nearly the mesial line of the back; the interfemoral membrane is small on the members, and rudimentary and partly hid at the coccyx. The upper incisors are small, and regularly arranged; the inferior in pairs, and at a considerable distance from each other; the superior molars exhibit the fine point of a false one, though scarcely visible to the naked eye; there is a small false molar below, which is obtuse; the false molars, after shedding, leave no traces behind. In the *old male* the markings are as follow: Middle of the abdomen brown, the end of hairs being tipt with grey; flanks greyish; head grey, shaded with light brown; nape, sides, and front of the neck, beautiful chestnut, passing on the shoulders to a golden hue; the rest of the upper parts being light grey, from the points being white; there is no vestige of a bushy tuft for the oily secretion in the neck. The *old female* is nearly wholly white; the abdomen preserving a slight grey, and the back and sides of the neck a reddish hue. The common livery, however, of *the adult* is the head, nape, and part of the shoulders, reddish white or bright red; descending from the shoulders all the other superior parts are of a greyish brown; the fur having the brown tint of wine-lees, and the shining hairs being whitish grey; it is somewhat crisp at the coccyx; the cheeks and chin are of a dark greyish-brown; front of the neck a very light red; the other inferior parts have an isabella hue, the middle of the abdomen russet. Such are the markings of the greatest number of adult and old females.

This species was discovered by Peron at Timor.

20. PTEROPUS PERSONATUS.—THE MASKED ROUSSETTE.

Syn. Roussette Masquée.—Pteropus Personatus.—Temm. Mon. Mam. I. 189.

Icon.

SPECIFIC CHARACTERS.

THE HAIR, on the head, pure white and brown; on the neck, pale yellow; on the shoulders, white; and on the back, grey.

THE MEMBRANES brown above, white beneath. THE INTERFEMORAL hid by the fur.

INHABITS Island of Ternate.

The Masked Roussette is of the same dimensions as the Grey. The ears are of medium length, somewhat rounded at the point; the interfemoral membranes are rudimentary; the upper portion being quite hid by the fur; all the membranes are brown above and whitish beneath. The upper incisors are well arranged, and in pairs; the lower are separate, very slender, short, and obtuse; there is a small anormal tooth in both jaws, the upper scarcely visible. The head of this species is strikingly marked with pure white and brown. Pure white covers the whole chanfrin, extends beyond the eye, and forms a spot behind it; the cheeks, margin of the lips and chin, are of the same colour; a broad brown zone covers the throat; the extremities of this zone surround the cheeks and extend to the nostrils. The crown, occiput, neck, and cheek, are of a pale yellow hue; the shoulders and hairs of the arm are white, those of the back are grey, mixed with brown; the chest, abdomen, and sides, have downy hair, brown at their base, and of an isabelle hue at the point.

We owe the discovery of this beautiful species to Professor Reinwardt, who described it in his Voyages aux Moluques. Its habits have not been observed.

21. PTEROPUS LABIATUS.—LONG-LIPPED ROUSSETTE.

Syn. ROUSSETTE LABIAIRE.—PTEROPUS LABIATUS.—Temm. Mon. Mam. II. p. 83.

Icon. ROUSSETTE LABIAIRE.—Temm. Mon. Mam. II. pl. 39, fig. 1, 2, (male,) 3, (femelle.)

SPECIFIC CHARACTERS.

THE HAIR, on the chest and sides, light red; on the abdomen, white; a white tuft on each side of the neck, in the male only.

THE LIPS greatly elongated in the male only.

THE MEMBRANES brown. THE INTERFEMORAL rudimentary. THE ALAR commencing from the sides. THE EARS very long and pointed.

INHABITS Abyssinia.

This beautiful Roussette, the male of which is remarkable for the extreme length of its bunch of oily hair, and the elongation of the two lips, is of the size of the Common Bat of English writers, *V. Murinus*. The muzzle is long; the incisors slender and in contact; a narrow membraneous appendix supplies the place of the interfemoral, which is throughout hid, and nearly clad by the fur; the alar membrane proceeds directly from the sides; the ears are long and pointed. There is a downy fur over the whole body, particularly on the back. The lips of the male project several lines beyond the teeth, and as completely hide the gape of the mouth as in some large mastiffs, producing a singular physiognomy. The downy fur clothes all the humeral region, and the margin of the alar membrane adhering to the sides; this, and that of the head, short, and not very abundant, is of a reddish isabelle hue, redder upon the back and crupper; the root of the ears, and their posterior margins, are covered with white hairs. From each side of the neck, of a reddish-brown colour, there arises a large pure white tuft of long hair; these large tufts, probably covering as usual an unctuous apparatus, form two bunches, the hairs of which diverge as from a common centre. The chest, humeral region, sides, and coccygeal region, are of a light red; the middle of the abdomen, where the hair is short and smooth, is of a dull white. All the membranes have the colour of a decayed leaf.

The female is destitute of the cervical tuft, and labial peculiarity, but is nearly the same in regard to the markings.

M. Botta presented to the Paris Museum two individuals of this new and beautiful species, discovered in his Abyssinian travels. The Leyden specimens were derived, one, without label, from London, and the other from M. Botta's collection.

(B.) TAILED ROUSSETTES. (ROUSSETTES AVEC UNE PETITE QUEUE.)

M. Geoffroy was the first to describe the species of this subdivision. One of them (*Pteropus Ægyptiacus*) is found in Egypt in the cavities of the Pyramids, and another, with a tail not quite so long, and engaged to about the extent of a half in the membrane, (*Pter. amplexicaudatus,*) comes from the Indian Archipelago.

The section of the TAILED ROUSSETTES is distinguished from the previous one by other characteristics than that expressed by their name; for in them we find that the one half of the thumb is engaged in the alar membrane, and the mammæ are placed higher up than the insertion of the arms; while in the *Tailless Roussettes*, the whole of the thumb is free, and the mammæ are placed underneath the insertion of the humerus. All the species comprehended in this section are likewise small, or of medium size. M. Isidore Geoffroy informs us that he has examined the crania of the majority of them, and found some interesting characters which seem to be common to them all. In the species without a tail, the cerebral cavity is separated from the face by a considerable contraction, corresponding in situation to the posterior part of the orbit, whilst in those which have this appendage, there is no appearance of the contraction, as M. Geoffroy had previously remarked in the *Pteropus marginatus*. In these last, moreover, the cranium is somewhat more developed, and the muzzle is not so slender. The dental system presents no particular character. The small false molar is usually found in the upper jaw, but very insignificant and almost useless, whilst it is often quite wanting in other species. These distinctions are more conspicuous in the smaller species than in the larger.

22. PTEROPUS STRAMINEUS.—STRAW-COLOURED ROUSSETTE.

Syn. LA ROUSSETTE PAILLÉE.—PTEROPUS STRAMINEUS.—Geoff. Ann. Mus. XV. 95.—Temm. Mon. Mam. I. 195, II. 84.—Isid. Geoff. in Dict. Class. d'Hist. Nat. (art. Roussette.)

Icon. Temm. Mon. Mam. pl. 15, fig. 12 and 13, (teeth and cranium.)

SPECIFIC CHARACTERS.

THE HAIR dull yellow above, greyish beneath; a demi-collar of golden-red hairs on the sides and front of the neck in the males only.

THE TAIL very short.

INHABITS Sennaar and Senegal.

For a long time this Bat was thought to be an inhabitant of the island of Timor, and it is still generally described as derived from that locality. There would appear, however, to be a mistake in this; and its residence is now ascertained to be Africa, in the neighbourhood of Sennaar and Senegal.

Though the total length is about eight inches, that of the tail does not extend beyond two lines. In the *adult male* the fur is smooth, very short, and thin. The region of the sides and front of the neck is adorned with a demi-collar of golden-red hairs, which are diverging and unctuous, and confined to the males. In the female these parts are of a dull yellow colour, more or less clouded with light brown. The rest of the fur is the same in both sexes. Above it is yellowish, or of a dull white, the points of the hairs being brown or ash-coloured; yellow prevails about the ears; the middle part of the chest and of the belly is grey, clouded with brown; the remainder of the inferior parts, and the under parts of the legs and wings, are of a dull pale yellow.

23. PTEROPUS ÆGYPTIACUS.—EGYPTIAN ROUSSETTE.

Syn. PTEROPUS ÆGYPTIACUS.—Geoff. Ann. Mus. XV. 95.
ROUSSETTE GEOFFROY.—PTEROPUS GEOFFROYI.—Temm. Mon. Mam. I. 197.—Isid. Geoff. in Dict. Class.

Icon. Geoff.[1] Descr. d'Egypt. I. pl. 3, fig. 2.

SPECIFIC CHARACTERS.

THE HAIR short and woolly, dull grey, deeper above. THE MEMBRANES brownish-grey. THE INTERFEMORAL broad. THE TAIL very short, one half surrounded by the membrane.

INHABITS Northern Africa and Senegal.

M. Temminck, as appears in the synonyma, has proposed a name for this species, different from that originally bestowed by M. Geoffroy, its first describer, at the same time paying him a well-merited compliment. The motive which influenced him was, that this Roussette was not confined to Egypt, but extended widely throughout Africa. Now, though this consideration, had it been known at the time, might have induced M. Geoffroy to avoid the appellation, yet, having been once fairly affixed, it should be preserved. The reasons for this are numerous and urgent, and quite sufficient, we apprehend, to vindicate us for not following even the high au-

[1] GEOFF. DESCR. D'EGYPT.—Description de l'Egypte, ou Recueil des Observations et des Recherches faites pendant l'expédition de l'armee Française.—Paris, 1809, et seq.

thority of M. Temminck. M. Geoffroy informs us that he himself detached many individuals of the species from the ceiling of one of the chambers of the Great Pyramid, and hence he could have no doubt of one of its habitats. Subsequent investigation, however, has shown that it is found at Senegal, and is now supposed to be common to the whole of Northern Africa.

The muzzle of this Roussette is short, and the eyes equidistant between the nostrils and ears. The interfemoral membrane is broad, surrounding the coccyx, and enveloping half of the very short tail, the upper portion of which member is covered both above and below with long and frizzly hair. The incisors are small, narrow, and symmetrically arranged; the inferior are detached, and, like the upper, placed in pairs; the false molars are very small. The fur is short, woolly, and close, except in the front of the neck, where the hairs are long and fewer. A dull grey forms the prevailing hue, which is deeper above than below; the membranes are brownish-grey. The thumb is proportionally not so long as in the other species.

24. PTEROPUS LESCHENAULTII.—SPOTTED ROUSSETTE.

Syn. La Roussette Leschenault.—Isid. Geoff. in Dict. Class. d'Hist. Nat. XIV. 702.—Temm. Mon. Mam. II. 86.—Desm. Mam. sp. 142.

Icon.

SPECIFIC CHARACTERS.

The Hair greyish-brown above, light fawn beneath; the neck with a fawn-coloured collar. The Alar Membrane spotted with white in parallel lines.

The Tail very short, nearly free from the interfemoral membrane.

Inhabits the East Indies.

Specimens of this species have for a considerable time existed in the Paris Museum, and, more lately, three have been introduced into the collection at Brussels. It was originally discovered by the Naturalist whose name it bears, in the neighbourhood of Pondicherry, and M. Roux found specimens at Calcutta. The tail is almost entirely free from the interfemoral membrane, and about six lines long. The Spotted Roussette is of a light fawn colour on the abdomen, and greyish-brown on the back; the back of the neck has a fawn-coloured collar upon it, and the head is dark brown. The ears are short and round. The superior and anterior portion of the membrane is marked with a number of whitish spots, ranged in parallel lines, more distinct in the young than in the aged. It is by mistake that M. Desmarest and Hamilton Smith have placed this species among the Tailless Bats.

25. PTEROPUS AMPLEXICAUDATUS.—LONG-TAILED ROUSSETTE.

Syn. La Roussette amplexicaude, (P. amplexicaudatus.)—Geoff. Ann. Mus. XV. 96.—Temm. Mon. Mam. I. 200.

Icon. Ann. Mus. XV. pl. 4, copied in Temm. Mon. Mam. I. pl. 13,—II. pl. 36, fig. 18 and 19, (cranium and teeth.)

SPECIFIC CHARACTERS.

The Hair russet brown above, red brownish-grey beneath.

The Tail as long as the femur, partly surrounded by the interfemoral membrane.

Inhabits Timor, Amboyna, Sumatra, and the adjacent parts of Asia.

This species is about the size of the Common Bat of Europe, (*Vespertilio murinus;*) its eyes are equidistant between the eye and the nostril; the alar membranes approximate on the medium line of the back; the interfemoral is quite naked, and involves the upper part of the tail, which equals in length a line drawn from the anterior margin of the eye to the point of the nose. The incisors are small and symmetrically arranged; the muzzle rather long. The fur is fine, smooth, and very short, though close; it covers the extremities very imperfectly, and is quite wanting on the membranes of the side. The back, too, is but partially covered. Russet brown is the marking of the head and upper parts of the body, whilst a red brownish-grey, somewhat tinged with the colour of wine lees, is the tint of the under: in the male the red predominates, in the female the brown. All the members are of russet brown, and the fingers of yellow-brown, which is also the colour of the naked tail. In the young the body is very sparingly covered with soft, fine, and sleek hairs.

The discovery of this species is due to Messrs Lesson and Lesueur, during their voyage to Southern Australia. Messrs Diard and Duvaucel also mention, it has been captured in the neighbourhood of Bencoolen, and Temminck has examined specimens sent from Siam.

26. PTEROPUS HOTTENTOTTUS.—HOTTENTOT ROUSSETTE.

Syn. Roussette Hottentot, (P. Hottentottus.)—Temm. Mon. Mam. II. 87.—Smuts[1] Mam. Cap. p. 3.

Icon. Temm. Mon. Mam. II. pl. 36, fig. 16 and 17, (cranium and teeth.)

SPECIFIC CHARACTERS.

The Hair light grey and brown above; dull brown beneath. The Membranes covered with hair beneath only.

The Tail short, free at the base.

Inhabits Southern Africa.

The size of the Hottentot Roussette is somewhat larger than that of the Amplexicaudatus; the alar membranes are similar in their connection and form, but better furnished with hair on their inner side; the same remark applies to the interfemoral membrane, which has the appearance of the letter V reversed. The tail commences at this point; it is quite free, but does not extend beyond the margin of the membrane; its length only equals one half of the distance from the anterior margin of the eye to the point of the nose, or the half only of that of the Amplexicaudatus. The incisors are very small, symmetrically arranged, and contiguous; there is a space between the molars. The ears are short and rounded; the muzzle long and compressed. The very short fur is fine, smooth, and close; possessing two colours above, and only one underneath; above, the hairs are light grey at their base, and brown at the point, inclined to a russet shade in the male, and to dull brown in the female; all the inferior parts, in both sexes, are mouse-coloured.

This species, therefore, presents the following distinguishing characters; the shape of the interfemoral membrane at the coccyx, the shortness of the tail, which is free in the groove, and the length of the muzzle; these, together with its greater size, readily distinguish it from the Amplexicaudatus, with which it might most easily be confounded. The Hottentot Roussette has no indication of a siphon or of odoriferous glands. It is found in the neighbourhood of Cape Town, and also in the interior.

27. PTEROPUS LEACHII.—LEACH'S ROUSSETTE.

Syn. Pteropus Leachii.—Dr Smith, in Zool. Jour. IV. 443.—Temm. Mon. Mam. II. 88.—Smuts Mam. Cap. p. 5.

Icon.

SPECIFIC CHARACTERS.

The Hair brownish-grey above; dull grey beneath. The Membranes blackish.

The Tail short and free.

Inhabits Southern Africa.

Leach's Roussette received its name and first description from the well known Naturalist, Dr A. Smith. It has the same locality with the last named, and Dr S. informs us that it is found abundantly in the gardens about Cape Town, during the fruit season, and often proves very destructive to vineyards in the night. The colour above is a sort of brownish-grey, beneath a dull pale smoke grey. The incisors are short, strong, regular, and rounded at the tips; the head long; ears of moderate length, and rounded at the apices; the membranes are blackish, the interfemoral one only edging the inner side of each hinder extremity; the tail is free.

28. PTEROPUS MARGINATUS.—BORDERED ROUSSETTE.

Syn. La Roussette à oreilles bordées, (P. marginatus.)—Geoff. Ann. Mus. XV. 97.—Temm. Mon. Mam. I. 202.

Icon. Ann. Mus. XV. pl. 5, copied in Temm. Mon. Mam. I. pl. 14.

SPECIFIC CHARACTERS.

The Hair olive brown; a white border round the ears.

The Tail very short, almost free.

Inhabits Bengal.

The incisors of this species are very slender, and symmetrically arranged, though almost crowded between the canines; the eyes are equidistant between the nostrils and ears; these appendages are of medium size, and bordered with a very distinct margin; the tail is exceedingly short, and connected at its root with the interfemoral membrane; the upper part of the humerus and alar membrane are well clad. The fur generally is spare, short, of an olive brown colour; the chanfrin is somewhat full.

A single individual of this species was sent to Paris from Bengal by the late M. Macé, and from this M. Geoffroy's original description (which has served for all the subsequent ones) was taken; a re-examination is desirable, though its specific characters are sufficiently distinct.

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[1] Smuts Mam. Cap.—Dissertatio Zoologica, Enumerationem Mammalium Capensium continens. Auctore Johanne Smuts. Leidæ, 1832.

To this place we are inclined to refer certain Bats from Western Africa, described by Messrs Bennett and Gray under the name of Epomophorus.

29. PTEROPUS WHITII.—WHITE'S ROUSSETTE.

Syn. Epomophorus Whitii.—Gray, in Mag. Zool. and Bot. II. 504.
Pteropus Whitei.—Benn. in Trans. Zool. Soc.
Icon. Pteropus Whitei.—Benn. in Trans. Zool. Soc. II. pl. 6.

SPECIFIC CHARACTERS.

The Hair pale brown above, whitish beneath.

An Odoriferous Gland on each side of the neck, covered by bunches of white hair—in the male only?

Inhabits Western Africa.

At the first glance of White's Roussette, the attention is arrested by a singular projecting patch of long white hairs placed on each side of the neck in front of the shoulders, and looking almost like a mass of white feathers. As we have no where seen this singular ornament of a considerable number of Bats, so minutely described as by the late Mr Bennett, we shall here transcribe his words. "The oval patch on either side of the neck, occupied by the white and peculiar tufts, measures about an inch in its longest diameter, which is from before backwards. The skin in this part has no other covering than that which is peculiar to the spot itself. This consists of straight, soft hairs, which diverge in all directions as from a common centre. Those that are situated towards the middle of the patch are longer than the others, and are partly directed forwards and partly backwards, having generally a dorsal inclination: their length is twice as great as that of the longer hairs of the body. The mode of their insertion into the skin is unlike that of the ordinary fur: in the latter, the hairs are implanted either singly, or a few only near each other, so that the covering of these becomes nearly uniform; in the patches on the sides of the neck, the hairs are gathered together into bundles, and are inserted in fascicles into the skin, leaving between the several minor tufts interspaces altogether naked. Each of the separate fascicles contains probably from fifty to sixty hairs: and the approximation of these at their base, and their divergence towards their tips, might almost be regarded as bearing a distant analogical resemblance to the quill and dilatation of the feather of a Bird." Considerable obscurity still hangs over the precise use of this apparatus. M. Temminck is of opinion, as already stated, that the diverging hairs cover a glandular structure which secretes an odorous substance, "which may probably afford indication to these animals in the season of their amours;" and Mr Bennett suggests, that the secretion poured forth may serve to sheath and protect a projecting part of the animal from the friction to which it must be subjected during its passage through the air.

The incisors are small and regular; the canines of intermediate size: the first false molar in the lower jaw is small, and of the normal form, but the second in this jaw, and the first in the upper, are of the same forms as the canines, and very little inferior to them in size, so that when the mouth is opened there appear to be four canines in each jaw; next follows in either jaw a tooth with a large lobe upon the outer edge, and a small one within, which is of the intermediate form between the true and false molars; after which come two normal molars in the lower and one in the upper jaw. The molars are separated from each other by a vacant space.

The fur of the body is closely set and soft, and consists of slightly wavy hairs of moderate length. It extends along the anterior extremities nearly as far as the wrist, densely covering the limbs; and is equally furnished on the hinder limbs as far as the ankle. The interfemoral membrane is entirely invested with fur. On the alar membrane there are a few hairs in small distant tufts. The colour is dark brown above, somewhat lighter beneath.

The only ascertained habitat of this species is Western Africa.

30. PTEROPUS MACROCEPHALUS.—GREAT-HEADED ROUSSETTE.

Syn. Epomophorus macrocephalus.—Gray, in Mag. Zool. and Bot. II. 504.
Pteropus macrocephalus.—Ogilby, in Proc. Zool. Soc. III. 100.
P. megacephalus.—Swainson, in Lard. Cab. Cyc. LXXII. 92, 356.

SPECIFIC CHARACTERS.

The Hair pale dull fawn above, paler beneath; fascicled and diverging on the sides of the neck.

Inhabits Western Africa.

This Roussette has been procured in the same locality as the former, and possesses, it would appear, precisely the same dentition. These circumstances would apparently indicate the necessity of distinguishing them as a separate group; but we agree with Mr Bennett in thinking, "that the dentary character of the Bats seems to vary so irregularly, that it would be hazardous to rely on them alone for generic distinctions."

The Great-headed, like White's Roussette, has tufts upon the neck, but so little conspicuous that they would be overlooked if the attention were not specially directed to the ascertaining their existence. The hairs of the sides of the neck, of a pale dull fawn colour, are generally slightly larger than the adjoining ones, and pass insensibly into those of the under surface, which resemble them in all respects except in being paler. On separating the fur so as to allow an inspection of its mode of insertion, a part will be found in which the hairs are implanted in bundles, and have a tendency to diverge as from a common centre. The coat above is generally of a deep fawn colour; beneath paler; and there is a conspicuous white spot on the bore of the ear.

DOUBTFUL SPECIES.

1. P. Gambianus, (Ogilby, in Proceed. Zool. Soc. III. 100,) from Western Africa, is said to have the head moderately long, and a tuft of white hairs at the front base of the wing.

Mr Ogilby describes the dental system of this species as precisely similar to that of Nos. 29 and 30; and it is upon this circumstance that Mr Gray forms these three species into his genus Epomophorus. We fear, however, that this is a hasty classification; and agree with Mr Bennett, that it is "more advisable to abstain from regarding this genus as constituted."

IMAGINARY SPECIES.

1. Pteropus Javanicus (Horsf. Zool. Jav.) does not differ specifically from P. edulis.

2. P. palliatus (Geoff. Ann. Mus. XV. and Desm. Mam.) is the young of Cephalotes Peronii.

3. P. medius is identical with P. Edwardsii.

Note.—Pteropus minimus (Geoff. Ann. Mus.) is now transferred to the Genus Macroglossus; Pterupus melanocephalus and P. titthæcheilus belong to the modern Genus Pachysoma.

M. Isidore Geoffroy-St-Hilaire has given a monograph of this family in the Dict. Class. d'Hist. Nat., art. Roussette. He has formed the genus Pachysoma with the Pteropus titthæcheilus of Temminck, and some allied species, on account of their having four molars less, while the zygomatic arches are more prominent than in the others. Of the Pteropus minimus or rostratus, he has composed the genus Macroglossus; its muzzle is longer and more slender; some vacant intervals appear between the molars, and its tongue is believed to be extensible. Finally, he has separated the Cephalotes of Pallas from that of Peron, to the latter of which he has assigned the term Hypoderma, on account of the insertion of its membranes and wings being wholly dorsal.

GENUS II. PACHYSOMA.—STOUT-BODIED ROUSSETTES.

Syn. Pachysoma.—Isid. Geoff. in Dict. Class. XIV. 703.—Temm. Mon. Mam. II. 91.
Pteropus, (in part.)—Temm. Mon. Mam. I. 198.

GENERIC CHARACTERS.

The Head spheroidal, large. The Muzzle large. The Zygomatic Arches prominent.

The Thumb inserted for one half of its length in the membrane.

The Mammæ placed before the arm-pit.

The Dental Formula $^{2}\left|\begin{matrix}2+C+(F+3)\ M\\ 2+C+(F+4)\ M\end{matrix}\right.=\frac{14}{16}=30$

This genus, instituted by M. Isid. Geoffroy, comprehends several species of a small size, which have hitherto been classed with the previous one, (Pteropus,) and from which they are distinguished by the following peculiarities: Their form is generally heavy and stout,—whence their name; their head is large and short, principally in front, necessarily leading to corresponding modifications in the dental system. In the Pachysoma, accordingly, we find but 30 teeth, instead of 34, there being a molar less on each side of each jaw, and that the last, and not the second one, as might be supposed. The form of the cranium is also remarkable; the muzzle is large, and the cerebral cavity very voluminous and spheroidal; whilst between them there is a marked compression, though not equal to that found in the great Roussettes. The space between the cranium and the zygomatic arch is, however, much larger than in the ordinary Roussettes; and the muscles which go to the lower jaw are correspondingly large. Lastly, the mammæ are placed anterior to the insertion of the humerus.

Their habits, moreover, are nocturnal, and they never issue from their

retreat except at the twilight, or after dark. Holes and crevices of trees are their habitual residences; their flight is rapid but irregular; their cry strong, and very piercing; and their bite painful. A penetrating and peculiar odour extends widely around them.

1. PACHYSOMA TITTHÆCHEILUM.—WART-LIPPED STOUT-BODIED ROUSSETTE.

Syn. Pteropus titthæcheilus, (Roussette Mammilèvre.)—Temm. Mon. Mam. I. 198.
Pachysome mammilèvre.—Isid. Geoff. in Dict. Class. d'Hist. Nat. (art. Roussette.)
Icon. Temm. Mon. Mam. II. pl. 35, fig. 8, (head.)—I. pl. 15, fig. 17 to 24, (crania and teeth.)

SPECIFIC CHARACTERS.

The Hair russet-brown above, grey beneath; on the neck, nape, and sides of the chest, bright rose colour, in the males only.

The Upper Lip with two large warts separated by a furrow.

The Tail short, enveloped, the point free.

The Interfemoral Membrane deeply sloped, naked beneath only.

Inhabits Java, Sumatra, Cochin-China, and probably India.

This Stout-bodied Roussette is about the size of the *Pteropus Ægyptiacus*, (No. 23,) or a trifle larger. A small portion of the front of the neck is naked; the muzzle is short, the eye nearer the nostrils than the ear; this appendage is small, keel-shaped towards the point of the posterior margin, marked with transverse ridges towards its base, and fringed with a white border. The nostrils are widely separated, somewhat tubular; on the upper-lip there are two large warts, separated by a furrow, and the lining membrane of both are dotted with small papillæ. The tail is short, nearly wholly enveloped in the interfemoral membrane, its slender termination being alone free. The interfemoral membrane, deeply sloped, is clad above; whilst its other surface, together with the four extremities, are naked. The incisors are slender and contiguous, the lower ones somewhat crowded; there is a small anormal molar in both jaws; the canines have a strong internal heel. The fur is fine, sleek, and very short, with the exception of that on the sides of the neck, and longer in the male than the female. The former has a tuft of diverging hair proceeding from a common centre, on each side of the neck, placed over odoriferous glands.

In the *male*, the front of the neck, the tufts, the nape, and the sides of the chest, are of a beautiful rosy tint, more or less lively, and verging to orange in the old; the superior parts of the body are russet-brown, the abdomen grey. The *female*, which is always larger than the male, has the superior parts of a greyish-brown, inclining to olive; the under are olive-grey; the front of the neck and upper part of the chest are naked, and the fringe round the ear is less distinct than in the male. The *young* of a year old are throughout of a very light brownish-grey, and the tufts are whitish. The secretion from this glandular apparatus has a strong odour, which is more offensive at particular seasons of the year.

2. PACHYSOMA MELANOCEPHALUM.—BLACK-HEADED STOUT-BODIED ROUSSETTE.

Syn. Pteropus melanocephalus, (Roussette mélanocéphale.)—Temm. Mon. Mam. I. 190.
Pachysome mélanocephale.—Isid. Geoff. in Dict. Class. d'Hist. Nat. (art. Roussette.)—Bélang. Voy. p. 97.
Icon. Temm. Mon. Mam. I. pl. 12.—II. pl. 36, fig. 10, (head.)

SPECIFIC CHARACTERS.

The Hair yellowish-white, tipped with grey above; dull pale yellow beneath; the head black.

The Tail wanting. The Interfemoral Membrane rudimentary, and nearly concealed.

Inhabits Java.

We owe the discovery of this very small species, scarcely three inches long, to M. Von Hasselt, who first became acquainted with it during a journey in the least frequented parts of the Island of Java; the district was mountainous, but he found a small family of them suspended upon a tree. It is quite destitute of a caudal appendage; its ears are small, short, and round; the interfemoral membrane rudimentary, and nearly hid by the hair. The muzzle is very short; the incisors contiguous and symmetrically arranged, the anormal tooth in both jaws is well marked. The fur is long and abundant, except on the front of the neck; even the fore-arms and the legs are well clad. The hair upon the back is yellowish-white, tipt with dark grey; the nape, crown, and muzzle, are black; there is a tuft on each side of the neck; all the under parts of the body are of a dull pale yellow; the skin itself is of a deep brown colour.

3. PACHYSOMA BREVICAUDATUM.—SHORT-TAILED STOUT-BODIED ROUSSETTE.

Syn. Pachysome à courte queue, (P. brevicaudatum.)—Temm. Mon. Mam. II. 92.—Isid. Geoff. in Dict. Class. d'Hist. Nat. (art. Roussette.)
Icon. Temm. Mon. Mam. II. pl. 35, fig. 9, (head.)

SPECIFIC CHARACTERS.

The Hair reddish-olive above; grey beneath; the neck bright red; the head ash-grey.

The Tail very short.

Inhabits Sumatra and the Continent of India.

This species might readily be confounded with our No. 1, (*P. titthæcheilum*,) as far as regards its markings and the tufts on the neck; but it is at once distinguished by the extreme shortness of the tail, which does not extend beyond the interfemoral membrane more than half a line. The head is small, the muzzle very short and obtuse, the margin of the ear is fringed as in No. 1. The incisors are small, and symmetrically arranged; the canines are large and obtuse. The fur on the sides of the neck is long and strong, hiding the secreting apparatus; the under parts are furnished with silky hairs; in the adult, frequently the chin and front of the neck are almost naked. In the adult *male* the head is an ash-grey; the sides of the neck bright red, the chest and abdomen grey, the flanks russet, the superior parts of an olive tint, more or less verging to red. In the *female* there are the following differences; the long hair of the neck is reddish-grey, and the under parts are ash-coloured, whilst olive-brown prevails above. This species was first particularly described by M. Isidore Geoffroy, and was captured by Messrs Diard and Duvaucel in the Island of Sumatra. It has also been procured from India.

4. PACHYSOMA ECAUDATUM.—BLUNT-NOSED STOUT-BODIED ROUSSETTE.

Syn. Pachysome écaudé, (P. ecaudatum.)—Temm. Mon. Mam. II. 94.
Icon.

SPECIFIC CHARACTERS.

The Hair dark brown above, ash-grey beneath.

The Muzzle obtuse. Nostrils projecting. The Tail wanting.

Inhabits Sumatra.

The name applied by M. Temminck to this newly introduced species will not be regarded fortunate, when it is considered that the *Melanocephalum*, which has long been known, is likewise destitute of the tail. This species is, however, remarkable for the shortness of its alar membranes, the great obtuseness of its muzzle, its projecting nostrils, and for having no fringe on the margin of the ear. Only one individual has been examined, and this an old female. Its fur was very short, of a pale grey colour at the nape and the sides of the neck, and sooty-brown on the head, and over the rest of the superior parts; the ears are black, and without margins. The under parts of the body were of an ash-grey colour. The membranes are brown, and so are the fingers which support them.

This specimen came from Sumatra.

5. PACHYSOMA DIARDII.—DIARD'S STOUT-BODIED ROUSSETTE.

Syn. Pachysome de Diard, (Pachysoma Diardii.)—Isid. Geoff. in Dict. Class. d'Hist. Nat., art. Roussette.
Icon.

SPECIFIC CHARACTERS.

The Hair brown above; whitish or yellowish beneath; the fore part of the neck naked.

The Face very obtuse. The Tail long; free for two-thirds of its length.

Inhabits Sumatra.

This species was discovered by Messrs Diard and Duvaucel in Sumatra, and first described by M. Geoffroy. Its fur is very short; brown on the head, back, and arms, grey round the neck, and on the middle of the abdomen, and greyish-brown on the flanks. Its tail is rather long, and extends seven or eight lines beyond the interfemoral membrane. Its face is very obtuse, and there is a naked spot on the front of the neck.

DOUBTFUL SPECIES.

1. Pachysoma Duvaucelii, (Isid. Geoff. in Dict. Class. d'Hist. Nat., art. Roussette.) This species has very slender claims to be considered as real; and Temminck, from actual examination, thought it belonged to *P. titthæcheilum*, our No. 1.

GENUS III. MACROGLOSSUS.—GREAT-TONGUED ROUSSETTES.

Syn. Pteropus, (in part.)—Temm. Mon. I. 191.—Macroglosse.—F. Cuv. in Dents des Mamm. p. 40.—Macroglossus.—Isid. Geoff. in Dict. Class. XIV. 705.—Macroglossa.—Less. Mam. p. 115.—Gray, in Mag. Zool. et Bot. p. 504.

GENERIC CHARACTERS.

The Head elongated. The Muzzle slender, almost cylindrical.

The Tongue long, slender, and exsertile.

The Alar Membranes arising from the sides of the back.

The Dental Formula $^{2}\left|\begin{matrix}2+C+(F+4)\ M\\ 2+C+(F+5\ M\end{matrix}\right.=\frac{16}{18}=34$

Inhabits the East Indian Archipelago.

The Genus Macroglossus constitutes the third of the Frugivorous Chiroptera. The generic distinction consists not solely in the prolongation of the muzzle, or maxillary bones, but also in the peculiar form of the intermaxillary, which is not in them, as in most animals, a part of a circle more or less prominent, and projecting no farther than the canines, as in the Pachysoma and the Harpies, but in this genus forms an obtuse cone, for the support of the muzzle, contributing to its prolonged form. This prolongation varies not so much among individuals of different ages, as according to the localities in which the animals have lived. Thus, those from Sumatra have an exceedingly long snout; and those from Java have a somewhat shorter one than those from Timor; that of the Amboyna animals is remarkably short, compared with those from Sumatra; whilst, in specimens from Celebes, the muzzle is much more slender, and a little longer than those from Amboyna. The local difference is great, but seems to depend solely upon the different lengths of the muzzle.

I. MACROGLOSSUS MINIMUS.—KIODOTE OR GREAT-TONGUED ROUSSETTE.

Syn. Pteropus minimus, (La Roussette Kiodote.)—Geoff. Ann. Mus. XV. 97.—Temm. Mon. Mam. I. 191.—Desm. Mam. Suppl.

Macroglossus minimus.—F. Cuv. in Dents Mam.—Isid. Geoff. in Dict. Class.

Macroglossa kiodotes et M. Horsfieldii.—Less. Mam. 115.

Icon. Kiodote.—F. Cuv. et Geoff. Hist. Mam.

Pteropus rostratus.—Horsf. Jav.

Temm. Mon. Mam. I. pl. 15, fig. 25 to 30, (crania and teeth,) pl. 16, fig. 1, 2, (skeleton.)

SPECIFIC CHARACTERS.

The Hair light red, tinted with yellow above; light russet beneath.

The Interfemoral Membrane very narrow, covered with hair above.

The Tail rudimentary.

Inhabits the East Indian Archipelago.

This long-muzzled Bat was first discovered by M. Leschenault, in Java, who called it Kiodote, supposing this to be the name applied to it by the natives. From M. Leschenault's notes, M. Geoffroy published a description in the year 1810, and Dr Horsfield gave another from the examination of several specimens, in his Zoological Researches, in 1824. He seems to have regarded it an undescribed species; and states that by the Javanese it is called *Lowo-Assu*, literally *Dog-Bat*. It was M. F. Cuvier who proposed to arrange it in a distinct genus, and for the following reasons, which appear perfectly satisfactory.

It may be distinguished at first glance, not only from the Roussettes, but from every other kind of Bats, by its very prolonged and slender muzzle, which is also cylindrical and pointed, somewhat like that of the Ant-eaters. The tongue also is cylindrical, long, and extensible, conforming to the shape of the snout. Finally, the teeth exhibit equally remarkable characters; for, notwithstanding the elongation of the muzzle, their number is not augmented, and, what is remarkable, they are likewise of smaller dimensions. The whole of the jaw, moreover, is not supplied with teeth, especially the lower one, where a wide interval exists between the incisors of the right and left sides; another is found behind the first and second molar, and a third behind the last molar.

To these more specific characters we have still to add, that the interfemoral membrane is very narrow, extending, however, from the feet to the coccyx, where it encounters the slender rudiments of a tail. The lower jaw is placed at an acute angle, and projects beyond the upper one: it is more slender than in any other species. The fur is short, close, and somewhat woolly. All the upper parts of the body are of a light red, somewhat tinted with yellow towards the root of the hairs. The under parts are of a light russet hue. The interfemoral membrane is clad above, and the hairs extend beyond the membrane; the whole cutaneous system is of reddish hue.

Dr Horsfield supplies the following information concerning the habits of the *Lowo-Assu*: "It is far less abundant than the *Kalong*—(The Edible Roussette, No. I.;) but it still exists in sufficient numbers to commit serious injury among the plantations and fruit trees. Like other species of Pteropus, it feeds on fruits of every description, but particularly infests the various species of Eugenia or Jambu, which are cultivated in gardens. During the day it remains suspended under branches of trees, or retires under roofs of old houses and sheds. At night it sallies forth, like the species Pteropus."

It inhabits Java, Timor, and the surrounding islands. Its existence on the Continent of India has not yet been proved.

GENUS IV. HARPYIA.—TUBE-NOSED ROUSSETTES.

Syn. Cephalotes, (in part.)—Geoff. Ann. Mus. XV. 104.

Vespertilio, (in part.)—Linn. Gmel. I.

Harpyia.—Illig. Prodr. p. 118.—Temm. Mon. Mam. II. 98.

GENERIC CHARACTERS.

The Head large and broad. The Muzzle thick and very short. The Nose prolonged into two diverging tubes, round, cleft externally, and terminated with a projecting margin.

The Alar Membrane arising from the sides of the back.

The Thumb partly covered by the membranes. The Index with a third phalanx and claw.

The Dental Formula—

In the Old, $^{2}\left|\begin{matrix}1+C+(F+3)\ M\\ \ldots\ C+(F+4)\ M\end{matrix}\right.=\frac{12}{12}=24$

In the Middle Age, $^{2}\left|\begin{matrix}1+C+(F+3)\ M\\ 1+C+(F+4)\ M\end{matrix}\right.=\frac{12}{14}=26$

Not well known in the Young.

Inhabits Amboyna.

This genus is founded upon a single species, the *Vespertilio Cephalotes* of Pallas, well described and delineated in all its details by the eminent German Naturalist. Illiger, in his Prodromus, first constituted it into the genus Harpyia. M. Geoffroy associated it with another of the Chiroptera, described by Péron, classifying them under the genus *Cephalotes*. M. Isidore Geoffroy, in his monograph of the Frugivorous Bats, in 1828, so often quoted above, demonstrated the necessity of separating the so-named Cephalotes of Pallas from that of Péron, herein agreeing with Illiger in an arrangement which is now very generally adopted. M. Isidore Geoffroy applies the generic term Cephalotes to Pallas' species, and proposes the name Hypoderma for that of Péron. We agree with Temminck in thinking this innovation unnecessary, and therefore follow Illiger as to Pallas' species, and apply the term Cephalotes to another group.

The osseous cerebral covering of the Harpy Roussette is spheroidal and very large; the zygomatic arches are strong and much detached; the lower jaw is long, much rounded, very slender, and terminated by canines curved forward, completely inclosing the small upper incisors of the intermaxillary bone. The fore-finger of this Bat has a claw upon it, exhibiting in this particular a striking difference to the genus Cephalotes, which, although it has the terminal phalanx, is destitute of the nail. It has also thirteen pair of ribs, and not fourteen, as in this last named genus. The tail is partly concealed in the interfemoral membrane, as in the succeeding genus; but not to the same extent as in the preceding. The alar membrane rises from the sides, and covers the whole of the metatarsal bones, extending to the middle finger, into which it is fixed, covering the two internal ones. The incisors, as they have been called, in the lower jaw, have given rise to controversial remarks. In adopting the common nomenclature, we follow the example of most Naturalists; although M. Geoffroy contends they are true canines, as Pallas had pointed out before. It is quite true, that these teeth in this animal have the same direction and form; and M. Isidore Geoffroy has, moreover, remarked, that were we to extract the so designated incisor of the Harpyia, and the canine of the Pachysoma, the most experienced eye could not determine any difference between them.

I. HARPYIA PALLASII.—PALLAS' TUBE-NOSED ROUSSETTE.

Syn. Vespertilio cephalotes.—Linn. Gmel. I. p. 50.

Cephalotes Pallasii.—Geoff. Ann. Mus. XV. 107.—Desm. Mam.

Harpyia Pallasii.—Temm. Mon. Mam. II. 101.

Molucca Bat.—Penn. Quadr. II. No. 503.—Shaw, Gen. Zool. I. 134.

Icon. Vespertilio cephalotes.—Pall. Spicil. Zool. III. pl. 1, (skelet. &c.,) pl. 2.—Copied in Schreb. Saügth. pl. 61.

Harpyie de Pallas.—Temm. Mon. Mam. II. pl. 40, fig. 1 and 2,—(cranium and teeth,) fig. 3, 4, and 5.

Cephalote.—Buff. Hist. Nat. Suppl. III. pl. 25.

SPECIFIC CHARACTERS.

The Hair clear ash-brown above, whitish beneath; on the tubes of the nose, ears, and tail, bright yellowish-brown.

The Membranes yellowish-red, marked with irregular whitish spots. The Interfemoral cleft in the middle, partly covering the tail. The Tail short.

Inhabits Amboyna.

Pallas' Tube-nosed Roussette possesses the same dimensions with the Common Bat of Europe, *Vespertilio murinus*. Its head is nearly oval; its muzzle short and broad; its nostrils prolonged into two diverging tubes, which are round, cleft in the outer side, and terminated by a projecting border. The upper lip also is cleft, and supplied with a double row of small whiskers; there is also a short tuft of hairs above the eyes. The ears are wide apart, naked, round, and short; there is a hooked nail upon the fore-finger, as well as upon the thumb, of which the half is enveloped in the alar membrane; the tail is covered above, and half concealed by the interfemoral membrane, which is broad, and supported by the cartilages of the tarsi, which are short. The membranes of the wings arise from the sides; they are very large, and completely cover the metatarsal bones, attaching themselves to the middle finger, differing in this particular from all the known Chiroptera. The Anatomical details perfectly agree with those of the Roussettes, and, especially as regards the cranium, with the Pachysomata

The fur is somewhat long, and frizzled above; short and smooth below; the upper part of the fore-arm, the larger half of the arm, and the flank membranes are clad. In the male the superior parts are of a clear brownish-grey, whilst a deep brown line runs from the coccyx to the nape; at this point it divaricates to the shoulders. In the female the whole of the upper part of the fur is of a greyish-brown, more or less deep, and the dorsal line does not divide as in the male. In both the sexes the cheeks, chest, and the middle of the abdomen, are of an ash-white colour; the lower part of the arms and sides ash-coloured, tinted as with wine lees. The nasal tubes, ears, and tail, are of a clear yellowish-brown; the membranes are of a yellowish-red, irregularly marked with whitish spots; the iris is bright brown.

The habits of this Roussette are wholly unknown. The elder Naturalists describe it as coming from the Moluccas; MM. Macklot and Müller sent it from Amboyna.

DOUBTFUL SPECIES.

M. Rafinesque-Smaltz, in his *Prodrome de Somiologie*, has described a remarkable species of Bat from the Island of Sicily, under the name of Cephalotes tæniotis. It has two incisors in the upper jaw, and none in the lower; the canines and molars are pointed; there is no projecting crest upon the nose, and the tail is free for one half of its length. The fur is entirely of a greyish-brown, and a wart appears between the two incisors of the upper jaw. At present it remains doubtful whether this Bat should be referred to Harpyia or Cephalotes, or even whether it may not form the type of a distinct genus.

GENUS V. CEPHALOTES.—CEPHALOTES.

Syn. Cephalotes.—Geoff. Ann. Mus. XV. 101.—Temm. Mon. Mam. II. 103.
Hypoderma.—Isid. Geoff. in Dict. Class. XIV. (art. Roussette.)

GENERIC CHARACTERS.

The Head very thick. The Muzzle short and truncated. The Nostrils slightly tubular, large. The Upper Lip cleft by a deep furrow.

The Alar Membrane enveloping the entire body in a single piece, and adhering to the spine only by a transparent membrane.

The Thumb Nail partly covered by the membrane.

The Index having the third phalanx, but without a Claw.

The Dental Formula varying according to the age.—

$$\text{In the Young } {}^{2}\left|\frac{2+C+4\,M}{2+C+(F+5)\,M}\right. = \frac{14}{18} = 32$$

$$\text{In the Adult } {}^{2}\left|\frac{1+C+4\,M}{1+C+(F+5)\,M}\right. = \frac{12}{16} = 28$$

$$\text{In the Old } {}^{2}\left|\frac{1+C+4\,M}{\ldots\,C+(F+5)\,M}\right. = \frac{12}{14} = 26$$

Inhabits the East Indian Archipelago.

In accordance with the observations of M. Geoffroy, we again separate the Cephalotes from the Roussettes, with which they agree in having the same kind of molar teeth, but the index, although having three phalanges, like the preceding, wants the claw. The alar membranes, instead of arising from the sides, unite together in the central axis of the back, to which they adhere by a vertical and longitudinal hinge. Their incisors [being variable according to age] are often only two in number.

The general form of the cranium of the Cephalotes resembles that of the Roussettes, but differs from them, as well as in Pachysoma, Harpyia, and all the other known Chiroptera, in possessing a very remarkable apparatus which takes the place of the intermaxillary bones, and which, with the Rhinolophus, to be afterwards noticed, exhibits an anomaly which is altogether peculiar. In this animal the intermaxillary bone is represented by two ossicula, detached from the maxillaries, and each supporting a small tooth; these little bones are shaped somewhat like an S, are three lines long, depressed, and united to the extremity of the nasal bones by a cartilage close to the origin of the teeth. The muscular attachments confer on these bones, and consequently upon the teeth, the power of moving backwards and forwards, whilst in the other genus alluded to, the motion is upwards and downwards; both, however, being remarkable examples of moveable incisors in the class Mammalia. Besides this anomalous peculiarity, and wanting the nail of the fore-finger, the Cephalotes is also destitute of the fibular bone, and has fourteen pair of ribs. The remarkably strong and disagreeable odour which this animal exhales is probably produced by the secretions of the two considerable glands of the cheek, the upper part of which, covered by the skin, is of a beautiful red colour.

The external forms present another peculiarity of this genus which is not less striking. The wings do not spring from the sides as in the majority of the Chiroptera, or even from a small distance from the spinal ridge, as is the case with a few species of the Roussette, but the skin extends continuously over the whole body of the animal, thus completely enveloping it as with a cloak; it is confined solely by a diaphanous integument, adhering to the skin of the trunk along the dorsal ridge, and about a line in breadth. Only half of the thumb is enveloped in the membrane, a character which, along with Pachysoma and Harpyia, distinguishes it from the Roussettes. The alar membrane takes its inferior attachment as high up as the metatarsal bones, and does not cover any of these bones, as in the Harpyia; the toes are totally free as in the Roussettes.

I. CEPHALOTES PERONII.—PERON'S CEPHALOTE.

Syn. La Cephalote de Péron.—Geoff. Ann. Mus. XV. 104.—Cuv. Reg. Anim. I. 114.
Hypoderma Peronii.—Isid. Geoff. in Dict. Class. XIV. 708.
Pteropus palliatus, (young.)—Geoff. Ann. Mus. XV. 99.
Icon. Hypoderme des molluques, (femelle.)—Quoy et Gaim. Voy. de l'Astr. pl. 11.
Temm. Mon. Mam pl. 35, fig. 7, (head.)
Cephalotes Peronii.—Geoff. Ann. Mus. XV. pl. 7.

SPECIFIC CHARACTERS.

The Hair brownish or reddish. The Tail partly engaged in the interfemoral membrane.

The Ears broad and pointed.

Inhabits Timor, Amboyna, Banda, &c.

The size of Péron's Cephalote is about that of the American Vampire, and it has no nail on the fore-finger. Its muzzle is obtuse, its ears straight and pointed. The alar member, different from any thing we have previously seen, envelopes the whole body, adhering to the spinal ridge by a transparent integument; about half of the tail is concealed by the interfemoral membrane; a few longish hairs are scattered around the mouth and eyes. In the young there are four incisors of the upper jaw, small and pointed, arranged in pairs, and fixed on either side into the rudiments of the moveable laminæ; those below are symmetrically arranged, though somewhat crowded. In the adult, the two incisors of the upper jaw remain moveable, and the two below are much approximated by the canines.

The fur of the *adult* is short, rough, and not very abundant; somewhat frizzly upon the shoulders, the hairs of the side of the neck converge to a point in the medial line of the neck; on the coccyx they are transparent. The whole of the body proper is well clad, whilst the membrane that covers the back is quite naked; the internal membranes in the upper part of the wing, and of the thighs, are covered with frizzly hairs. In the *young*, the fur is short and cottony, and the membrane which covers the back is covered with down, or semi-transparent hair; the inferior parts of the body are almost bare. A reddish colour predominates in the *young*, olivaceous grey in the *adult* and *old*; a yellowish tint pervading the male, and a greyish the female. There is but little fur on the chin, cheeks, and front of the neck, and in the old these parts are quite naked.

The whole of the membrane is diaphanous, and of a bright brown colour.

The entire length of this Bat, including the tail, (half an inch,) is about six and a half inches, and the extreme breadth two feet and a half, sometimes a trifle more. These dimensions do not depend always on age, but also on locality; those of Amboyna being larger than those of Banda, and those of Timor less than these last. This great animal retires and conceals itself during the day in caverns and among the clefts of the rocks; from which inaccessible hiding-places it usually issues only at the twilight. It flies with rapidity, is not very social with the allied genera, bites very cruelly, and occasions an abominable odour, although destitute of the unctuous apparatus possessed by some of the previously described species.

It inhabits Banda, Samao, Timor, and Amboyna, in large numbers; but has not hitherto been seen in Java.

IMAGINARY SPECIES.

1. Cephalotes Molluccensis of MM. Quoy and Gaimard (Voy. de l'Astrolabe, P. Zool. vol. I. p. 86) is distinguished only by trifling individual peculiarities.

Note.—Cephalotes Pallasii is now transferred to the Genus Harpyia.

FAMILY II. INSECTIVORA.—INSECTIVOROUS BATS.

Syn. Les Vraies Chauve—Souris.—Cuv. Reg. Anim. I. 114.

CHARACTERS OF THE FAMILY.

The Molar Teeth studded with conical points.

The Index with one or two phalanges only, always without a nail.

Inhabit the tropical or temperate parts of the whole globe.

Having fully discussed the characters of the Frugivorous Bats, we now arrive at the Proper Bats, which are all Insectivorous. Their molar teeth, three in number on either side of each jaw, and studded with conical points, are preceded by a variable number of false molars. The index finger is always deprived of the nail, and with the exception of one sub-genus, the membrane extends between the thighs.

We have already had occasion (p. 3) to notice the recent and interesting discovery of M. Isidore Geoffroy in the osteology of the Bats, namely, that they have a bone connected with the elbow-joint in all respects answering to the knee-pan. This interesting structure is most marked in the Frugivorous Bats, but continues sufficiently striking in most of the Insectivorous; the genus Vespertilio supplying the only partial exception, being in them entirely hid in the tendon of the triceps muscle. M. Temminck enumerates the following as the functions to which this peculiar apparatus is subservient. Most of the Bats, he remarks, possess the power of using their wings, or membranes, in the capacity of hands, the wing being moveable in all directions, and susceptible of prehension. The structure of the wing accordingly corresponds to these functions, as they supply hands to seize, feet to walk, and wings to fly, the *Elbow-pan*, as we may term it, being used in their crawling gait, and in affording support on the ground, in the same way as the knee-pan in the other classes of the Mammalia. M. Brehm has made the same remark, and adds that in this respect the Bats differ from Birds, which never employ their wings in seizing or retaining an object, or in supporting their body, except when flying.

In the *Insectivorous Chiroptera* the thumb is always very short, being composed of a single articulation, and of a claw with its phalanx; the fore-finger always wants the nail and the unguinal phalanx. The interfemoral membrane, with one exception, is very ample, most frequently enveloping the whole of the tail by means of strong tendons and of a tendinous prolongation from the heel. This apparatus, directed towards the abdomen, is employed in retaining the young as in a sac during flight.

From M. Temminck we learn that a fact hitherto inexplicable, has received an explanation from recent observations made upon these winged Mammiferæ. We allude to a curious circumstance noticed in the capture of these animals. In the haunts where they have been found in numbers, at one time, only males have invariably been obtained, at another only females, and, finally, at others a heap of young only, without a single adult of either sex. The habits of the animals, as lately observed, afford an explication of these isolated unions. For it would appear that the two sexes never resort to the same retreat; but immediately when their amours are ended, the females retire, always in company, and often in great flocks, into narrow chinks far from the company of the males, who in their turn associate in bands; the sexes remain thus separated till the young are in a state to fly about and take care of themselves; after which they quit the society of their mothers, and choose a new retreat, where individuals of the same age assemble, and which separate into their several sexes about the time of their love season. M. Brehm has verified a part of these observations upon several of the European species of Vespertilio; and testimonies to the same effect have been communicated by the Dutch Naturalists in the East Indies. Facts speak quite as distinctly to the point, for M. Temminck assures us that parcels of these Bats, coming from all parts of the world, when obtained in their native haunts are invariably composed of males, or females, or their young exclusively. Up to the present time, he adds, we have obtained females only of some species belonging to the Great Asiatic Archipelago, and probably from the resorts of the males not having as yet been discovered by Naturalists.

Two of the reflections of the eminent conservator of the Leyden Museum, after his review of the whole order, are so important that we must not omit them. 1st, He states that his researches lead him to conclude that in some species the function of reproduction goes on chiefly, if not solely, not when the animals appear to have attained their full maturity, but apparently at an earlier period. The sutures of the cranium in the class thus signalized indicate that they have not reached their full growth, and their length of body and span across the wings are *strikingly smaller* than in their fellows, whose strong occipital and coronal crests, and every other sign, indicate that they have attained the maximum of their developments. Some species of the genera Molossus, Pachysoma and Pteropus, have supplied the matter for this remark, which M. Temminck considers, in the present state of our knowledge, very inexplicable. 2d, His concluding observation respects the markings of the Chiroptera. In some of the species, and more especially of the Insectivorous family, he has observed that there is a perfect resemblance in the colouring of the fur of the two sexes; and when there is a difference, it is always a reddish colour more or less pure, which distinguishes the livery of the female whilst the male is marked with brown or grey. When, however, the males, and sometimes those of the other sex also, are provided with unctuous bunches at the sides of the neck, and generally with all the frugiverous family, it is the male which is adorned with red, and when there is a difference in colouring, the female wears the dull and more obscure livery. His study of the colours of the Chiroptera also lead to the conjecture that, as in Birds, they are probably subject to a double moult, and thus have one dress for summer and another for winter.

The Insectivorous Bats may be subdivided into two principal tribes. The first has the middle finger of the membrane, with three ossified phalanges, but the other fingers, as well as the index, have only two. The second tribe has only one ossified phalanx for the index, and the other fingers have two [or three.]

M. Spix subdivides the Insectivorous Bats into Istiophori, or Leaf-nosed Bats, and into Anistiophori, which have the nose simple, and wholly destitute of that singular nasal appendage. By combining his arrangement, with the preceding, we form four tribes corresponding nearly with those indicated by M. Lesson, and in our own country by Mr Gray, under the names of Noctilionina, Phyllostomina, Rhinolophina, and Vespertilionina.

TRIBE I. DIPHALANGIA ANISTIOPHORA.

Syn. Anistiophori, (in part.)—Spix, Sim. et Vespert. Bras.
Noctilionina.—Less. Mam.—Gray, in Mag. Zool. and Bot. II. 498.

CHARACTERS OF THE TRIBE.

The Index with two ossified phalanges.
The Nose simple, without a leafy appendage.

GENUS VI. DYSOPES.[1]—BULL-DOG BATS.

Syn. Molossus.—Geoff. Ann. Mus. VI. 150.—Desm. Mam. p. 113.
Dysopes.—Illig. Prodr. p. 122.—Temm. Mon. Mam. I. 205.
Dinops.—Savi, in Nuov. Giorn. di Letter. No. 21, p. 230.
Nyctinomus.—Geoff. Descr. d'Egypte, II. 28.—Desm. Mam. p. 116.—Horsf. Jav.
Cheiromeles.—Horsf. Jav.
Thyroptera?—Spix, Sim. et Vespert. Bras. p. 61.
Vespertilio, (in part.)—Linn. Gmel. I. 49.

GENERIC CHARACTERS.

The Head thick. The Muzzle broad and flat.

The Ears very large, mostly approximated, recumbent over the eyes, and arising from the commissure of the lips. The Upper Lip large and wrinkled.

The Auricular Operculum round, thick, placed in front. The Tongue smooth.

The Dental Formula varying according to the age; as under—

First Age,	$2\left\|\frac{2+C+(F+3)M}{3+C+(2F+3)M}=\frac{14}{18}=32\right.$
Very young,	$2\left\|\frac{1+C+(F+3)M}{3+C+(2F+3)M}=\frac{12}{18}=30\right.$
Young,	$2\left\|\frac{1+C+(F+3)M}{2+C+(2F+3)M}=\frac{12}{16}=28\right.$
Adult,	$2\left\|\frac{1+C+(F+3)M}{1+C+(2F+3)M}=\frac{12}{14}=26\right.$
Old,	$2\left\|\frac{1+C+(F+3)M}{C+(2F+3)M}=\frac{12}{12}=24\right.$

The Toes covered with bristles. The Thumbs of the hinder feet free, and sometimes opposable.

The Alar Membranes narrow. The Tail long, partly engaged in the Interfemoral Membrane.

Inhabit the tropical parts of the entire globe, and the warmest portions of the temperate zones.

The Bull-Dog Bats have the muzzle simple, their ears broad and short, arising from the angle of the lips, and uniting together upon the muzzle, the auricular operculum short, and not surrounded by the auricle. The tail occupies the entire length of the interfemoral membrane, and often extends beyond it. [In the adult state only two incisive teeth appear in each jaw; according to M. Temminck, in their extreme youth, their incisors are as many as six in the lower, and four in the upper jaw; these are gradually reduced with age to two in the upper jaw only.][2]

The following admirable description of the characters of this genus is supplied by M. Geoffroy. The Bats belonging to the genus Dysopes may be easily recognised by their fierce-looking physiognomy, and the peculiarity of their whole figure: their large head and broad muzzle has led to their being compared to the Bull-Dog, and to their being designated by his name. The head is remarkably full across the ears, which approximate and are festooned over the eyes, so that they are calculated quite as much to protect these organs, as to favour the power of hearing: they arise very near the commissure of the lips, and after passing behind the auditory foramen, sweep upwards and forwards to unite upon the brow. Most of the Chiroptera have the tragus placed in the auditory cavity, where it forms a kind of second external ear, and then receives the name of *auricular operculum;* but in the Dysopes there is a difference, because this second ear is situated in front and exteriorly; it is, moreover, round and thick. Lastly, the species of this genus are recognised by their tail, which is long, and generally more or less engaged in the interfemoral membrane. The tongue is smooth, and the muzzle unfurnished with hairs; the nose is destitute of membranes and cavities; the nostrils are but slightly prominent, open in front, and margined with a small hood.

To these indications M. Temminck adds the following:—In all the species of this genus the posterior members are very short, the fibula is perfect, often as large as the tibia, and the wide separation of these bones supplies large space for the strong muscles of the feet. They have all bristles on their toes, and the outer or inner one is usually freer than the others, and sometimes opposable. The thumb is short, strong, and bulky; the upper lip is ample, and wrinkled; the snout more prominent than the lips. Their most striking characteristic, however, is the apparent insufficiency of their wings, seemingly quite disproportioned to the size of their bodies, which are big and heavy. To such an extent is this narrowness of their wings, that in some species we should be led to conclude they could not serve them in a long continued flight, and must be useful only as a parachute. Forced to subsist in subterranean and deep caverns, it would appear that it was chiefly by scaling the walls of buildings and the trunks of trees, or by crawling by means of their prehensile organs, that they provided for their wants. Insects and larvæ are probably the food of these creatures; whose manners and appetites are, however, as yet but little known.

All Naturalists agree that this group of animals is very distinctly and accurately defined and circumscribed, and yet it was for a long time separated into two, or more. This circumstance was owing to the reputed differences in the number of their incisive teeth, arising from changes produced by age, and which it is now ascertained occur alike in them all. The *Molossus* was said to be characterized by two incisors above and two below, and the other section, the *Nyctinomus*, by two above and four below; the latter being, moreover, supposed to belong exclusively to the old world, whilst the former alone were found in the new. All this, however, was the result of hasty inference. It would appear that the maximum number of the incisors is not less than six above and four below. To these succeed the canines, which on their mesial side are supplied with prominent heels. These appear as the animal advances in age, and before them the incisors, one by one, drop out till there is only one pair left above, and sometimes none below. In the words of Temminck, a part of the canines takes the place of the incisors which fall out, and the heels of the lower canines discharge, along with the upper incisors, the functions of mastication.

The Genus Dinops of M. Savi is formed of one of these Bull-Dog Bats (Dysopes Cestonii) which [being examined in its first age] was found to have six incisors in the lower jaw.

Again, M. Geoffroy has formed those with four incisors only in the lower jaw, into the Genus Nyctinomus. [These are the young.]

At first, the Bull-Dog Bats were found only in America; at present they have been discovered in both Continents, [and more recently in New Holland.] Many of them have the thumbs of the hinder feet more separated than the fingers, and distinctly moveable, a character which has led Dr Horsfield to form a new Genus Cheiromeles, with a single species in which this character is very distinctly marked.

It is probably to this genus that we should refer the Thyroptera of M. Spix, which have been but imperfectly described by him. They appear to have many of the characters of the Bull-Dog Bats, and their thumb has a concave dilatation, peculiar to them, and enabling them to cling with greater security.

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[1] Dysopes, from δυσωπεω, to frighten with excessive ugliness.

[2] The precise words of the Baron Cuvier are, "One seldom finds more than two incisors in each jaw; but, according to M. Temminck, many have at first six incisors below, of which they successively lose four,"—a remark not strictly accurate, as an examination of the dental formulæ noted above will serve to explain.

(A.) BULL-DOG BATS OF AMERICA.

1. DYSOPES RUFUS.—RUFOUS BULL-DOG BAT.

Syn. Molossus rufus.—Geoff. Ann. Mus. VI. 155.—Desm. Mam.
Dysopes rufus, (Molosse Marron ou Doguin.)—Temm. Mon. Mam. I. 230.

Icon. Dysopes perotis.—Pr. Max. Abbild.
Temm. Mon. Mam. pl. 23, fig. 17, 18, 19, (cranium and teeth.)

SPECIFIC CHARACTERS.

The Hair dark reddish-brown above, light reddish-brown beneath.
The Membranes and Ears dark brown.
The Muzzle very broad and short. The Tail robust.
Inhabits Surinam and Brazil.

The size of the Rufous Bull-Dog Bat is considerably larger than that of the Common Bat of English authors, the length of the body being upwards of three inches, of the tail two, and across, from tip of the one wing to that of the other, sixteen inches. Its muzzle is of enormous size, very full and short, and somewhat resembling that of the Bull-Dog; the gape of the mouth is also very large, and the external ear exceedingly developed; the interfemoral membrane is connected, angle-shaped, to the middle of the tail, enveloping the upper portion, and leaving the other half free, and without any membraneous edging; the lips are surrounded with hairs, but have no verrucæ or warts about them; the inner parts of the ears, and the base of the outer surface, are clad with hair. The fur of the upper parts of the animal is of a deep reddish chestnut colour, of the lower of a lighter reddish chestnut; the ears and membranes dusky brown.

M. Geoffroy first described this animal; and M. Temminck, who, in the Low Countries, in the year 1827, examined a specimen preserved in spirits of wine, states that its habitat is unknown. The individual which supplied Prince Maximilian's description and plate was procured in the Brazils.

2. DYSOPES ALECTO.—BLACK BULL-DOG BAT.

Syn. Dysopes Alecto, (Molosse alecto.)—Temm. Mon. Mam. I. 231.
Molossus Alecto.—Less. Mam. 101.

Icon. Temm. Mon. Mam. pl. 20, (old.)—pl. 23, fig. 23 to 26, (cranium and teeth.)

SPECIFIC CHARACTERS.

The Hair deep and shining black. The Membranes small and very narrow. The Tail free for the greater part of its length.
Inhabits Brazil.

The length of the body of the Black Bull-Dog Bat is very much the same as that of the one last described, whilst its extreme breadth is not more than a foot. The wings are hence somewhat disproportioned to the size of the body, being very narrow, as if clipped; the tail is free for about two-thirds of its dimensions. The ears are much broader than they are elevated; they are united in front, and are prolonged, riband-like, towards the nostrils, which are almost united. The head is short, and surmounted by a very elevated coronal crest, which runs down the chanfrin. The canines, having each a strong heel, are contiguous, and two fine bilobed incisors project in front of them. Some long hairs appear on the lower part of the back, but the rest of the fur appears like very fine silk velvet, having a beautiful lustre; the membrane which connects the arm with the fore-arm is clothed with close and short hairs, which extend along the arm, and between the origin of the two last fingers. The colour, above and below, is a brilliant and shining black; the membranes and face are also black. The additional aural appendage is broad, and the common one, which is not high, is in the shape of a semicircle.

This new species was introduced by Temminck, who justly remarks, that its hideous physiognomy, short feet, and sombre colouring, make the name he has bestowed peculiarly appropriate.

Its habits are quite unknown.

3. DYSOPES ABRASUS.—SHORN BULL-DOG BAT.

Syn. Dysopes abrasus, (Molosse à poils ras.)—Temm. Mon. Mam. I. 232.
Molossus abrasus.—Less. Mam. 102.

Icon. Temm. Mon. Mam. pl. 21, (young.)

SPECIFIC CHARACTERS.

The Hair very short but thick, very bright reddish-brown above; lighter and more dingy beneath. The Membranes black.
Inhabits Brazil.

The Shorn Bull-Dog Bat has much the same forms, but is somewhat less than the preceding. The lesser half of the tail is free of the interfemoral membrane; the ears are nearly as broad as they are high; they are distinct, and not united upon the chanfrin; the muzzle terminates in the nostrils, which are far apart. The head is short and obtuse. The canines have a large heel, and are continuous, whilst two delicate bilobed incisors project in front of them. In the young, the canines are somewhat separated, and between them four bilobed incisors are found, somewhat crowded together.

The fur is very spare, but close; and the hairs appear more or less to adhere throughout their course. On the forehead, and the membrane which unites the arm and fore-arm, also on a stripe along the latter part, and at the base of the little finger, the skin is covered with short and close hair; but all these parts are naked beneath. The upper parts are of a very bright and shining chestnut colour, somewhat duller and paler beneath; the membranes are black. This species was first described by Temminck. Its habits are unknown.

4. DYSOPES NASUTUS.—LONG-NOSED BULL-DOG BAT.

Syn. Dysopes nasutus, (Molosse velox.)—Temm. Mon. Mam. I. 233.
Nyctinomus nasutus.—Gray, in Mag. Zool. and Bot. II. 501.

Icon. Nyctinomus Brasiliensis.—Isid. Geoff. in Ann. des Sc. Nat. I. pl. 22.—Copied in Zool. Journ. I. pl. 11.
Molossus nasutus.—Spix, Sim. et Vesp. Bras., pl. 35, fig. 7, (indifferent.)
Temm. Mon. Mam. pl. 24, fig. 2, 3, (skeleton.)

SPECIFIC CHARACTERS.

The Hair yellowish-brown above; greyish-brown beneath; a band detached from the rest of the hair, on the internal surface of the membranes; the long hairs of the hinder feet silvery white. The Membranes brown.
The Nostrils prolonged.
Inhabits Brazil.

The Long-nosed Bull-Dog Bat is one which has long been known as very common, and widely spread over the Brazils. It has been mentioned by M. Natterer of Vienna, by the Prince de Neuwied, and many other travellers, and specimens have long been preserved in the museums of the Low Countries, of Berlin, Munich, &c. By a fortunate mistake, however, eleven specimens having been transmitted from South America by M. Augustus-St-Hilaire, they fell, many years ago, into the hands of M. Isidore-St-Hilaire, who, apparently ignorant that they were pretty well known, made his *début* in the Science by publishing a long account of them in the Ann. des Sciences Naturelles. He takes occasion, from the subject, to discuss the dogma laid down by the celebrated Buffon, that the animals of the one Continent are wanting in the other, and shows that, although this is very extensively, it is not universally true. At the time he wrote, (1824,) he could say, "That, of all the genera of Simia, Lemures, Chiroptera, and Insectivora, now known, there is not one, I may venture to affirm, whose existence in both Continents is unquestionable. The first instance that we find of this simultaneous existence in the two worlds, is in the Carnivora, where we come to the Ursi, Feles, &c." He then goes on to prove, at length, that this Dysopes is unequivocally of the same genus with that section which is more common in the Old World, and concludes the interesting discussion in these words:—"We must not forget, that the truth of the idea (Buffon's) which I have just proved erroneous, seemed demonstrated by the experience of ages, and consequently that the exceptions to the rule are very rare. Difference of country neither can nor will any longer be a proof of difference of organization, but it can and must always be an indication of it: it can no longer prove it; but it ought always to make us suspect it; in a word, it can no longer command, but it will always counsel; and thus the Naturalist, without blindly following the route it points out, ought carefully to collect its indications, that he may advance with firmer and truer step in the path he has thought fit to pursue."

The whole length of this Bat is about four inches, and its breadth across the wings between eleven and twelve. The snout is slender, the nostrils prominent, the muzzle short, and the lips marked with transverse wrinkles. The ears are broad, roundish, not united; the tail is long, and the upper and longest portion engaged in the interfemoral membrane, the rest being free. The fur is short, very soft, and somewhat shining. All the superior parts, and the head, are of a dull or fawn brown; beneath, greyish-brown prevails; a stripe, distinguished from the rest of the coat, extends along the flanks on the internal side of the membrane; long hairs cover the toes, and these are of a silvery whiteness. The membranes are brown.

Of its habits we have seen no account.

5. DYSOPES VELOX.—LONG-WINGED BULL-DOG BAT.

Syn. Dysopes velox, (Molosse véloce.)—Natterer.—Temm. Mon. Mam. I. 234.
Molossus velox.—Less. Mam. 102.
Icon. Temm. Mon. Mam. pl. 22, fig. 1.—pl. 23, fig. 22, (teeth.)

SPECIFIC CHARACTERS.

The Hair deep reddish-brown above; lighter beneath. The Membranes long and narrow.
The Neck with a glandular sac.
Inhabits Brazil.

This Bat was discovered and named in the Brazils, was sent thence by M. Natterer of Vienna, and has since been examined by other Naturalists. Its dimensions are a trifle less than those of the preceding species; the wings are rather narrow, but are far from being short; and the shorter half of the tail is alone left free. The ears are broader than they are elevated, and conjoined in front, but destitute of any fold of skin on the chanfrin. The syphon of a small glandular bag may be seen in the front of the neck, if examined when the specimen is fresh or moist, but not when dry. The fur is very sho t and smooth, and the hairs every where are of one colour; the side membranes are clad both above and below, and transparent hairs run along the arm and fore-arm. The colour in the superior parts is of a very deep and shining chestnut colour; beneath, the tint is somewhat duller and paler.

Its habits have not been described.

6. DYSOPES OBSCURUS.—SOOTY BULL-DOG BAT.

Syn. Molossus obscurus.—Geoff. Ann. Mus. VI. 155.—Desm. Mam.
Molossus fuliginosus?—Gray, in Mag. Zool. and Bot. II. 501.
Dysopes obscurus, (Molosse obscur.)—Temm. Mon. Mam. I. 236.
Icon. Temm. Mon. Mam. pl. 22, fig. 2.—Pl. 23, fig. 20, (teeth.)
Molossus fumarius?—Spix, Sim. et Vespert. Bras. pl. 35, fig. 6.

SPECIFIC CHARACTERS.

The Hair of two colours; above blackish-brown at the points, beneath greyish-brown; the base of the hairs white.
The Ears united by a band of skin, passing to the nostrils.
Inhabits Brazil and Surinam.

The Sooty Bull-Dog Bat is three inches three lines long; its alar membranes are somewhat broader, in proportion to the size of the body, than in its congeners; the ears, not so high as they are broad, are united at their base by a fold of skin which reaches the nostrils; the larger half of the tail is engaged in the interfemoral membrane, and the rest is quite free; the tibia and fibula are proportionably longer than in the other species. The individual hairs exhibit two colours; in the upper parts of the body they are blackish-brown at the tip, and white at the base; in the lower parts, with a white base, they have ash-brown tips. There are minute hairs at the margin of the lips, which are smooth.

M. Temminck states that he has seen individuals of this species which were sent from Brazil; but he took his description from individuals transmitted from Surinam.

7. DYSOPES MOXENSIS.—NOTCH-EARED BULL-DOG BAT.

Syn. et Icon. Molossus Moxensis.—D'Orb. Voy. (Mammifères,) pl. 11.

SPECIFIC CHARACTERS.

The Hair brown above, lighter beneath; the membranes grey.
The Ears uniting over the forehead with a transverse notch.
Inhabits South America.

To D'Orbigny, the celebrated Naturalist, who has travelled to such good purpose in South America, we owe the (as yet slight) intimations we possess of this species, as well as the following. The description of these Bats will appear in the splendid work of the French Government, "Voyage dans L'Amerique Meridionale;" but the portion relating to the Mammalia not having been published, we possess only the beautiful coloured engravings without the letter-press. Compelled, therefore, to postpone the minute description, we observe that the Moxensis, in its general appearance, closely resembles its congeners. It is stout bodied and compact, and the breadth of the membranes is moderate throughout; this is especially true of the interfemoral, which scarcely comes down to the end of the fibula, and does not include the half of the tail; the ears are broader than they are high, and the anterior bands hanging over the eyes, all but meet over the nose, having a marked notch between them. The fur over the body seems copious, and is universally of a rich brown; the colour of the membranes and ears is of a brownish-black.

8. DYSOPES RUGOSUS.—WRINKLED BULL-DOG BAT.

Syn. et Icon. Molossus rugosus.—D'Orb. Voy. (Mammifères,) pl. 10.

SPECIFIC CHARACTERS.

The Hair and Membranes grey-brown. The Ears and Upper Lip deeply wrinkled.
Inhabits South America.

From the same reasons as those assigned in the notice of the last species, our acquaintance with this one is likewise very limited. In size it appears to be somewhat less, and the interfemoral membrane extends two-thirds down the tail, which, however, is shorter. The uniform tint both of the body and membranes is a greyish-brown. The ears are remarkably large and broad; and a very distinguishing character, whence the animal has derived its name, consists in a number of marked rugæ extended along both the aural membrane and the upper lip.

9. DYSOPES AMPLEXICAUDATUS.—GUIANA BULL-DOG BAT.

Syn. Molossus amplexicaudatus.—Geoff. Ann. Mus. VI. 156.—Desm. Mam. No. 159.
Vespertilio barbipes.—Act.[1] Soc. Hist. Nat. Par. I. 115.
Icon. La Chauve-Souris de la Guyane.—Buff. Hist. Nat. Suppl. VII. pl. 75.

SPECIFIC CHARACTERS.

The Hair black; lighter beneath; grey on the sides of the abdomen.
The Tail entirely enveloped in the interfemoral membrane.
Inhabits Cayenne.

The fur of this Guiana Bull-Dog Bat is blackish, darker above than below, the flanks ash-coloured; the ear is wrinkled, and extends over the cheeks; the tail is wholly enveloped in the interfemoral membrane, which is much more ample than in the other species. It is said to be of the size of the Serotine Bat, and to be very common in Cayenne, where it flies about in large troops.

10. DYSOPES CASTANEUS.—CHESTNUT BULL-DOG BAT.

Syn. Molossus castaneus.—Geoff. Ann. Mus. VI. 155.—Desm. Mam. No. 156.
Chauve-Souris chataine, ou Sixième D'Azar.—Quadr. Parag. II. 282.
Icon.

SPECIFIC CHARACTERS.

The Hair chestnut brown above, whitish beneath; a band extending from the muzzle to the forehead.
The Tail free for one-third of its length.
Inhabits Paraguay.

Our acquaintance with the Chestnut Bull-Dog Bat rests solely on the short description of Azara, this one forming the sixth of the twelve he has described.[2] It is chestnut-coloured above, and whitish beneath. It has a cutaneous band extending from the muzzle to the forehead; the alar membranes are blackish; the tail free only in its last third; the external ear is six lines high, rounded towards the point, and inclined somewhat forward, extending to the front band. Its length is four and a half inches; its extreme breadth fourteen. Its fur is short, soft, and close. It inhabits Paraguay, where, however, Azara states he never saw any other than the one from which he took his description, and which he bought.

(B.) Bull-Dog Bats of the Old Continent.

11. DYSOPES TENUIS.—SLENDER BULL-DOG BAT.

Syn. Dysopes tenuis, (Molosse grêle.)—Temm. Mon. Mam. I. 228.
Icon. Nyctinomus tenuis.—Horsf. Jav.
Temm. Mon. Mam. I. pl. 19, (bis.)—Pl. 23, fig. 10 to 16, (crania and teeth.)—Pl. 24, fig. 1, (skeleton.)

SPECIFIC CHARACTERS.

The Hair blackish-brown above, ash-coloured beneath.
The Alar Membranes very long and narrow.
The Interfemoral Membrane sustained by scattered muscular fibres.
The Tail free for one-half of its length.
Inhabits Java.

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[1] Act. Soc. Hist. Nat. Par.—Actes de la Societé d'Histoire Naturelle de Paris. Paris, 1792.
[2] Essais sur l'Histoire Naturelle des Quadrupedes de la Provence du Paraguay, tome II. 264—295.

The first published description and representation of this Bat of the Old Continent was supplied by Dr Horsfield, in his Zoological Researches in Java, and this was shortly afterwards followed by the original drawings and accounts of Temminck; so that our information regarding it is tolerably satisfactory and minute. It is about the size of the Barbastelle Bat, being nearly four inches long, and a foot across from tip to tip of the wing. The alar membranes appear long and slender, on account of their narrowness. The lips are very thick and broad; the upper being wrinkled vertically with very deep folds, the lower being covered with warts. The interfemoral membrane proceeds nearly at right angles from the ankle-joint, and envelopes the larger half of the tail; the remainder is quite free. The ears, which are very large, are united on the chanfrin, and have a border on the outer margin.

The following is Dr Horsfield's description of the canine teeth. The canines are remarkable in both jaws; in the upper they present interiorly a very sharp cutting edge; in the lower jaw they are of uncommon size, greatly distended at the base, and provided with a strong, obliquely diverging process, resembling a thorn, which forces the front teeth in an oblique direction forward. This peculiar structure serves to prevent the escape, and to secure in the interior of the mouth, the minute insects which are seized in the rapid movements of these creatures, until they can be conveyed to the back part of the mouth, where the grinders furnish a most effectual apparatus for their immediate destruction.

The fur is very short, soft, and smooth; that on the upper part of the body is a blackish-brown, underneath it is ash-coloured. The very thick upper lips are studded throughout their whole length with a series of transverse warts, as is also the lower, but to an inferior extent. The interfemoral membrane is supported by rudimentary ossicula.

The Island of Java is the only locality in which this species has hitherto been observed, though it is probable that they are also observed in Sumatra and Banda.

Dr Horsfield supplies the following particulars concerning the habits of this and the allied species. They feed at night. During my residence on the hills of Prowoto, their pursuit afforded me occasional amusement. They are peculiarly abundant on these hills, which are covered with a luxuriant vegetation, and afford a plentiful supply of their favourite food. They appeared after sunset, while the light was still sufficient for the purpose of distinguishing objects clearly. Observing them almost uniformly, and in quick succession, to direct their flight along the hedges which surrounded a village in which I had my abode, I watched them in this situation, and readily caught them with a large net. By this means I obtained them in great numbers.

12. DYSOPES ÆGYPTIACUS.—GEOFFROY'S BULL-DOG BAT.

Syn. et Icon. Nyctinomus Ægyptiacus.—Geoff. Descr. D'Egypte, tome I. pl. 2, fig. 2.
Dysopes Geoffroyi.—Temm. Mon. Mam. I. 226.—Pl. 19.—Pl. 24, fig. 9, (teeth.)

SPECIFIC CHARACTERS.

The Hair red above, brown beneath; a margin of white hairs on the alar membranes along the sides.

The Interfemoral Membrane destitute of muscular bands. The Tail free for one-half of its length.

Inhabits Egypt.

This species was first discovered by M. Geoffroy during the French Expedition to Egypt, was described by him in the *Mem. de l'Institut d'Egypte*, and represented in the accompanying atlas. More lately it was again sent from Egypt by M. Ruppell to M. Cretzschmar, keeper of the Museum at Frankfort, who subjected it to M. Temminck's inspection, so that all doubt is removed from its leading characteristics. Its habits, however, are still but little known; it is found among the catacombs and the subterranean vaults of the great deserted edifices.

The length of this Bat is about four inches, with an extreme breadth of ten. The ears, moderate in size, are roundish, but curved somewhat irregularly at their anterior margin; its base is provided with an internal operculum, and a second one externally, which is of a lenticular shape. Their inner margins do not coalesce. The tail is of the length of the body, half enveloped in the interfemoral membrane, and without muscular bands. The fur is close, the hair on the occiput and back of the neck being somewhat longer than elsewhere; a stripe of white hair extends along the alar membrane at its union with the sides. The upper lip is covered with wrinkles, which, however, are not very deep. Its markings are red above, particularly on the occiput; brown on the abdomen, with a faint white line running along the mesial line, and assuming somewhat of a rosy tint towards the flanks.

13. DYSOPES CESTONII.—CESTONI'S BULL-DOG BAT.

Syn. Dinops Cestonii.—Savi, in Nuov. Giorn. di Letter, No. 21, p. 230.—No. 37, p. 46.
Molossus Ruppellii.—Less. Mam.

Icon. Dysopes Ruppellii.—Temm. Mon. Mam. I. 224, pl. 18.—Pl. 26, fig 6, 8, 9, (cran. and teeth.)
Dysopes Cestonii.—Bonap.[1] Faun. Ital.

SPECIFIC CHARACTERS.

The Hair uniform mouse grey above; paler beneath. The Ears excessively large, shading the face not approximated.

The Interfemoral Membrane without muscular bands. The Tail or the major part free.

Inhabits Egypt and Italy.

Cestoni's Bull-Dog Bat is about the size of the Common Bat of Europe. The external ears, especially the conchæ are excessively large, quite overshadowing the face; their internal margins, however, are not united, but project from the forehead by a common base, a large internal fold at the same time covering the eyes. The base of the ear is provided with an internal operculum, and with a second which is external, and lenticular in shape. The tail is of the same length with the body proper, and is thick, depressed, being more than half enveloped in the interfemoral membrane, which is destitute of muscular bands. The toes are covered with whitish bristles; and the great one is considerably freer than the others. The two upper incisors are wide apart, the six or four (as it may happen) inferior are crowded together, and the internal ones are projected forwards. There is a very small anomalous tooth in the upper jaw, between the canine and the first false molar. The fur is abundant, fine, close, and smooth, a large border of close hairs running along the origin of the alar membranes at the flanks. The muzzle is covered with black hairs, few and diverging; the lips are large, pendant, and folded. The upper parts of the body are throughout of a uniform mouse-grey colour, as are also the lower, but of a somewhat lighter shade. The alar membranes are very narrow, but the expanse from tip to tip of the wings is great, amounting to fifteen or sixteen inches.

The first notice of this species was given by Professor Savi of Pisa, who, however, was acquainted with the young only.

We owe our knowledge of the adult to the researches of M. Ruppell in Egypt, who has brought to light many of those animals which had been indicated by Aristotle and Pliny, and concerning which modern Naturalists had erred when they imagined that their prototypes were to be found in Southern Africa.

14. DYSOPES PLICATUS.—CHAMCHECKA BULL-DOG BAT.

Syn. Nyctinomus Bengalensis.—Geoff. in Instit. d'Egypte Hist. Nat. II. 130.
Dysopes plicatus, (Molosse Chamché.)—Temm. Mon. Mam. I. 223.

Icon. Vespertilio plicatus.—Buchanan, in Linn. Trans. V. pl. 13.

SPECIFIC CHARACTERS.

The Hair of a sooty brown, mixed with grey above; paler beneath; a broad hairy band, arising from the sides, at the margin of the alar membrane.

The Interfemoral Membrane naked, with muscular bands. The Tail free for one-half of its length.

Inhabits Bengal.

The Chamchecka Bat, to adopt its Hindoo name, was first described by the late celebrated Dr F. Hamilton Buchanan in 1799, in the fifth vol. of the Linnæan Transactions; it was then noticed in Egypt by M. Geoffroy, and Temminck tells us he saw a couple of specimens in the collection of a dealer in articles of Natural History in London. We shall here condense Dr Buchanan's account.

From the point of the nose to the root of the tail it measures three inches; from the extremity of one wing to that of the other twelve. The *wings* and naked parts of the body are soot-coloured; the hair is mixed with ash-colour, and is paler below than on the back. The *head* is large, thick at the shoulders, and tapers gradually to the *snout*, which is blunt, terminates in a heart-shaped margin, and projects far before the lower jaw, mostly naked; it has still some long erect bristles on it. The *nostrils* are small circular holes, remote from each other, and placed under the margin of the snout. The *upper lip* hangs over the under jaw, at the sides, and is there deeply wrinkled with seven or eight vertical folds. The *ears* are large, blunt, wrinkled, and somewhat pendulous: from being bent into several folds, they at first sight appear to be

[1] Bonap. Faun. Ital.—Iconografia della Fauna Italica di Carlo Luciano Bonaparte, Principe di Musignano. Roma, 1835, et seq.

thick and fleshy; they approach near at their insertion on the brow, and are naked, except in a sharp sinus towards the hinder part of the head; on their edge, near the tip, are five or six small warts. The *eyes* are in two small slits, above the angles of the mouth, and are almost covered by the ears. The *neck* is very short, and so covered with hair as to be scarcely observable; the shoulders are high and round, with a deep cavity between them; the body at the shoulders is much wider than at the haunches; the buttocks are bare. The *tail* is naked, round, and blunt, and is half inclosed in the interfemoral membrane. A broad *hairy list* surrounds the whole body, and covers the bottom of the membrane.

This animal inhabits caverns and old buildings.

15. DYSOPES TORQUATUS.—COLLARED BULL-DOG BAT.

Syn. Cheiromeles torquatus.—Horsf. Jav.
Dysopes cheiropus, (Molosse pédimane.)—Temm. Mon. I. 218.
Icon. Horsf. Jav.—Copied in Temm. Mon. I. pl. 17.—Pl. 25, fig. 15, (cranium and teeth.)

SPECIFIC CHARACTERS.

The Hair wanting on the back, somewhat long on the neck, forming collar.

The Thumbs of the feet entirely free and opposable.

Inhabits Siam.

This very remarkable Bat was first obtained either at Penang or Singapore, by the late Dr George Finlayson, the meritorious Naturalist, who accompanied Mr John Crawfurd in his mission to Siam, Cochin-China, and the Indian Archipelago. On Dr F.'s decease, it was deposited, with he rest of his collection, in the Museum of the Honourable East India Company, and was minutely described and depicted by Dr Horsfield in his Zoological Researches. It was also carefully examined by M. Temminck during his visits to London.

It is the largest known species of the genus. The great toe, completely separated from the others, is quite free and opposable, like the thumb in the Quadrumana, and must greatly assist its powers of prehension. The ears, not united in front, are long and pointed, having a lobe or operculum at the inferior part, and a second or rudimentary one proceeding from the interior. Its large tail is half enveloped in a very short interfemoral membrane. The alar membranes proceed from the upper part of the back, very near the mesial line, but adhere to the sides in their progress downwards. This animal may be said to have no fur except along the sides, and on the front of the neck, where the hairs are coarse, very short, and far apart; a few slender hairs cover the interfemoral membrane and the thighs; whilst a kind of down, extremely short, and only recognizable by the touch, or the magnifying glass, covers the abdomen; the back is completely naked, and the muzzle is very sparingly provided with minute hairs; a sort of ruff, composed of brown hair, surrounds the neck. The great toe is not only free, but is supplied with a very large nail, broad and obtuse, and hid under a great tuft of hair. The tail is quite wrinkled in that part of it which is free. The ears are wide apart, long, and pointed.

To this condensed summary of characters by the accurate Temminck we shall add some further details, supplied by Dr Horsfield. The entire length, he remarks, of the specimen now before me is five and a half inches; its extreme breadth two feet. The great extent of the internal ear is one of the peculiarities of the animal; the entrance to the cavity of the tympanum is likewise of extraordinary size; the bones of the ear, in comparison with those of the human, are of enormous dimensions; the cochlea, too, is of uncommon extent. The eyes are small, and partially concealed; the eyelids are surrounded by a minute circle of rigid hairs, regularly disposed. The pouch or cavity, behind and below the arm-pit, and formed by the connection of the alar membrane with the body of the animal, though not peculiar to this species, is well worthy of attention. This cavity is about an inch deep, and nearly two inches long, and is lined by a very delicate membrane. It is bounded anteriorly by the membrane extending from the arm to the pectoral muscle, and posteriorly by the spine and haunches. This organization renders the animal specifically lighter, and assists its flight; and, by supplying a deep and extensive pouch, it affords to the young, while they continue at the breast, a convenient covering, and a retreat in which they find the security and warmth they require. The skin throughout is marked with very minute dots, and, when closely examined, exhibits the appearance of shagreen. The membranes of the wings and back, as well as the head, feet, and tail, are of a sooty black colour, with occasional modifications of tawny; the nails of a yellowish-brown colour. The brush on the great toe is of a peculiar character. It consists of stiff hairs, directed to one side, and forming a regular series along the outer margin of the thumb. At the extremity the hairs are long, and spread like a fan over the nail; they gradually decrease in length, preserving the same direction; the separate hairs are rigid, and terminated by a hook; its use remains to be determined.

(C.) Bull-Dog Bats of Australia.

16. DYSOPES AUSTRALIS.—SOUTHERN BULL-DOG BAT.

Syn. Molossus Australis.—Gray, in Mag. Zool. and Bot. II. 501.
Icon.

SPECIFIC CHARACTERS.

The Hair dark brown, paler beneath, a broad white streak on each side, a narrow white streak beneath the edge of the rump.

The Ears large, broad, rounded. The Tail nearly one-half free.

Inhabits New South Wales.

A specimen of this Bat, very recently discovered by Major MacArthur, is deposited in the Museum of the United Service Club, London.

DOUBTFUL SPECIES.

1. Molossus crassicaudatus, (Geoff. Ann. Mus. VI. 156.)—The hair is of a cinnamon brown colour, somewhat lighter beneath; the tail emarginated on each side by a prolongation of the interfemoral membrane. It is the tenth species mentioned by Azara. The hair is very short and soft. The interfemoral membrane envelopes more than half the tail.

2. M. ater, (Geoff. loc. cit. p. 155.)—The fur is black and shining above. Habitat unknown. Specimen in the Paris Museum.

3. M. longicaudatus, (Geoff. loc. cit.)—Of a fawn grey colour; a band extends from the tip of the snout to the forehead; the tail nearly as long as the body. M. Geoffroy conceives this was the species described by Daubenton under the name of the *Mulot volant*, and figured by Buffon; but this is doubtful.

4. M. fusciventer, (Geoff. loc. cit.)—The fur brownish-grey above, and ash-coloured beneath, except on the abdomen, which is brown in the middle. This was also described by Daubenton.

5. M. laticaudatus (Geoff. loc. cit.)—is Azara's eighth species, and inhabits Paraguay. The fur dull brown above, somewhat lighter beneath. The tail emarginated by a continuation of the interfemoral membrane. The upper lip marked by vertical ridges; the tongue is also wrinkled.

6. M. ursinus, (Spix, Sim. et Vespert. Bras. p. 59, pl. 35, fig. 4.)—According to Spix, this species is black all over; the body and snout are very stout; and the anterior lolds of the auricles meet on the forehead. It was found in the province of Para.

7. Nyctinomus acetabulosus, (Geoff. in Mém. de l'Instit. d'Egypte Hist. Nat. II. 130.)—This species was discovered by Commergon, and was found near Port Louis, Isle of France. Its fur is of a blackish-brown colour. The tail, for two-thirds of its extent, is enveloped in the interfemoral membrane.

8. D. tricolor, (Spix, p. 61, pl. 36, fig. 9.)—The genus Thyroptera of M. Spix is founded upon the following character:—Pollice manus infra patella subconcava armato. The specimen (a young one) was dark brown above, and quite white beneath, the membranes and feet black.

9. D. auripendulus, (Shaw, Gen. Zool. I. 137.)—The Slouch-eared Bat, with obtuse nose, and large pendant ears with pointed tips. Tail long, included in a membrane, and terminated with a hook. Colour above, deep chestnut, lighter in the belly; length three inches, extent of wing fifteen. Native of Guiana.

10. D. Moops, (F. Cuv. Dents des Mam.)—The specimen upon which this species is founded was sent from India by MM. Diard and Duvaucel.

11. D. pumilus, (Rupp.[1] Atl., pl. 27, fig. a,)—scarcely three inches in length, is the smallest of those Bats which M. Ruppell has discovered in Northern Africa. It is dark brown above, light grey beneath, the limbs reddish, the membranes dark brown. It seems a miniature representation of D. Cestonii, already described, and is in all probability the young of D. Ægyptiacus.

IMAGINARY SPECIES.

1. Dysopes perotis (Pr. Maximilian Abbild.)—is identical with D. rufus.

2. D. Ruppellii (Temm. Monogr.)—is the adult of a Bat previously described by Professor Paolo Savi of Pisa, under the name of Dinops Cestonii.

Note.—Nyctinomus Brasiliensis (Isid. Geoff. Ann. Sc. Nat.)—is the same as Dysopes nasutus; and

Dysopes Geoffroyi (Temm. Monogr.)—is but another name for D. Ægyptiacus.

[1] Rupp. Atl.—Atla zu der Reise im Nördlichen Afrika, von Eduard Rüppell. Frankfurt am Main, 1826. (Säughthiere bearbitel von Ph. J. Cretzschmar. Med. Dr.)

GENUS VII. STENODERMA.—NARROW-BANDED BATS.

Syn. Stenoderma.—Geoff. in Mém. de l'Instit. d'Egypte Hist. Nat. II.—Desm. Mam. p. 117.—Temm. Mon. Mam. II. 50.

GENERIC CHARACTERS.

The Ears small, lateral, isolated, with an auricular operculum.

The Interfemoral Membrane rudimentary, lining the thighs like a band.

The Tail wanting.

The Dental Formula varying according to age.

Young? $^{2}\left|\frac{2+C+4M}{2+C+4M}\right.=\frac{14}{14}=28$ (Geoffroy.)

Adult? $^{2}\left|\frac{1+C+4M}{2+C+4M}\right.=\frac{12}{14}=26$ (G. Cuvier.)

Inhabit

To this place appears to belong a Genus of Bats, of which little is yet known beyond the characters enumerated above. It consists of a single species, the false molars of which are undetermined.

1. STENODERMA RUFUM.—RED NARROW-BANDED BAT.

Syn. Stenoderma rufum.—Geoff. in loc. cit.

Icon. Dict. des Sciences Naturelles, L. p. 499.

SPECIFIC CHARACTERS.

The Hair uniform reddish-brown. The Ears middle-sized, oval, slightly notched on their external margin.

Inhabits

The length of this animal, of which nothing further is known, is about three inches; the expansion of its wings eleven inches nearly.

GENUS VIII. DICLIDURUS.—BOX-TAILED BATS.

Syn. Diclidurus.—Pr. Max. Reise.—Abbild.—Beitr.

GENERIC CHARACTERS.

The Head broad. The Muzzle pointed.

The Ears broad, inserted over the eyes.

The Tail consisting of two corneous valves, moveable and hollow; the os coccyx entering the upper valve.

The Interfemoral Membrane extending beneath and beyond the caudal valves.

The Dental Formula $^{2}\left|\frac{1+C+(F+4)M}{3+C+(F+4)M}\right.=\frac{14}{18}=32$ in the single specimen examined by Prince Maximilian.

Inhabits Brazil.

This genus consists at present of one species only.

1. DICLIDURUS ALBUS.—WHITE BOX-TAILED BAT.

Syn. Diclidurus Freyreissii.—Pr. Max. in Isis, 1819, p. 1629, Reise, II. p. 76.

Diclidurus albus.—Ib.—Beitr. II. 242.

Icon. Diclidurus albus.—Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair bushy, long, and whitish. The Arms long and robust.

Inhabits Brazil.

The White Box-Tailed Bat, the only one as yet referred to the genus Diclidurus, is in various particulars strikingly different from the nearest allied genera. The most remarkable feature unquestionably is the tail, distinct from all other tails we have heard of.

It is formed on the following plan: The coccygeal bones run out jointed into two horny pieces, covered by the skin of the body, thus forming a kind of box out of the two capsules or valves taken together. The upper valve is shaped like a half moon, corneous, hollow, with somewhat of a protuberant and thickened edge, and hence in all respects is a hollow capsule. The lower valve smaller, somewhat triangular, pointed, applied horizontally against the upper, is likewise covered by the skin, and hollow. Both these corneous pieces are placed with their flattest surfaces horizontally; they are capable of moving upwards or downwards, of separating from each other, and being closed or applied to the body through a particularly fine membrane at their base. The coccygeal bones proceed into the upper valve.

The coat of the animal is white, and the box-like appendage is a deep black. The latter extends but a little way down the interfemoral membrane, which in its mesial part is festooned up in a deep semicircle. The tibiæ are very slender; and the feet, the long muzzle, and upper part of the face, are black; the membranes are of a dark flesh colour. The ears are short and broad, and overhang the eyes; the fur is bushy, composed of fine long whitish hair, and the arms are strong and long.

This singular Bat was discovered by M. Freyreiss upon the cocoa-trees near Canavievas, at the mouth of the Rio Pardo, where it concealed itself during the day in the foliage of those majestic palms. Of its habits nothing has been ascertained. The specimen is in the Neuwied Museum.

GENUS IX. NOCTILIO.—HARE-LIPPED BATS.

Syn. Les Noctilions.—Cuv. Reg. Anim. I.

Noctilio.—Geoff.—Cuv.—Temm. et al.—Pteropus.—Erxl.

Vespertilio (in part.)—Linn. Gmel. I.

GENERIC CHARACTERS.

The Head broad. The Muzzle short, swelling, cleft, and furnished with warts, or fleshy tubercles.

The Nose confounded with the lips. The Nostrils almost tubular, approximated, prominent.

The Ears small, lateral, isolated, with the auricular operculum placed interiorly.

The Dental Formula $^{2}\left|\frac{2+C+(F+3)M}{1+C+(2\ F+3)M}\right.=\frac{14}{14}=28.$

The Interfemoral Membrane very broad, projecting, entire, with two prominent obtuse angles. The Tail mostly enveloped in the membrane, but free at the point above.

Inhabit South America.

The Hare-lipped Bats have a short swelling muzzle, cleft like a Hare-lip, and furnished with warts and uncouth fleshy tubercles; their ears are separate. They have four incisors above, and two below; their tail is short, and free above the interfemoral membrane.

1. NOCTILIO LEPORINUS.—RUFOUS HARE-LIPPED BAT.

Syn. Vespertilio Leporinus.—Linn. Gmel. I. 47.

Noctilio Americanus.—Linn. Syst. Nat. (Ed. 12,) I. 88.

Noctilio unicolor.—Pr. Max. Beitr. II. 223.—Desm. Mam. No. 165.

Noctilio albiventer, (young.)—Desm. Mam. No. 167.

Noctilio dorsatus.—Pr. Max. Beitr. II. 218.

Peruvian Bat.—Penn. Quadr. II. No. 500.—Shaw, Gen. Zool. I. 139.

Noctilio vittatus.—Schinz Thierr. I. 170.

Icon. Vespertilio Leporinus.—Schreb. Saügth. pl. 60.

Noctilio unicolor.—Pr. Max. Abbild.

Noctilio dorsatus.—Pr. Max. Abbild. (var.)

Noctilio albiventer, (young.)—Spix, Sim. et Vesp. Bras. pl. 35, fig. 2 and 3.

Noctilio rufus.—Spix, Sim. et Vespert. Bras. pl. 35, fig. 1.

SPECIFIC CHARACTERS.

The Hair uniform reddish-yellow above, paler beneath.

Inhabits South America.

Though this large and beautiful Bat has been long known, there is by no means all the accuracy and satisfaction concerning its appearance and history which is desirable. The difference between the only British representation of the animal which exists (Shaw's) and the foreign ones is so great, that they would never be taken for the same animal; and the shades of colour given in the plates of Schreber, and the *albiventer* and *dorsatus* of Prince Maximilian, are respectively pale straw coloured, light tobacco brown, and a very dark, almost black brown. Of its habits we have seen no account; and no description equal to that of the accurate Azara, which we, therefore, embody in our pages.

The celebrated Spaniard tells us he had been in possession of many of these animals, and that they were strikingly similar to each other. He gives the length of the body at five inches, the tail one; and the expanse across the wings scarcely two feet, whilst our English authorities make it of "the size of a middling rat, and the extent of the wings two feet five inches." The fur underneath, says Azara, (Quad: Parag. II. 280,) is of the colour of pale Seville tobacco; it is the same above, but mixed with brown, and along the back-bone there is a streak of a lighter colour. The interfemoral membrane originates as high up as the ankle, and the alar from the middle of the tibiæ, a striking character in which most of the figures agree. The mem-

branes are ample; the interfemoral extends considerably beyond the feet, and the tail descends about a fourth of it. The ear is directed forwards; it is very acute, transparent, and more than an inch long. The head above is very flat. The muzzle is naked, very acute, and bent upwards, so that the animal has been compared to a pug-dog; the lip is divided by the cleft which separates the nostrils, and the mouth is festooned in a very peculiar manner. There is a white stripe along the dorsal ridge in some specimens.

2. NOCTILIO RUFIPES.—RED-CLAWED HARE-LIPPED BAT.

Syn. et Icon. Noctilio rufipes.—D'Orb. Voy.—Mammifères, pl. 9.

SPECIFIC CHARACTERS.

The Hair uniform reddish-yellow. The Membranes, Ears, and Feet, grey. The Claws reddish. The Auricular Operculum deeply notched.

Inhabits South America.

This species is known to us only through the figure of M. D'Orbigny[1] above quoted.

IMAGINARY SPECIES.

1. Noctilio albiventer, (Spix, Sim. et Vesp. Bras. pl. 35, fig. 2 and 3,) is the young of N. Leporinus according to Temminck.

2. N. dorsatus of Geoffroy is a variety of sex or age of the same species.

DOUBTFUL GENERA AND SPECIES.

1. Aëllo.—Dr Leach (Linn. Trans. XIII. p. 71) has described a Bat under the name of Aëllo Cuvieri, now in the Museum of the University College, London. The head is nearly conical; the forehead flat; the ears large and separate, apparently truncated at the extremity; the tail with a membraneous band produced to the point of a large interfemoral membrane. Its colour is rusty brown; its alar membranes dark brown; the dimensions are not indicated, and its country is unknown. The dentition $^{2}\left|\frac{1+C+4\,M}{2+C+6\,M}\right.=\frac{12}{18}=30$.

2. Celæno.—This is another of Dr Leach's genera, reposing on a single specimen, which he styled Celæno Brooksiana, (Linn. Trans. XIII. 70.) According to Mr John Edward Gray, the specimen in the Museum of the University College, London, is merely a Noctilio, in which the bones of the tail had been withdrawn from the skin.

3. Pteronotus.—Mr Gray (Mag. Zool. and Bot. II. 500) proposes a new genus to contain a Bat, named by him P. Davyi, from Trinidad. His account is as follows: Ears lateral, tragus elongate lobed; chin with a reflexed cartilaginous edge to the lower lip, and an erect membraneous ridge across its lower part; wings only affixed by a narrow line to the middle of the back, which is covered with fur beneath them; hind-feet long, the ankle rather produced and exposed; the lower angle of the wing lies folded over it. Its dentition is not stated. Mouse-coloured, wings baldish; expanse of wing twelve inches. From a specimen in the Museum Fort Pit, Chatham.

4. Myopteris.—M. Geoffroy (Mém. de l'Inst. d'Egypte, II. p. 113) describes a Bat under the name of Myopteris Daubentonii. The nose is simple, the ears broad, separate, and lateral, with an internal operculum; the tail long, one half enveloped in the interfemoral membrane; the muzzle short and thick. The upper parts of the head and body are brown, beneath it is lighter. The dentition is $^{2}\left|\frac{1+C+4\,M}{1+C+5\,M}\right.=\frac{12}{14}=26$. This is the *Rat volant* of Daubenton, (Mém. de l'Acad. de Paris, 1759.)

TRIBE II.—DIPHALANGIA ISTIOPHORA.

Syn. Istiophori, (in part.)—Spix, Sim. et Vespert. Bras.
Phyllostomina.—Gray, in Mag. Zool. et Bot. II. 486.—Less. Mam.

CHARACTERS OF THE TRIBE.

The Index with two ossified phalanges, the middle finger with three.
The Nose with one or two leafy appendages.

We have now arrived at that group of Bats where the cutaneous system, ample in them all, acquires its maximum development. This is aided by the two phalanges of the index finger, and the three of the middle one; the phalanges being the frame-work of the membranes; and is manifested by the nasal appendages, consisting of the *horse-shoe*, (*fer-à-cheval,*) a semi-circular cutaneous excrescence immediately below, and often involving the nostrils, and the *nose-leaf*, usually rising up at right angles to the horse-shoe, and exhibiting a resemblance to the leaves of some vegetables. A few remarks, then, on the more prominent peculiarities of this development, and the uses it subserves, are more especially required. In many of the genera the tegumentary folds, more especially the alar and interfemoral, are so superabundant, as well as those of the ears and nose, that the bodies themselves of these animals can scarcely be perceived: their aspect is thus rendered more shadowy, their physiognomy wilder, and, finally, their forms so vague and indistinct, as greatly to increase the horror which their alleged devastations inspire.

In the Anistiophora division just described, we had occasion to allude to the extraordinary development manifesting itself in the external ears, which, in some species, are approximated and festooned over the eyes; but in some of those we have yet to review the external auricle nearly equals in dimensions the whole body. The external ear, in fact, instead of being single, as in all other animals, may be said to be double in many of the Bats; for, in addition to the external concha, which they have in common with other terrestrial Mammalia, they have a second and internal one, which more directly surrounds the auditory foramen. This second auricle is derived from the tragus, or rather, according to M. Geoffroy's well known views, is the tragus itself, though we are led to suppose it a distinct part, on account of its great volume, in proportion to that of the ear, and on account of this latter being so folded and rolled upon itself. A precisely corresponding change takes place at the nostrils, which are furnished with borders in the form of crests and leaves supplied by duplicatures of the skin; these membranes are somewhat tubular in shape, and the bottom of the funnel constitutes the entrance of the nasal apertures. This arrangement then prevails in the organ of smell as of hearing; both being provided with conchæ, or external trumpets.

The consequence of this is not less apparent than it is striking. Most of the senses of these Bats are thereby rendered exquisitely acute. From the great expanse of their alar and interfemoral membranes, they acquire, by means of the aërial vibrations, information of many minute bodies, of which other animals are perfectly unconscious. Hence the observations of Spallanzani led him to infer, that most frequently they perceive the indications of touch without requiring immediate contact; and hence, according to the judicious remark of Cuvier upon these experiments, all that they require to be advertised of the immediate presence of corporeal objects, is to beat, or rather feel, the air which is interposed between them and these objects, judging by the manner in which it acts upon their membranes. Spallanzani states this may be considered as the possession of a sixth sense. That the ample dermal apparatus at the ears and nostrils produces corresponding effects on the senses of hearing and smelling, is too evident to be dwelt upon,—a remark the more valuable when associated with an observation of Dr Horsfield formerly noticed with regard to the Dysopes torquatus, (p. 20,) that the development of the internal ear, when compared to that of Man, is enormous. All this acuteness of apprehension is necessary for the exercise of their predatory propensities against nocturnal insects, during the twilight, and even midnight darkness. And, lest the sensibility should overwhelm them under the scorching influence of a tropical sun, it is not less interesting to observe, that these same tubes and conchæ are, by a slight muscular agency, at the will of the animal, converted into so many plugs and valves, whereby all smells and sounds are shut out as effectually as is the light by the closed eye-lids. The "operculum," says M. Geoffroy, "is placed at the margin of the meatus auditorius, in such a way as at will to be-

[1] It is much to be regretted that the elegant Work of M. D'Orbigny, published under the auspices of the French Government, proceeds at a rate of intolerable slowness; the descriptions of many Plates, which have long been in our possession, are still withheld.—Should not a public work of that kind be issued at a lower price, and the separable portions in distinct series?

come a valve which closes its entrance, and the folds and pads of the nose-leaf effect the same object at the nostrils; so that," continues the ingenious Naturalist, "it is not without a purpose that, in the Bats, the cutaneous system acquires so great a development."

GENUS X. VAMPYRUS.—VAMPYRE BATS.

Syn. Phyllostoma, (in part.)—Cuv. Geoff. et al.
Vampyrus.—Leach, in Linn. Trans. XIII.—Spix, Less. et al.

GENERIC CHARACTERS.

The Head long and narrow. The Muzzle lengthened.

The Ears middle-sized, separate. The Auricular Operculum notched, placed interiorly.

The Tongue extensile; point formed for suction; the papillæ directed backwards.

The Nose with two appendages, the one horizontal, in the form of a horse-shoe, the other erect, resembling a javelin.

The Dental Formula $^{2}\left|\begin{matrix}2+C+(2\ F+3)M\\2+C+(3\ F+3)M\end{matrix}\right.=\frac{16}{18}=34.$

Inhabit South America.

The appellation *Vampyre* was introduced into Natural History by Linnæus, and applied by him to the Great Roussette Bats already described. Buffon again applied it to the animal we are now about to consider, under the conviction that the habits which made the name applicable belonged exclusively to this species. In this conclusion, it speedily appeared he was mistaken, as there were many South American Bats, closely allied in several of their features, all of which have blood-sucking propensities. MM. Cuvier and Geoffroy, about the year 1809, in examining together the family of Bats, associated these together under the name of *Phyllostoma*, which group becoming very numerous, has again been subdivided into smaller sections. The Vampyre was, of course, for a long time ranked by all writers, foreign and domestic, as a Phyllostoma. M. Geoffroy, twenty years later, (in 1829,) in his Leçons, separated the Vampyres from the last named group, grounding the distinction on the difference of the shape of the crania, those of the Phyllostomes being short, with a broad muzzle, whilst the cranium and muzzle of the Vampyre are very narrow: a difference likewise exists as to the number of the teeth.

After these explanatory remarks, it will readily be understood that many of the relations which have been published concerning the blood-thirsty propensities of Bats, do not refer exclusively to what is now considered as the true Vampyre: though this, however, is the case, yet, as the last named animal possesses them in a prominent degree, we shall in this place introduce such general observations as are required for the illustration of the subject.

It is not for a moment to be imagined that any of these animals live on blood alone. No more is it to be supposed that, though distinguished as the insectivorous tribe, they confine themselves to this species of food.—On the other hand, it is [illegible]e, as previously observed, that as the frugivorous Bats sometimes devour flesh, so these insectivorous Bats are sometimes frugivorous. Nor is this to be regarded as a rare or trivial occurrence. It would, on the other hand, appear that the Bats immediately under consideration are decidedly omnivorous, and that their depredations upon fruit are occasionally troublesome and as vexatious, as is experienced from the ravages of the true Frugivoræ. A fact or two will illustrate this. "When the moon shone bright," says Mr Waterton, "and the fruit of the Banana-tree was ripe, I could see the Vampyre approach and eat it. He would also bring into the loft where I slept, from the forest, a green round fruit, something like the wild guara, and about the size of a nutmeg. There was something also in the blossom of the Sawarri Nut-tree which was grateful to him."—(Wanderings, 179.) M. Palissot-Beauvois again, as mentioned by M. Geoffroy, was an eye-witness of the devastations they made of fruit, to the great annoyance of the agriculturist. From Hayti this gentleman wrote: "One morning my friend exclaimed, 'Shall I gather the beautiful fruit from that superb tree to-day, or wait for its perfect maturity to-morrow? If I take this latter course, I am afraid of the Bats.' The fruit was left, and the gentleman's worst anticipations were realized. During the night a cloud of Bats made their appearance, and left scarcely a sample behind." M. Geoffroy was so much interested in this recital, that he wrote inquiring what particular Bat had wrought the mischief; specimens both of the fruit and its devourer were transmitted to France, and the latter turned out to be the Spectacled Javelin-Bat soon to be noticed.

That they are also pre-eminently insectivorous cannot be doubted; often have multitudes of these troublesome tribes been found in their stomachs after death, and in this way much must be done to keep these hordes in their proper subordination.

With regard to the attacks of these creatures on the other animals and Man, D'Azara states that it is only in lack of their more common food that they resort to nobler prey. Be this as it may, they are in this way often troublesome, and sometimes, it would appear, destructive. The range over which they extend seems to be wide. P. Martyr mentions the existence of these animals at the Isthmus of Darien; both the Ulloas report their presence at Carthagena; Roume discourses of the Vampyre of the Island of Trinidad, and D'Azara encountered them in Paraguay. The injury they produce has probably been exaggerated, and yet it is such as not to be despised. The great Spanish Naturalist informs us that they frequently attach themselves to the combs and wattles of the domestic fowl and destroy them; not so much by the hemorrhage they produce, as from the injurious effects of their wounds. Mules, Asses, Horses, and horned Cattle, in fact, all Quadrupeds are exposed to their attack, and to an extent which is characterized by Mr Darwin in relation to the Horse, as "often the cause of much trouble." M. Geoffroy seems perfectly to credit the narrative related by M. de la Condamine, that the attacks of these animals destroyed the herds and flocks which the first European settlers succeeded in conveying to the New World. "When some Spaniards," says he, "at the epoch of the discovery of America, detesting the cruelty and villany of their compatriots, were led to cherish more honorable sentiments towards the Aborigines, and, in the exercise of their philanthropy, thought of compensating for the massacre of man by the gift of the European domestic animals, the Phyllostomes frustrated this generous enterprise; these Bats in numbers attacked the first Cattle and Sheep which the missionaries transported into America, and destroyed them by sucking their blood."

Finally, in relation to Man, it is certainly not a little curious that the attacks of the Vampyres should be confined to his great toe; for of all narratives we have met, this part alone has been signalized. Another curious fact is, that it is only during sleep that they commit their depredations, and so dexterously as not even to awake the sufferer. These certainly curious circumstances have led to various hypotheses for their explanation, none of which, however, appears very satisfactory, and hence the phenomena are still regarded as mysterious. Buffon detected something peculiar in the tongue of his "Vampyre," which, in his estimation, constituted it a peculiar organ of suction, capable of drawing blood without inflicting a wound; but unfortunately for this ingenious speculation, Buffon's Vampyre, as stated above, was a Roussette, and not a Vampyre—a frugivorous, not an insectivorous Bat,—and guiltless, in short, of such bloody deeds. Led on Buffon's track, M. Geoffroy assures us he has made the identical discovery which Buffon had anticipated. "The tongue of the Phyllostomes presents a very curious organization, whence they are endowed with a power of suction. Close to its extremity is a cavity, in the centre of which there is a small point in relief, and round its circumference are placed eight warty projections, somewhat less prominent than the central one." (Ann. des Sc. Nat. XV. 165, Leçons, XIV. p. 31.) And again, "I have now satisfied myself that the Phyllostomes are endowed with a real organ of suction at the extremity of the tongue, in the midst of a circle of warty papillæ. The tip begins to act in a plane, which is quite level: in this state it is applied in immediate contact to the point about to be operated upon; the muscular fibres, which are attached by a tendon to each wart, now contract, hence they are all simultaneously approximated, and a smaller circle is formed within the original one." (Leçons, XIV. p. 35.) This is a curious fact; but the ingenious Naturalist does not rest here. In connection with the admitted truth, that the blood is abstracted during sleep without wakening the subject of attack, he concludes that this could not occur if the skin were wounded as in an ordinary bite, and that sometimes there is no lesion in the integument at all. This we apprehend is carrying the matter too far. That they inflict a wound is attested by numerous eye-witnesses. "The wounds on my toes," says D'Azara, "which, however, I knew nothing of at the time of their infliction, were circular or elliptical, from a line to a line and a half in diameter;" and Waterton, "on the great toe there was a wound somewhat less than that made by a leech, whence the blood was still oozing." That they give pain is no more doubtful:—"When bivouacking late one evening," says Mr Darwin, "near Coquimbo, my servant noticing that one of the horses was very restive, went to see what was the matter, and fancying he could distinguish something, suddenly put his hand on the beast's withers, and secured a Vampyre." (Zool. of the Beagle, Mam. p. 2.) The mystery is probably less than usually imagined. The leech, though its bite is sufficiently sharp, is often applied to man asleep without awakening him. The teeth of the Vampyre are sharp; a slight incision, with the help of the sucking apparatus, is all that is required, and the sleeper's repose is undisturbed.

The quantity of blood drawn by the Vampyre does not appear to be very great; but considerable oozing often continues, so that much may be lost. The wound is troublesome for a few days, but in man usually heals without

difficulty. D'Azara, who was himself bitten four times, states that the inhabitants of Paraguay thought but little of these attacks, or of the animals which made them.

1. VAMPYRUS SPECTRUM.—COMMON VAMPYRE BAT.

Syn. Vespertilio Spectrum.—Linn. Gmel.
Phyllostoma Spectrum.—Geoff. Ann. Mus. XV. 174, 186.—Desm. Mam. No. 175.
Vampyrus Spectrum.—Leach, in Linn. Trans. XIII. 80.
Le Vampyre.—Cuv. Reg. Anim. I. 117.
Spectre Bat.—Penn. Quadr. II. 508.—Shaw, Zool. I. 143.
Icon. Geoff. Ann. Mus. XV. pl. 11, fig. head, cran., and teeth.
Seba, pl. 58.—Schreb. Säugth. pl. 45, B.

SPECIFIC CHARACTERS.

The Hair reddish-brown above; reddish-yellow beneath.

This Vampyre is the Andira-guaçu of the Brazilians, figured in Seba, pl. 58. Its leaf is oval, and hollowed in the shape of a funnel. This animal comes from South America; it is reddish-brown, and about the size of a Magpie. It has been accused of destroying men, and the lower animals, by sucking their blood, but it merely inflicts some very small wounds, which may sometimes become inflamed by the climate.

Though much of the alarm and apprehension which attached to this animal, and led Dr Shaw to dilate upon it as "a tremendous creature, said to be sometimes six feet in extent," is now removed, yet its habits are so peculiar, annoying, and, we may add, destructive, that the popular interest with which it is still regarded is not by any means surprising.

We believe it is larger than any of the Phyllostomes, with which it is so closely associated. It is commonly stated to be about nine inches in extreme length, from the tip of the nose to the termination of the hind-feet, and from eighteen inches to two feet in extreme breadth, though Mr Waterton informs us he once killed one which measured thirty-two inches across, from the tip of one wing to that of the other; the ears are about fourteen lines high; the nasal leaf six; the interfemoral membrane nearly three inches. The incisor teeth are closely set between the canines; in the upper jaw the two mesial ones are larger than the lateral; and in the lower they are all very small and pushed forward; the canines are strong; the molars have all the characters of a carnivorous animal. Its physiognomy is singular, and far from being captivating; its muzzle is long, its mouth large, its teeth formidable, and the ears are of great size in length and breadth, with a marked operculum; the nasal leaf is of medium size, prolonged from the horse-shoe, without any intervening division; its middle stem is not very thick, and the lateral lobes are rounded, and terminate somewhat on this side of the point. The alar membranes extend from the ankle to the origin of the thumb; the interfemoral occupies the whole space included between the limbs; its terminal edge forming a salient angle, shaped, as in a demi-hexagon, the product of three equal lines, the two external terminating at the spurs, and the third at that part of the membrane which is destitute of support. We need scarcely remark, it has no vestige of a tail, though this appendage is conferred upon it in some of the older descriptions. The fur is soft, chestnut-coloured above, and of a reddish-yellow colour beneath.

The whole extent of the South American Continent is usually assigned as the habitat of the Vampyre, though this probably has arisen from the name being applied indifferently to a number of the Phyllostomes. That it occurs in Guiana seems to admit of no doubt; and in proof of this, as well as illustrating its habits and blood-thirsty propensities, we shall quote some of Mr Waterton's interesting remarks. "As there was a free entrance and exit to the Vampyre in the loft where I slept, I had many a fine opportunity of paying attention to this nocturnal surgeon. He frequents old abandoned houses and hollow trees; and sometimes a cluster of them may be seen in the forest hanging head downwards from the branch of a tree; as stated by Goldsmith—

'In matted woods, where birds forget to sing,
And silent Bats in drowsy clusters cling.'

"Some years ago I went to the river Paumaron with a Scottish gentleman. We hung our hammocks in a thatched loft of a planter's house. Next morning, as soon as there was light enough, I went to his hammock, and saw it was much stained with blood. On examining his foot, I found the Vampyre had tapped his great toe; there was a wound somewhat less than that made by a leech; the blood was still oozing from it; I conjectured he might have lost from ten to twelve ounces of blood. On another occasion, they sucked a young man of the Indian breed very severely, as he was sleeping in the shed next to mine; his great toe seemed to have all the attractions. I examined it minutely as he was bathing it in the river at day-break. The midnight surgeon had made a hole in it, almost of a triangular shape, and the blood was then running from it apace."—(*Waterton's Wanderings*, pp. 179, 301.)

DOUBTFUL SPECIES.

1. Vampyrus soricinus, (Spix, Sim. et Vespert. Bras. pl. 36, fig. 2 and 6.)

The body rather slender; incisors with a somewhat diverging apex; the nose-leaf entire, continuous below and in front with the lip; the lips are undivided, and free from warts; a few on the chin.

Frequents the roofs of the houses of Rio Janeiro, and the banks of the St Francis.

2. V. cirrhosus, (Spix, pl. 36, fig. 3.)

The head somewhat prolonged; the lips, sides, and lower part of the nose-leaf, and especially the chin, studded with warts.

Habitat not ascertained.

3. V. bidens, (Spix, pl. 36, fig. 5.)

The muzzle acute; the incisors long; ears wide spreading; the fur above is brownish-black, beneath mouse-coloured; the alar membranes are black and naked; the point of the tail perforates the interfemoral membrane externally; the spurs are very long, and concave towards the lower margin of the membrane, to which they give a bilurcated appearance.

Inhabits the banks of the St Francis.

GENUS XI. PHYLLOSTOMA.—JAVELIN-BATS.

Syn. Phyllostoma, (in part)—Geoff. Cuv. et al.
Monophyllus et Artibeus.—Leach, in Linn. Trans. XIII.
Carollia et Macrophyllum.—Gray, in Mag. Zool. and Bot. II.
Lophostoma.—D'Orb. Voy.

GENERIC CHARACTERS.

The Head short and thick. The Muzzle short and broad.

The Dental Formula $^{2}\left|\frac{2+C+(2\,F+3)M}{2+C+(2\,F+3)M}\right.=\frac{16}{16}=32.$

(For the other characters, see Vampyrus, p. 23.)

Among the Javelin-Bats the normal number of incisors is four in each jaw, but a part of those in the lower often fall out, expelled by the growth of the canines. They are further distinguished by their leafy appendage being turned up across the tip of the nose. The tragus or operculum of the ear is shaped like a small leaf more or less dentated. Their tongue, capable of great extension, is terminated by papillæ, which appear to be so arranged as to form an organ of suction, and, further, their lips have tubercles symmetrically arranged. These are American animals, which run upon the ground with more facility than the other Bats, and (along with the Vampyres and Long-tongued Bats) are in the habit of sucking the blood of animals.

Having already, under the genus Vampyrus, treated so fully of the characters and habits of the Phyllostomes, little additional will be required in this place. The alar membranes are of large dimensions, arising from the additional phalanx of the middle finger, viz. the unguinal one, which, however, has no nail, but a cartilage bent and drawn inwards by the membrane. The interfemoral extends across from limb to limb, and usually projects outwards; at the same time this great extent receives but an inconsiderable support from the os coccyx. Some of the Phyllostomes are destitute of tails; and among those in which they appear they are usually short, and very partially engaged in the membrane, piercing it either above or beneath.

(A.) Tail-less Javelin-Bats.

1. PHYLLOSTOMA PERSPICILLATUM.—SPECTACLED JAVELIN-BAT.

Syn. La Lunette.—Cuv. Regn. Anim. I. 117.
Icon. Phyllostoma perspicillatum.—Geoff. Ann. Mus. XV. pl. 11, (head.)
D'Orb. Voy. (Mamm.) pl. 9, fig. 7 and 8.
Grand fer-de-lance.—Buff. Hist. Nat. Suppl. pl. 74.

SPECIFIC CHARACTERS.

The Hair dark brown above, light brown beneath; a white band extends from the nose to each ear.

The Nasal Appendage short, furrowed towards the point.
Inhabits South America. Also Hayti.

The Spectacled Javelin-Bat was designated the *Grand fer-de-lance* by Buffon, and yet, according to M. Geoffroy, it is of smaller dimensions than the *Common* one bearing the name. Its extreme length from the tip of the nose to the extreme part of the interfemoral membrane is five inches; its extreme breadth eighteen inches. The muzzle is short and broad; the lower incisors are regularly placed between the canines, which are far apart, and the two internal ones are bilobed; the external ears are slightly emargined at their external border, and the opercula are deeply denticulated; an irregular row of warts encircles the lips, and there are considerable excrescences on the articulations of the third and fourth toes; the interfemoral membrane forms an entering angle with the hind-feet, and the inferior support it receives is inconsiderable on account of the diminutive size of the bony spurs. The nasal leaf is formed of a strong central part, with membranes at its sides, which do not extend quite to the point; it is sloped, oval-shaped at its lower extremity, and terminated in front by the common horse-shoe membrane. The fur is of a blackish-brown colour on the back, and of a light brown on the abdomen; a white line rises at the nose, and extends along the side of the head as far as the ear.

It has been clearly ascertained that this Phyllostome (and probably its congeners) is not only insectivorous, but is frequently a great annoyance to the agriculturist, from the immense quantities of ripe fruits it devours. Thus, in M. Geoffroy's 14th Leçon, (Cours de l'Hist. Natur.,) we have the following interesting particulars extracted from a letter of Dr Alex. Ricord, an able Naturalist, who has long resided in Hayti. "After leaving Hayti I preserved these animals alive, and fed them on Common Sapotas, (*Achras Sapota*,) the fruit of a Mammee tree, which they prefer to all others. Every evening, two hours after sunset, they leave the virgin forests which they frequent during the day, and, in flocks of thousands, precipitate themselves upon the Naseberry trees. I have often observed them bite indiscriminately every one of the fruits on the trees, to discover those which are ripe, for by the touch alone they cannot do this; and hence great mischief follows, for the fruit has but a slender hold of the tree, and falls on the slightest injury. Often have I noticed these animals suspending themselves on the wing, without changing their position, and devouring the ripe fruit with the greatest avidity. They do not quarrel much, but rather maintain a mutual good understanding. The noise which they in this way produce among the branches resembles that made by birds about to rest on ceasing their flight. They utter a feeble cry; and nothing can scare them away. Shots from a musket do not annoy them. I have watched these Bats throughout the whole night, and have seen them depart an hour before the break of day, betaking themselves towards the forests, where they reside, at the foot of the mountains, in places not far distant from human habitations."

Var. Superciliatum.—Reddish S. J. Bat.

Syn. Phyllostoma Superciliatum.—Pr. Max. Beitr. II. 200.
Chauve-souris obscure et rayée ou Ch. Première.—D'Azar. Quadr. Parag. II. 269.

We are inclined to consider the Ph. Superciliatum of Prince Maximilian to be merely a variety of the Spectacled Javelin-Bat already described; its ears are short, pointed, and white; the hair is dark brown; there is a white streak from the nasal appendage to each ear. It was found on the sea coast to the north of Cabo Frio.

2. PHYLLOSTOMA LINEATUM.—STRIPED JAVELIN-BAT.

Syn. Chauve-souris brune et rayée.—Azar. Parag. II. p. 271.
Phyllostoma lineatum.—Geoff. Ann. Mus. XV. 186.
Icon.

SPECIFIC CHARACTERS.

The Hair brown above, lighter beneath; four white stripes on the face, and one on the back.
The Nasal Appendage entire.
Inhabits Paraguay and Brazil.

This Striped Phyllostome, and the two which succeed, are founded upon the descriptions of the indefatigable D'Azara, and, though defective in the synonomy, and incorrect, in so far as he has identified them with previously described species, yet they so conspicuously bear the traces of his accurate hand, that it is impossible for a moment to doubt their specific and distinct existence. The Lineatum forms the second on his list, and he remarks that he had possessed many of them, and that they strongly resembled each other. Their length very nearly reached three inches, their extreme breadth fourteen. The colour of the fur is brown, lighter beneath. A white stripe commences at the coccyx, and runs in a straight line to the occiput: besides this great band, two others, which, like it, are white, extend from the nostril to the ear, at the elevated part of the hind-head, and two others, also white, from the angle of the mouth to the lower part of the ear. The ear is very narrow, and shovel-shaped, generally flat, but reflected on its edges. At about a line from the extremity of the muzzle, which is not acute, the horse-shoe membrane commences, from the centre of which springs the nasal one, forming an angle with the forehead of seventy degrees, extending four lines, and terminating in a point. D'Azara says nothing of its habits.

3. PHYLLOSTOMA ROTUNDUM.—ROUND-LEAFED JAVELIN-BAT.

Syn. Chauve-souris troisième ou Ch. brun.—Azar. Parag. II. p. 277.
Phyllostoma Rotundum.—Geoff. Ann. Mus. XV. 181.
Icon.

SPECIFIC CHARACTERS.

The Hair reddish-brown.
The Nasal Appendage entire, rounded at the extremity.
Inhabits Paraguay.

This Javelin-Bat was supposed to be the true Vampyre by the Spanish Naturalist D'Azara,—a mistake arising partly from the imperfect descriptions of these South American species, current in his day, and partly from his not being aware that most of them had never been described; hence he erroneously identifies them with their congeners. The length of this Bat is three inches and a half; its extreme breadth nearly seventeen. Its colour is brown, somewhat lighter underneath. The alar membrane arises from the tibia four lines from its articulation. The ear is acute, straight, eight lines high, and has a projecting operculum. The muzzle is rather acute than flat, and the nasal leaf, flatter than in most others, does not terminate in a point, but is rounded. The lower jaw is somewhat the largest, and the whole physiognomy may perhaps be considered by some as very ugly. In this description the colour, the rounded leaf, and the dimensions reaching only one half, distinguish this Bat from the true Vampyre. It is very common in Paraguay, where D'Azara says it differs from all the others, in running as swift as a Rat when on the ground, and in delighting in sucking the blood of men and animals.

4. PHYLLOSTOMA LILIUM.—FLEUR-DE-LIS JAVELIN-BAT.

Syn. Chauve-souris brun-rougeatre ou Ch. quatrième.—D'Azar. Quadr. Parag. II. p. 277.
Phyllostoma Lilium.—Geoff. Ann. Mus. XV. 186.
Icon.

SPECIFIC CHARACTERS.

The Hair reddish-brown above, lighter beneath.
The Nasal Appendage entire, length equal to its breadth, narrow at the base. The Jaws elongated.
Inhabits Paraguay.

D'Azara imagined that the animal described by him as his fourth species, under the appellation of the *Brun-Rougeatre*, was identical with Buffon's Fer-de-lance; but this is manifestly a mistake. The one in hand is three inches and a half long, and thirteen inches across the wings, and is destitute of a tail, whilst the hastatum has a tail, and measures seven inches by nineteen. Its ear is straight and acute; its eye, though small, is, according to Azara, somewhat larger than in his other Bats, and is placed equidistant between the ear and tip of the muzzle, which is very obtuse, and somewhat cleft. M. Geoffroy assigned it its specific name, from the resemblance of the leaf to that of the middle petal of the fleur-de-lis of heraldry; it is pointed at its tip, and as straight as that of the hastatum at its extremity, but it bulges out more, being as broad as it is long. D'Azara compares its form to that of a military spear.

5. PHYLLOSTOMA BRACHYOTUM.—BROAD-EARED JAVELIN-BAT.

Syn. Phyllostoma brachyotum.—Pr. Max. Beitr. II. 196.
Carollia Braziliensis.—Gray, in Mag. Zool. and Bot. II. 488.
Icon. Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair dark greyish-brown above; the points of the hairs sooty; lighter beneath.
The Ears short and broad. The Operculum short and rounded. The Nasal Appendage narrow and pointed.
Inhabits Brazil.

This Phyllostome might with as much propriety be designated broad-bodied as broad-eared. It is singularly broad across the shoulders, and short in the length of the body; head included, it is somewhat heart-

shaped, and its shoulders seem covered with a short mantle. The hair of the entire body is soft, tolerably long, and plentiful, of a dark russet colour all over. The hair on the throat is greyish-brown, dark at the points. The under part of the body is lighter, tending more to a greyish-brown. These animals fly about the dense foliage of the forests, and towards the approach of night. The only known specimen was captured by Prince Maximilian in his apartments near the Mucuvi in the Brazils.

6. PHYLLOSTOMA JAMAICENSE.—LEACH'S JAVELIN-BAT.

Syn. Artibeus Jamaicensis.—Leach, in Linn. Trans. XIII. 75.
Icon. Phyllostoma Jamaicense.—Horsf. in Zool. Journal, III. 236, and pl. 21, Suppl.

SPECIFIC CHARACTERS.

The Hair greyish-brown above, lighter beneath, and blueish.
The Nasal Appendages and Membranes nearly black. The sides of the nose without warts.
Inhabits Jamaica and Cuba.

This species was first described shortly, in the year 1820, by the late Dr Leach in Vol. XIII. of the Linnean Transactions as noted above, from a specimen sent him from Jamaica by a correspondent; and in the year 1827, the well-known Naturalist, W. S. Macleay, Esq., sent another specimen to Dr Horsfield from the Havannah, of which the Doctor supplied an excellent description in the Zoological Journal, after having compared it with the identical individual which had fallen into Dr Leach's hands, and which had formed a part of Mr Brooke's museum.

The body of this Phyllostome is robust, and covered both above and beneath with long silky hairs of a very soft texture; the colour of the body and head above is grey, inclining to brown, but without any tinge of yellow or red; underneath it is paler and blueish; the hairs above are darker at their extremity, so that the fur appears of darker and lighter shades, according to the position of the hairs, and underneath it has a silvery gloss on the surface. The wings, interfemoral membrane, and nasal appendages, are nearly black; the ears are narrow, rounded, and somewhat lengthened; the nose is covered at the sides with a soft down, through which a few bristly hairs are scattered; its leaf is horizontally somewhat undulated, is acute towards the point, and marked in front with striæ. Of the four upper incisors the two lateral ones are smaller; the lower are uniform in size, and regularly disposed. The interfemoral membrane is deeply excavated; the toes are uniform in length and size, and have all the same direction; the claws are partially covered by stiff projecting bristles. The lower lip is surrounded with a regular row of warts, and "the mouth is provided internally with a narrow, fimbriated, cribriform membrane." The specimens examined by Dr Horsfield had an expansion of the flying membranes, amounting to one foot and three inches; and the entire length from the muzzle to the extremity of the interfemoral membrane is four inches and ten lines.

7. PHYLLOSTOMA OBSCURUM.—SOOTY JAVELIN-BAT.

Syn. Phyllostoma obscurum.—Pr. Max. Beitr. II. 203.
Icon. Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair sooty-black above, ash-grey beneath.
The Ears nearly ovate. The Auricular Operculum very small, rather broad.
Inhabits Brazil.

This specimen was found by Prince Maximilian at Villa Viçoza, on the river Peruhype.

(B.) Tailed Javelin-Bats.

8. PHYLLOSTOMA HASTATUM.—COMMON JAVELIN-BAT.

Syn. Le Fer-de-lance.—Cuv. Reg. Anim. I. 117.
Vespertilio hastatus.—Linn. Gmel.
Icon. Phyllostoma hastatum.—Geoff. Ann. Mus. XV. pl. 11, (head.)—Pr. Max. Abbild.
Buff. Hist. Nat. XIII. pl. 33.—copied in Schreb. pl. 46, B.
Vespertilio perspicillatus.—Schreb. pl. 46, A.

SPECIFIC CHARACTERS.

The Hair varying from dark to light brown, sometimes tipped with grey.
The Nasal Appendages smooth on the margins. The Tail wholly engaged in the interfemoral membrane.
Inhabits Brazil.

Buffon first described this Bat under the appellation of *Fer-de-lance*, from the resemblance of its nasal leaf to the head of a spear. This appendage is undivided, without any ridge at its point, or any heel or pad; the middle line is somewhat elevated, and its base is so narrow, that the leaf seems as if supported by a slender petal; the horse-shoe, on the other hand, is broader than in any other species of the genus. It is a strong, robust-looking animal, largely endowed with membranes; its extreme length, including the head and membrane, is about seven inches, and breadth between nineteen and twenty inches. The fur is short, of a chestnut colour above, and fawn brown on the abdomen; the membranes are reddish-brown, and the leaf, ears, and limbs, of a blackish-brown. The muzzle is short and broad; the incisors regularly set between the canines, which are wide apart; the ears are long, and project upwards; a row of warts, in the form of the letter V, appears on the lower lip; the tail, half an inch long, is all but completely enveloped in the interfemoral membrane, which is prolonged as far as the toes, and is abundant.

9. PHYLLOSTOMA ELONGATUM.—SHORT-TAILED JAVELIN-BAT.

Syn. et Icon. Le Phyllostome à feuille allongée, (Ph. elongatum.)—Geoff. Ann. Mus. XV. 185, pl. 9.
Phyllostoma brevicaudum?—Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair reddish-brown above, lighter beneath.
The Nasal Appendage long, pointed, and entire.
The Tail free at the point.
Inhabits Brazil.

It is to M. Geoffroy that we are likewise indebted for all our knowledge of this very remarkable-looking species. He found it in the Paris Museum, and could learn nothing of its origin or history. This animal strikingly illustrates the superfluity of cutaneous texture with which this genus abounds; the wings are most ample, and the interfemoral membrane a large parachute; its lower margin springing at right angles from the ankles: the tail extends about one third of its length, and then perforates it, not, as in the former species, on the inside, but on the outside. The nasal leaf of this species surpasses in length that of all the other known species; it is terminated at its base by a sinuose border, and united in front with the horse-shoe, both being narrow at their junction. The ears are broad, striated, and straight towards the point; the operculum is notched as mentioned in the last species; the muzzle is large and short, a regular row of warts appears on the under lip, and the incisors are regularly arranged. Its extreme length from the snout to the inferior extremity of the interfemoral membrane is about six inches; its breadth across one foot four inches.

10. PHYLLOSTOMA CRENULATUM.—NOTCHED JAVELIN-BAT.

Syn. Le Fer crénelé.—Cuv. Reg. Anim. I. 117.
Icon. Phyllostome crénelé, (Ph. crenulatum.)—Geoff. Ann. Mus. XV. pl. 10.

SPECIFIC CHARACTERS.

The Nasal Appendage triangular, notched on the margin.
The Tail free at the point.
Inhabits South America.

This species was first noticed by M. Geoffroy in the year 1810, and we are not aware that any further information has since been added to his short, but excellent description. The French Naturalist found a specimen in the Paris Museum, and inferred that it came from South America. Its habits, accordingly, are quite unknown.

The most marked peculiarities of this interesting species are the striking indentations or notches upon the outside of the leaf of the nose and the projecting operculum of the ear, which at once attract attention on a front view of the animal, and from which it has received its specific name. The leaf is, moreover, singular in these respects, that it is the only one known in which the edge is straight, not curved, but like an isosceles triangle, or a serrated halbert head, and does not spring from the horse-shoe. Its muzzle is short, thick, and obtuse; its lower lip is studded with warts; its ears are broad, and nearly regularly oval; the tail extends more than half way down the interfemoral membrane; and its point, for more than a line, is free from the membrane, projecting on the inner side. The body is stout, and about two inches and a half long; the head is an inch; the ears ten lines, the leaf nearly six; the extreme breadth from the tip of the one wing to that of the other thirteen inches, the tail eleven lines.

11. PHYLLOSTOMA MACROPHYLLUM.—LONG-TAILED JAVELIN-BAT.

Syn. Das Grosblat.—Pr. Max. Beitr. II. 188.
Icon. Phyllostoma macrophyllum.—Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair sooty-black.

The Nasal Appendage very long and pointed. The Tail nearly as long as the body.

The Interfemoral Membrane marked with concentric lines, and semicircular.

Inhabits Brazil.

This Bat is found, though rarely, in the large forests which skirt the banks of the Mucuri. During the day they remain suspended by the rocks and trunks of trees. The interfemoral membrane is much longer than in most of its congeners, and the species can be at once distinguished by the semicircular rugæ.

12. PHYLLOSTOMA GRAYII.—GRAY'S JAVELIN-BAT.

Syn. et Icon. Phyllostoma Grayii.—Waterb.[1] in Voy. Beagl. II. 3, Mamm. pl. 2.

SPECIFIC CHARACTERS.

The Hair dark brown, mixed with grey. The Membranes sooty-black.

The Tail short, included in the interfemoral membrane.

The Under-lip with an ovate group of warts.

Inhabits Pernambuco, Brazil.

Mr Darwin informs us that this species appeared to be common at Pernambuco, (five degrees north of Bahia.) Upon entering an old lime-kiln in the middle of the day, he disturbed a considerable number of them: they did not seem to be much incommoded by the light, and their habitation was much less dark than that usually frequented as a sleeping place by these animals.

13. PHYLLOSTOMA? SYLVICOLUM.—RUSTIC JAVELIN-BAT.

Syn. et Icon. Lophostoma sylvicola.—D'Orb. Voy. Mamm. pl. 6.

SPECIFIC CHARACTERS.

The Hair on the face brown, whitish beneath the neck, elsewhere grey.

The Nasal Appendages entire, long, pointed.

The Ears divided by a membrane into two compartments.

The Tail short, free at the point.

Inhabits South America.

This animal is only known to us through the beautiful drawing of M. D'Orbigny. As that Naturalist has not yet published the characters on which he reposes the genus Lophostoma, we are unable to speak with certainty thereon; but from the appearance of the cranium, we are inclined to regard it as a Phyllostome which had lost two of the lower incisors through the development of the canines.

DOUBTFUL SPECIES.

1. Ph. Planirostre, (Spix, Sim. et Vespert. Bras. pl. 36, fig. 1.)—The head is broad, and depressed above: sides of the nose studded with verrucose tubercles, the lower margin of the nose-leaf is free and hanging; lips notched at the margin; chin not deep but broad.

It frequents the suburbs of St Salvador.

2. Ph. Childreni (Gray, in Mag. Zool. and Bot. II.) has the lower lip studded with an half ovate group of crowded warts. It is brown, slightly grizzled, hairs grey-tipped; it is greyer beneath; ears large, membraneous, rounded at the ends; nose-leaf ovate, lanceolate, rather longer than wide; wings brown; warts of lower lip in three or four arched series; expanse twelve inches.

It inhabits South America. Specimen in British Museum, received from J. G. Children, Esq.

3. Ph. Bennetti, (Gray, loc. cit.)—We are informed that, on the front of the lower lip of this Phyllostome, there is a small ovate space formed of two small tubercles, as in the Vampyre. Its colour is fulvous brown, rather paler beneath; hair is very long, soft, with greenish tips; ears very large, rather acute; nose-leaf very large, ovate, lanceolate, with a thick convex midrib; wings brown. Expanse twelve inches; nose-leaf eight lines.

It inhabits South America. Specimen in the British Museum.

4. Ph. brevicaudum, (Pr. Max. Abbild. and Beitr.)—The length of this species is described as about two inches and three lines, and the extreme breadth eleven inches; the ears are broad, and the short tragus is narrow and lance-shaped. The muzzle is broad and obtuse; the interfemoral membrane springs from the upper part of the ankle, and, approximating the tail, is crescent-shaped. The fur on the body appears to be copious; it is russet brown on the head and back, and somewhat paler underneath. The ears, nasal leaf, and membranes, are dark brown. It is gregarious in the old buildings of Coroaba, and in the Brazilian forest on the banks of the Jucu.

Is this not the young of Ph. elongatum?

Note.—Phyllostoma soricinum, Geoff., belongs to the Genus Glossophaga.

Phyllostoma Spectrum, Geoff., belongs to Vampyrus; probably also Ph. soricinum, cirrhosum, and bidens of Fischer, (Syn. Mamm.)

DOUBTFUL GENUS AND SPECIES.

1. Monophyllus Redmanni, (Leach, in Linn. Trans. XIII. 75.) This species was sent to the British Museum by R. S. Redman, Esq.; and Dr Leach precipitately regarded it as entitled to a generic distinction from having four incisors in the upper jaw, and none in the lower. This animal had a short tail, and the nose-leaf was erect. The colour above, as of the membranes, ears, and nose-leaf, was brown; beneath mouse-coloured. The ears were round, and the beard long.

GENUS XII. GLOSSOPHAGA.—LONG-TONGUED BATS.

Syn. Les Glossophages, (Glossophaga.)—Geoff. Mém. Mus. IV. 418, et al.
Diphylla.—Spix, Sim. et Vespert. Bras.—D'Orb. Voy.
Madateus.—Leach, in Linn. Trans. XIII.
Phyllophora, Anoura, and Brachyphylla?—Gray, in Mag. Zool. and Bot. II.

GENERIC CHARACTERS.

The Head broad. The Muzzle produced and narrow.

The Ears small, with an operculum.

The Nasal Appendage double; the upper one erect, almost hastate small; the lower blending into the upper lip.

The Tongue very long, extensile, slender, channelled, and rough, with reversed papillæ.

The Interfemoral Membrane imperfect or wanting.

The Tail short or wanting.

The Dental Formula $2\left|\frac{2+C+(4\ F+2)M}{2+C+(3\ F+3)M}\right.=\frac{18}{18}=36.$

Inhabit South America.

M. Geoffroy (Mém. du Mus. IV. p. 418) separates from the Javelin-Bats those species having the tongue slender, capable of extension, and furnished with papillæ resembling hairs. To these he assigns the name of Glossophaga, all of which are likewise from America.

By the above arrangement of M. Geoffroy, proposed in the year 1818, the blood-sucking Bats were thus divided into three groups, Vampyrus, Glossophaga, and Phyllostoma, their natural arrangement, according to him, being in the order in which they are above enumerated.

The chief distinction of the Glossophaga, as may be supposed, is founded on the characters of their tongue, which is very long, straight, extensible, and capable of longitudinally folding upon itself. Its length is so great, that, after death, it generally projects to a great extent from the mouth, and it is next to impossible by any means to return it: hence these animals are usually represented with this member protruding. But the most remarkable peculiarity of their tongue consists in its edges, or what may be called its border. It has the power of being folded superiorly upon itself from side to side, so that there is a deep hollow, or rather a true canal, formed throughout its whole extent; the edge being surmounted with small papillæ, and covered with ciliæ. Pallas long ago represented this in his Spicilegia Zoologica, both of the natural size, and as seen under the microscope. It will be recollected that, whilst dwelling upon the sucking apparatus of the Vampyres, we remarked that particular attention had been paid to a number of warts, which were arranged in a circular form upon the centre of the tongue, and considerable discussion maintained upon the manner in which these acted in the production of a vacuum. But, however admirably those parts may in them discharge this function, their efforts are feeble when compared with this interesting piece of anatomy in the glossophagæ. The resources in these latter for the production of a vacuum is augmented in proportion to the

[1] Waterh. in Voy. Beagl.—The Zoology of the Voyage of H.M.S. Beagle, under the command of Captain Fitzroy, R.N., during the years 1832 to 1836, published with the approval of the Lords Commissioners of Her Majesty's Treasury. Mammalia by George R. Waterhouse. London, 1838.

number of the points of the tongue they apply; and it is manifest, that the whole organ is engaged in the operation.

The cranium, moreover, is broader, and proportionally quite as long as that of the Vampyres; its case also is more voluminous, and the maxillary bones by no means so contracted, hence the teeth are freer during their growth. The incisors are persistent, and regularly arranged. The head is long, and remarkably conical. The extremity of the muzzle is slender; the leaf is very near its extremity, and inconsiderable in size. Its mantle, likewise, is not remarkably large, the interfemoral membrane especially being sometimes very small, or even quite deficient.

On examining the several species, it will be found that there is a strong resemblance in their heads and nasal apparatus, and that the most striking characters are to be found in the interfemoral membrane; in some it is sufficiently ample, whilst in others it is very insignificant, and almost rudimentary; at one time, again, there is a tail, and at another none.

Pallas foresaw that the presence or absence of this appendage might be construed into a characteristic distinction of the two sexes. He accordingly reports that he had seen many individuals of the species he described, and that he never observed in any of them, male or female, the slightest vestige of a tail,—*caudæ nullum vestigium.* In the Knot-tailed Bat, which, by the extent of its interfemoral membrane, closely approximates to Pallas' animal, the tail exists: it is a very small appendage, which is not prolonged beyond a fourth of the extent of the membrane, and which appears externally as a mere point or nodosity. It might be designated a tubercle, manifesting the tendency of the tail to render itself free.

1. GLOSSOPHAGA SORICINA.—PALLAS' LONG-TONGUED BAT.

Syn. Vespertilio soricinus.—Linn. Gmel. I.
Leaf-Bat.—Penn. Quadr. No. 498.—Shaw, Gen. Zool. I. 141.
Icon. Phyllostoma soricinum, (Musette.)—Geoff. Ann. Mus. XV. pl. 11.
Vespertilio soricinus.—Pall. Spicil. Zool. III. pl. 3 and 4.—Copied in Schreb. Säugth. pl. 47; and in Buff. Hist. Nat. Suppl. III. pl. 53.

SPECIFIC CHARACTERS.

The Hair greyish-brown above, whitish beneath.
The Interfemoral Membrane broad. The Tail wanting.
Inhabits Surinam and the Carribbee Islands.

This species is found in Surinam, and in the islands which lie near the coast. The account which Pallas supplied, both of its external characters and anatomical structure, is drawn up with the usual ability of this Naturalist, and leaves nothing to be desired. It is small when compared to the Phyllostomes. Its muzzle is proportionably long and stout; hence the canines are wide apart; the incisors are not crowded, and are in a single row. The nasal leaf is small, and at the very extremity of the snout; it is in the shape of a heart, broadest at its base in the males, and terminating in an acute point. The ears are small and oblong. The interfemoral membrane starts upwards from the ankle, making rather an acute angle with the tibia, and is supported by very short spurs or ossicula. The tongue is very large, remarkably long, and formed into a deep canal, whose edges are covered with papillæ, which overlap, and resemble minute hairs. This deep furrow can, without doubt, be converted during life into a regular tube or cylinder; and it is through these canals that the blood, in which these animals delight, flows while they feed. The fur of this animal is soft and woolly; its back is of a greyish-brown; its abdomen whitish. Its dimensions from the tip of the snout to the origin of the tail is scarcely two inches; its tail does not exceed two lines; its extreme breadth is nearly nine inches.

2. GLOSSOPHAGA AMPLEXICAUDATA.—KNOT-TAILED LONG-TONGUED BAT.

Syn. Phyllophora amplexicaudata.—Gray, in Mag. Zool. and Bot. II.
Icon. Glossophaga amplexicaudata.—Geoff. Mém. Mus. IV. pl. 18, A. Pr. Max. Beitr. II 208.—Spix, Sim. et Vespert. Bras. pl. 36, fig. 4.

SPECIFIC CHARACTERS.

The Hair dark greyish-brown above, paler beneath.
The Interfemoral Membrane broad. The Tail short, included in the interfemoral membrane, and ending in a nodule.
Inhabits Brazil, about Rio Janeiro.

This species was first discovered in Brazil by the younger Delalande, who transmitted it to Paris, where it was examined and classified by M. Geoffroy in 1818. It is one of that section that has rather a large interfemoral membrane and a tail. The length of its head and body is three inches; of the tail two lines, of the nose-leaf scarcely two lines, of the external ear one and a half line; extreme expanse, ten inches and two lines. The nose-leaf is spear-shaped and pointed; the lip is fissured and notched on the margin; the ear naked, and without a margin; the alar membrane is long, rather narrow, naked, and, near the body and joints, ornamented with rows of spots. The fur of the whole body is very copious, soft, and longish; above it is of a dark greyish-brown; beneath the colour is paler.

It inhabits the houses of Rio Janeiro, and is common throughout Brazil.

3. GLOSSOPHAGA CAUDIFERA.—FREE-TAILED LONG-TONGUED BAT.

Syn. et Icon. Glossophaga caudifera.—Geoff. Mém. Mus. IV. pl. 17.—Dict. des Sc. Nat. XI. p. 118.—Desm. Mam. No. 178.—Gray, in Mag. Zool. and Bot. II.

SPECIFIC CHARACTERS.

The Hair dark brown.
The Interfemoral Membrane very short. The Tail free at the point.
Inhabits Brazil, near Rio Janeiro.

The Free-tailed Glossophaga was also discovered in Brazil by M. Delalande, and was examined by M. Geoffroy, although the details of its organization have as yet been scantily provided. The interfemoral membrane is very short and narrow, forming but a slender margin from the spurs to the coccyx; the tail is very short, and yet projects somewhat beyond the membrane, The ears are of rather small dimensions, with a small operculum; the lower lip is deeply fissured; the horse-shoe is well marked; the nose-leaf disrinctly marked, broad, and not high, but pointed; a copious supply of small bristles surrounds the nose and lower lip. It is a trifle longer in its proportions than the preceding species. Its colour is dark brown.

This species was discovered in the Brazils, near Rio Janeiro.

4. GLOSSOPHAGA ECAUDATA.—TAIL-LESS LONG-TONGUED BAT.

Syn. Anoura Geoffroyi.—Gray, in Mag. Zool. and Bot. II.
Icon. Glossophaga Ecaudata.—Geoff. Mém. Mus. IV. pl. 18, B.—Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair dark brown above, paler beneath.
The Interfemoral Membrane very short. The Tail wanting.
Inhabits Brazil, near Rio Janeiro.

The length of the head of this species is eleven lines, of the body two inches and five lines; the extreme expanse is about eleven inches and a half. The length of the auricle is almost four lines; of the nose-leaf two. The head is both long and broad; the body is proportionably stout; the lip is cleft; the nose-leaf triangular in shape, the spur small and pointed. The face is covered with minute bristles; the whole body is clad with soft hairs as in the mouse, longest on the back, where the colour is dark brown, and is paler underneath, merging to a greyish-brown.

M. Delalande found this animal near Rio Janeiro, and Prince Maximilian at Porto Seguro.

DOUBTFUL GENERA AND SPECIES.

1. Diphylla ecaudata, (Spix, Sim. et Vespert. Bras. p. 68, pl. 36, fig. 7.)—The peculiar distinctions of this proposed genus of Spix are a bifoliated nose-leaf, and a total absence of the interfemoral membrane and tail. The length of this animal is three inches, the extreme width between ten and eleven; its back is of a dark brown colour, the abdomen and under part of the head light brown; the wings are black, and almost naked.

2. Brachyphylla cavernarum, (Gray, in Mag. Zool. and Bot. II. 489.)

Specimens of this Bat are to be found in the Museums of the British Museum and of the Zoological Society, having been received from St Vincents, West Indies. The following is Mr Gray's description of the generic characters: "Tail very short, interfemoral membrane deeply nicked, two rayed; nose-leaf small, surrounded by a deep groove, which separates it from the face; front of under lip with a smooth triangular space bearded on the edge."

3. Manatæus Lewisii, (Leach, in Linn. Trans. XIII. 81.)—This animal constituted the seventh and last genus of Dr Leach's Nose-leafed Bats. It had four incisors above and four below; two nose-leaves, one horizontal, the other vertical, and no tail. The specimen described formed part of Mr Brooke's Museum, and was sent from Jamaica by Mr D. Lewis. Its extreme expanse was seventeen inches. Its colour generally black; its teeth were transversely striated, and the interfemoral membrane acutely emarginated.

TRIBE III.—MONOPHALANGIA ISTIOPHORA.

Syn. Istiophori, (in part.)—Spix, Sim. et Vespert. Bras.
Rhinolophina.—Gray, in Mag. Zool. and Bot. II.—Less. Mam.

CHARACTERS OF THE TRIBE.

The Index with only one ossified phalanx, the other fingers with two.
The Nose with one or more leafy appendages.

GENUS XIII. MEGADERMA.—BROAD-WINGED BATS.

Syn. Les Mégadermes.—Cuv. Reg. Anim. I. 118.
Megaderma.—Geoff. Ann. Mus. XV. 197, et al.
Lavia.—Gray, in Mag. Zool. et Bot. II.

GENERIC CHARACTERS.

The Dental Formula $\frac{4}{2}\left|\frac{C+(F+3)M}{2+C+(2\ F+3)M}=\frac{10}{16}=26.\right.$

The Nose with three appendages, the upper one vertical, the second horizontal, and the lower resembling a horse-shoe.

The Ears very large, united over the forehead ; the opercula prominent.

The Tongue short and slender.

The Interfemoral Membrane bounded by a straight margin.

The Tail wanting.

Inhabit Africa and the East Indies.

The Broad-winged Bats have their nasal appendages as complicated as those of the Phyllostomes ; the opercula are large, often furcated ; the conchæ of the ears are very ample, and blended one into the other on the top of the head ; the tongue and lips are smooth ; the interfemoral membrane entire ; and the tail wanting. Their incisors are four in the lower jaw ; these teeth are wanting in the upper, and the intermaxillary cartilage never becomes ossified.

They all come from different parts of the Old Continent, such as Africa, and the Eastern Archipelago ; and, like the Phyllostomes, may most readily be distinguished among themselves by the forms of their nasal appendages.

The Megadermata constitute a link in the animal series which, in an interesting manner, connects the Phyllostomes we have left, with the Genus Rhinolophus, to which we next proceed. This link is in itself perfectly circumscribed, and on either side there is an interval or hiatus which is distinctly marked. The Broad-winged Bats are furnished with an operculum, and have no tail, so that they cannot be confounded with the Rhinolophi. In these points they agree with the Phyllostomes, but then they want the long tongue, and the extraordinary papillæ and warts with which these last are furnished : neither their tongue, nor their lips, which are smooth, and without notches or tubercles, are peculiarly formed for the purpose of sucking. They are not endowed with the additional phalanx upon the middle finger, and yet none of the Bats are more copiously supplied with the dermal development, as it respects the wings and other parts. The ears are so large that they not only come into contact, but unite to a greater or less extent above the forehead. The nasal appendage likewise so superabounds, that, in addition to the horse-shoe, and nose-leaf proper, there is an additional one which protrudes on either side horizontally from between the nostrils, and acts as a distinct valve to these apertures. M. Geoffroy speculates whether it be owing to the extraordinary development of this apparatus that there is a diminution, or rather, we might say, extinction of the intermaxillary bones, and decidedly inclines to this belief. Be this, however, as it may, the fact remains the same, viz. that the intermaxillary bones are either quite wanting, or degenerate into mere membranes, which are suspended in the soft parts of the upper lip : their absence accounts for the want of the upper incisors.

The species in this genus have no tail, but possess an interfemoral membrane, which is of very considerable dimensions ; and, to make up the deficiency arising from the want of the former appendage, we find there are two strong ligaments which have their origin in the sciatic region, and run obliquely to the heels ; they are inclosed in the coats of the membrane, and contribute to its support.

The geographical distribution of these Megadermata, as well as of the Rhinolophi, is the Old World, more especially the Indian Archipelago, though they are also found on the continents of Asia and Africa ; whilst the Phyllostomes, as we have seen, are confined to the New World.

1. MEGADERMA SPASMA.—TREFOIL BROAD-WINGED BAT.

Syn. Le Spasme de Ternate.—Cuv. Reg. Anim. I. 118.
Megaderma Spasma.—Geoff. Ann. Mus. XV. 198.
Cordated Bat.—Penn. Quadr. No. 499.
Le Trêfle de Java.—Cuv. Reg. Anim. I. 118.
Megaderma trifolium.—Geoff. Ann. Mus. XV. 197.
Icon. Geoff. Ann. Mus. XV. pl. 12, (heads Spasme and Trêfle.)—Seba, pl. 56, fig. 1, copied in Schreb. pl. 48, and again from the latter in Shaw, Zool. pl. 42.

SPECIFIC CHARACTERS.

The Vertical Nasal Appendage ovate or cordate, resembling the horizontal ; size, one-fifth of the auricle.

The Opercula bi- or tri-lobed.

Inhabits Ternate and Java.

This very singular-looking Bat has long occupied a place in the annals of the science, without much being actually known of its history. It is the *Glis volans Ternatanus* of Seba, and the *Vespertilio Spasma* of Linnæus and Cuvier, in Tab. Element. des Animaux. Long after the discovery of Seba, M. Leschenault de la Tour encountered in Java a Bat, which he sent, along with a description, to Paris, where it fell under the inspection of M. Geoffroy, who regarded it as a new and distinct species, a view which subsequently was adopted in the Regne Animal, and in most systematic works. Additional information, we apprehend, has led M. Temminck and J. B. Fischer to regard these animals as one.

The *Spasma* exhibits very strikingly the three-crested appearance of the nasal appendages of the genus. It has first a large horse-shoe, then what is called the horizontal leaf, and, finally, the perpendicular one ; these latter are heart-shaped, with the base downwards ; the lower is the larger, and more immediately covers the entrance of the nostrils. The name *Trifolium* has been applied to this animal from the peculiar shape of its very large operculum, having three not very symmetrical lobes, the central one of which is much the longest, and is acutely pointed. The auricles correspond to the great size of the opercula : they are very broad, full, and high ; they meet over the forehead, and are there united to about one-third of their extent. The only other specific differences which require to be dwelt upon regard the membranes. The spurs or spicula of the tarsus are long, so affording firm support to the interfemoral membrane, and the alar membranes are very diaphanous, being freer from tendinous fibres than some of their congeners. Its fur is very long and soft, and its colour is mouse-grey. Seba described the animal he observed as having its forehead a light red, and the other parts of its body of a russet hue. The length of the head and body is four inches, of the interfemoral membrane one and a half, the extreme breadth ten and a half inches.

The last named observer found this animal in the island of Ternate, and Leschenault in Java. Of its habits nothing has yet been recorded.

2. MEGADERMA LYRA.—LYRE-NOSED BROAD-WINGED BAT.

Syn. La Lyre.—Cuv. Reg. Anim. I. 118.
Icon. Megaderma Lyra.—Geoff. Ann. Mus. XV. 198, pl. 12, fig. and cranium.

SPECIFIC CHARACTERS.

The Vertical Nasal Appendage rectangular ; the horizontal one-half less.

Inhabits India.

The size of the Lyre-nosed Bat very nearly agrees with that of the preceding species. M. Geoffroy received a specimen of the animal from Holland, and hence inferred it must have been procured from some of the Dutch Colonies in the East Indies : the name he conferred on it agrees perfectly with the form of the nasal leaf. Mr Gray informs us there is a specimen in the British Museum.

The mid-rib of the nose-leaf appears more prominent than in the Phyllostomes, though in reality it is not so thick ; the appearance being owing to a fold extending the whole length of the lateral lobes, which are somewhat hollow, and curve forward. The leaf at its upper extremity is square pointed, as may be proved by unfolding it, otherwise it seems to terminate in three points, the centre one being the most projecting. The lateral lobes are continuous with the horse-shoe, or the semicircular ridge situate before the nostrils. Besides these, there is the fold which covers the base of the cone ; it is concentric with the horse-shoe, and takes its rise from the root of the projection ; adhering

in its medial line to the cartilages which form the nostrils, it becomes in a measure a pair of auricles to these apertures, whose openings are lateral; this fold is about half the breadth of the leaf properly so called.

The ears are very large, and the portion which is united over the forehead exceeds that which is free above. The operculum consists of two lobes, in the form of half a heart; the internal lobe is round at its extremity, the external acute, and twice the length of the other. The interfemoral membrane includes three tendons, which take their origin at the coccyx, and run in a straight line, the lateral ones to the tarsi, and the middle one to the external margin in the course of the mesial line. These tendons appear useful in confining and folding the interfemoral membrane when required. The fur is red above, and fawn coloured below.

3. MEGADERMA FRONS.—SMALL-EARED BROAD-WINGED BAT.

Syn. La Feuille.—Cuv. Reg. Anim. I. 118.—Buff. Hist. Nat. XIII.
Megaderma Frons.—Geoff. Ann. Mus. XV. 198.
Lavia Frons.—Gray, in Mag. Zool. et Bot. II.
Icon. Geoff. Ann. Mus. XX. pl. 1, (head.)

SPECIFIC CHARACTERS.

The Vertical Nasal Appendage oval; size, one-half of the auricle.

Inhabits Africa.

This Bat, remarkable for the size of its nose-leaf, and described about seventy years ago by the accurate Adanson, was long forgotten by Naturalists. M. Daubenton, in the *Memoires de l'Acad. des Sciences*, first noticed it under the name of the Leafed-Bat. Its appendage is eight lines high, and six broad, a great size in proportion to that of the animal, which is only two inches and a quarter long from the tip of the snout to the extremity of the body. The ears are about twice the size of the nose-leaf, and these appendages are united above the forehead for half the extent of their inner margin; the operculum again is half the length of the external ear, and very narrow and pointed towards the extremity. The fur is of a beautiful ash-colour, having here and there shadings of a delicate yellow tint.

Adanson found it at Senegal; it is also stated to exist in Gambia and Egypt. Mr Gray reports there is a specimen in the British Museum.

IMAGINARY SPECIES.

1. M. Trifolium.—After the statements made above, we need scarcely remark that this alleged species is to be regarded as identical with M. Spasma.

GENUS XIV. RHINOLOPHUS.—HORSE-SHOE BATS.

Syn. Les Rhinolophes.—Cuv. Reg. Anim. I. 118.
Rhinolophus.—Geoff. Ann. Mus. XX. et al.
Hipposideros et Ariteus.—Gray, in Mag. Zool. et Bot. II.
Phyllorhina.—Bonap.
Noctilio.—Kuhl et Bechstein.
Vespertilio, (in part.)—Linn. et Erxl.

GENERIC CHARACTERS.

The Dental Formula $2\left|\frac{1+C+(2\,F+3)M}{2+C+(3\,F+3)M}\right.=\frac{14}{18}=32$

More generally $2\left|\frac{1+C+(2F+3)M}{2+C+(2\,F+3)M}\right.=\frac{14}{16}=30$

or, only $2\left|\frac{1+C+(F+3)M}{2+C+(2F+3)M}\right.=\frac{12}{16}=28$

The Muzzle obtuse. The Mammæ two, pectoral; two inguinal glands not lactiferous.

The Ears large, separated, without opercula.

The Nose with complicated membranes.

The Interfemoral Membrane entire.

The Tail middle sized, included in the interfemoral membrane.

Inhabit the Old World.

The Rhinolophi, commonly called Horse-shoe Bats, (Fers-à-cheval,) have the muzzle supplied with very complicated membranes and crests, attached to the chanfrin, and presenting some resemblance to a Horse's shoe: the tail is long, and included in the interfemoral membrane. They have four incisors below, and two very small ones above, placed in the intermaxillary cartilage. Two of the species, very common in France, were discovered by Daubenton.

The variations presented by the teeth of the animals composing this genus have long been a cause of annoyance to Naturalists and confusion in the Science, which M. Temminck has at last succeeded in removing. That distinguished Professor, as is well known, has long been engaged with several monographs on various tribes of the animal series, amongst others on these Bats; and we avail ourselves of the present opportunity to express our obligations to him, our admiration of his ardent zeal, and the successful issue of his labours. Generally two incisors are found in the upper jaw, but sometimes there are none:—they are connected with the intermaxillary cartilages, which again are connected with the nasal cartilage; they are obtuse, very small, sometimes scarcely visible, and often fall out in advanced age. The lower incisors are somewhat crowded, and are either bi-lobed or tri-lobed. The canines have a heel of very considerable size, which is developed with age, and yet does not displace the incisors as we have previously seen in other genera. The variation in the molars, which have three sharp cusps, is also remarkable. Sometimes there are four in the upper jaw and five in the under; and in this case there is no kind of anormal or false grinder:—sometimes again there are five above and five below; and when this occurs, we find an anormal tooth, not in the regular line of the teeth, placed externally upon the heel of the canine, and without any apparent use:—finally, again, there are sometimes five teeth above and six below, and then there is an additional false molar in the lower jaw. Thus we explain how the total number of teeth is twenty-eight, thirty, and more rarely thirty-two.

We have now in addition to notice, that the Rhinolophi are destitute of an intermaxillary bone connected in the usual way with the maxillaries; and this bone is replaced in those species which are furnished with upper incisors, (as already stated respecting the Megadermata,) with two small osseous laminæ, which are flat, very thin, diverging at their extremities, and touching each other in the middle; each of these small laminæ suspended in the nasal cartilage supports a tooth, not very firmly attached to these moving laminæ, and falling out under the slightest violence. Notwithstanding this, however, they do not regularly disappear, and when exposed to pressure they must yield and recoil, for the great majority of this group are generally found with these teeth in the adult state, and they are always in the young. Those species, again, which altogether want these teeth, are found destitute of them at every period of their existence, in consequence of the absence of the intermaxillary laminæ, which are replaced by a simple cartilage. This singular intermaxillary apparatus is put into action by sets of muscles, which give to this genus, as we have already noticed in others, the power of elevating or depressing the upper incisors; thus exhibiting in these Mammalia an analogy with the peculiar formation which exists in numerous Serpents. The posterior extremity of the nasal cartilage and the two bony laminæ are suspended at the anterior extremity of the vomer; and their movements seem to depend upon the organ of smell, which is very delicate in these animals, and to which we shall presently revert.

The Rhinolophi are quite destitute of the fibula, or smaller leg-bone; the tibia again is long and slender; and they have no great toe, which, as in the genus Dysopes, is separate and opposable to the others. The radius is much bent, and the accompanying ulna is remarkably short and rudimentary. The sternum is projecting, and its angle salient. As to the phalanges of the toes, the index finger has but one, and the others have two or three, the metacarpal bone being taken into account. The tail is long, and wholly or partially embraced even to its last articulation by the interfemoral membrane.

For a long time doubts were entertained as to the use which was to be ascribed to two abdominal papillary tubercles which were placed a little above the pubis; some authors believing they were a second pair of true mammæ. Kuhl, in speaking of one of the species, mentions that they had not appeared in the females of a year old, that they are scarcely visible in those that are two years old, and that they are not completely developed till the age of three. The same Naturalist also demonstrated that these parts were not mammæ properly so called, because they did not terminate in glands which served for the secretion of the milky fluid; he affirmed, on the other hand, that they terminated in the cavity of the pelvis. Curious to verify the observations made by M. Kuhl, as well as by Bechstein and others, M. Temminck informs us that he made minute investigations in half a dozen of species, and the result satisfied him that these nipples in no degree subserve the function of lactation, but give issue only to an oily and fetid secretion, which greatly increases the disagreeable odour which these animals exhale; and which confined to the males serves the same ends as the syphons or odoriferous glands which are observed in many other genera of the Chiroptera. They are found in most of the Dysopes, and in many of the Frugivori, in some Phyllostomes, and in the species *Speoris* and *nobilis* of our present genus.

It has been stated that the ear of the Rhinolophi possesses nothing which can supply the deficiency of the operculum or tragus; an asser-

tion which is true concerning some of the species. It applies to all those which have the nose-leaf simple and transversal, and which will be found arranged in the first section of the genus; in these we may say there is no operculum, or it is very imperfectly developed, their ear is straight, without the tragus, or any conspicuous lobe. On the other hand, all those species which have a complicated nose-leaf, or one in the form of a spear-head, and which go to form the second section of our arrangement, are possessed of an inferior lobe more or less distinct, and transversal, detached from the ear by a furrow more or less marked, and which effects the closing of the organ as completely as it is possible to conceive that any other apparatus could do. This lobe is in a remarkable degree developed in some species which belong to India, of which we may mention the *Trifoliatus*, *Luctus*, *Eurotis*, and *Diadema*; it is also very distinct in some of the European species.

The organ of smell presents a complication in this genus similar to what we have seen in the Megadermata, and such as we shall find in some genera which succeed. The nasal chambers do not extend beyond the first molars, and are tortuous and globose; the entrance to the nostrils is found in front and below; it is a large opening which the intermaxillary bones, reduced to two thin laminæ, terminate, and which accompany the motions of the lips; these latter parts, again, rising in folds as high as the chanfrin, leave between themselves and the nasal chambers a void space, at the bottom of which, and as it were in a tube, are the openings of the two nostrils, a fold of the skin protecting and clothing the tube, and forming a concha. This fold projects from the nostrils in the form of a horse-shoe, whence the Rhinolophi of Europe have derived their name; and it is detached and rises backwards in a leaflet which differs in form in the different species. The thickness of the lips results from the aggregation of the muscular fibres, which are entwined with each other and opposed in their course. The intermaxillary laminæ, and in their absence the mere cartilage which is their substitute, are moved by those fibres, and follow all the vibrations of the organ of smell.

The result of the inquiries hitherto made lead to the conclusion, that none of the genus Rhinolophus have as yet been found in America, nor in the region known under the name of Oceanica; the Sonda Islands, along with India, Asia, Africa, and Europe, supplying the types of the group.

The Rhinolophi, as we have seen of some other genera, spend a great part of the year united in bands of many hundreds of individuals of the several sexes in immense caverns, old buildings, or in the enormous trunks of the worm-eaten trees of the virgin forests. When the season of love is past, the females separate from the males, establish themselves in large bands in distinct caverns, and occupy themselves in each other's society, in the care of the two little ones they bring into the world; the males, at this period, also live in bands; and the social habits of the whole family are not resumed till the young ones are in a condition to provide for their own wants. M. Temminck informs us that he has reason to suppose that this kind of separation occurs among the majority of the Chiroptera, and that the young of the first year congregate by themselves.

We shall now make a few remarks upon the labours of those Naturalists who preceded M. Temminck in his meritorious exertions. Linnæus, Erxleben, and Bechstein, took into their accounts neither the dental, aural, nor odoriferous organization of these Bats, which so remarkably distinguishes them from all their European congeners, but associated them all under the common name *Vespertilio*. Linnæus, moreover, confounded the two distinct European species, ascribing their dissimilarity to a local and accidental cause, and classed them together under the name of *V. ferrum equinum*, and for a long time his disciples maintained the erroneous opinion of their master. Bechstein was the first who distinguished the European species into two, assigning the name *Hipposideros* to the second; mistaking, however, another animal for it. Daubenton was at last right, distinguishing them as the large and small Fer-à-cheval. M. Geoffroy afterwards published a memoir upon the Chiroptera with a compound nose-leaf, and separated these species under the generic title Rhinolophus, adding four foreign species; Cuvier adopted the views of his worthy colleague, and Dr Horsfield reviewing the species, added several from Java.

M. Temminck divides the genus into two sections; in the former of which he places all the species which have the nose-leaf not complicated, with a smooth edge, placed transversely, ribband-like, on the chanfrin; these have no distinct lobe at the base of the concha of the ear, or, at all events, it is very insignificant: this section has no representative in Europe. The second group includes those species which have the nose-leaf more or less complicated, elevated in the form of the *lance-head*, and having a cartilaginous leaf-stalk; these animals have a marked lobe at the base of the aural concha, and this lobe, more or less developed, is used in closing the auditory foramen, and is the substitute of the more largely developed tragus of the other genera of the Chiroptera. The two European species belong to this section.

(A.) With a simple Nose-leaf, transversal, and more or less circular.

(Hipposideros,) Gray.

1. RHINOLOPHUS NOBILIS.—KEBBLECK HORSE-SHOE BAT.

Syn. et Icon. Rhinolophus nobilis.—Horsf. Jav.—Temm. Mon. Mam. II. 10, pl. 28, pl. 29, fig. 1.

SPECIFIC CHARACTERS.

The Hair chestnut-brown above, paler beneath; on the sides of the neck, abdomen, and arms, whitish.

The Tail as long as the tibia.

The Nasal Appendage with the edge notched.

The Ears broad and pointed.

Inhabits Java, the Moluccas, and Timor.

This is the largest of the known Rhinolophi; its total length being about five inches, of which the tail and membrane occupy one and a half inch; its extreme breadth is nineteen inches. Dr Horsfield supplied a description of the first specimens which reached Europe, since which, M. Temminck has received others from Java and the Moluccas, and some from Timor. Its head is large; the ears are simply shell-shaped, nearly as broad as they are high, without any distinct lobe, and clothed with fur exteriorly at their base. The nose-leaf is simple, with its terminal edge notched somewhat like a crown; behind, and at the base of this leaf, there exist four small orifices or syphons, almost imperceptible to the naked eye; the horse-shoe discharges the office of a funnel, and consists of a broad membrane, which is pointed forwards, and of lateral folds; the tail is half the length of the fore-arm. In the adult the two upper incisors are approximated and converging; the four lower are lobed, and more or less crowded according to the development of the heel of the canines. There are five molars above, the one connected with the canine being very small, and without any apparent function. The fur is very soft and fine; it is also long, abundant, and shaggy. The shoulders and middle of the back are of a fine chestnut colour; below, the shoulders and the lateral parts of the back are pure white; the top of the head and the back of the neck are whitish-grey; the tips of the hair being brown; at the region of the head of the humerus a chestnut band surrounds the white; the sides of the chest, the flanks, and arms, are pure white; the cheeks and sides of the neck brownish-grey, the hairs tipt with white; the middle of the chest and abdomen mouse-coloured. The membranes are of a deep brown; the ears are clad nearly to their middle, the remainder is naked, and marked with striæ. These are the markings of the adult; those of the young and mean age are still wanting to complete the history of this beautiful species.

The *nobilis* appears, as already stated, to have a wide distribution. Two specimens exist in the museum belonging to the Honourable East India Company, and numerous specimens in those of the Netherlands. It issues from its native haunts in the evening, flying about the roads and shady walks, and during the day clings in preference to the leaves of the Banana-tree, (*Musa sapientum.*) It feeds on nocturnal insects. The Javanese call it Kebbleck.

2. RHINOLOPHUS DIADEMA.—DIADEM HORSE-SHOE BAT.

Syn. et Icon. Rhinolophus Diadema.—Geoff. Ann. Mus. XX. 263, pl. 6, pl. 5, (head.)—Temm. Mon. Mam. II. 12; pl. 26 and 27, copied from Geoff.

SPECIFIC CHARACTERS.

The Hair golden reddish-brown above, greyish beneath, and on the head.

The Tail as long as the tibia.

The Nasal Appendage resembling a crown; the upper margin rounded.

The Ears broad and pointed.

Inhabits Timor.

The Diadem Rhinolophus is somewhat less than the preceding, its length being five inches, two of which go to the tail, and the extreme breadth sixteen. The head is small in proportion to the size of the ears, which are large, and higher than broad, the pointed extremity being somewhat curved backwards; they are naked, diaphanous, and have something like a lobe towards the base of the concha. The nose-leaf is simple, the terminal edge being in the shape of a quadrant, more or less rolled upon itself; another transverse folicle, somewhat elevated into a point towards the centre, is found between the great leaf and the nostrils; its lateral margins unite with the horse-shoe, and orm, as pointed out by

M. Geoffroy, a kind of crown which surrounds the olfactory organ, several folds ornamenting the lateral margin of the horse-shoe. The tail is two-thirds of the length of the fore-arm, and free at the extremity. In the *adult state* the two upper incisors approximate, and the four lower are tri-lobed and ranged in a line; there are five molars above, the so called false one being very small, and attached to the heel of the canine; the five below have pointed cusps.

The remarkable difference between the crania of the *nobilis* and *Diadem* species requires the more ample detail, since the outward forms of the two are so much alike. The olfactory and auditory appendages present no other differences than those connected with the larger size of the former animal; their other dimensions are also proportional, and their colouring differs only in that of the Diadem being somewhat more uniform. The cranium of the *nobilis* is larger, owing to the greater width of the zygomatic arches, and the dilatation towards the auditory concha is more considerable; its chanfrin also is broader, and nearly flat, whilst in the *Diadem* the anterior part of the chanfrin is demi-spherical, and its back part forms a fossa with salient edges.

The fur of this animal is soft, fine, long, and abundant, of nearly a uniform colour every where, though somewhat deeper above than below. The head is brownish-grey; the upper parts a golden reddish-brown; the inferior parts a greyish-brown, the base of the hair being every where whitish, and the darker shade proceeding from the tips.

Two specimens of this species were brought from Timor by MM. Peron and Lesueur, and now form a part of the Paris Museum. One of them was sent by M. Geoffroy to M. Temminck for examination; and hence the satisfactory details we have been enabled to present.

3. RHINOLOPHUS INSIGNIS.—UNIQUE HORSE-SHOE BAT.

Syn. Rhinolophus insignis.—Horsf. Jav. in loc.
Rhinolophus vulgaris.—Ibid.—(Fem.)
Icon. Temm. Mon. Mam. II. pl. 29, fig. 2.

SPECIFIC CHARACTERS.

The Hair on the head and neck white; the body dark brown in the male; redder in the female.

The Nasal Appendage rounded on the margin, broad, three folds on each side of the horse-shoe.

The Ears broad, margin partially clipped, wanting the lobe.

Inhabits Java and adjacent islets.

The male of this animal was first described by Dr Horsfield in his Researches; and the descriptions supplied by Temminck of male and female were, he informs us, derived from an examination of not fewer than thirty specimens. The whole length of the adult is four inches, the tail occupying somewhat more than one; the extreme breadth is between twelve and fourteen inches. The nose-leaf, with a round edge, is broader than it is high; between it and the horse-shoe there is another leaflet, which is hairy, and flanked on both sides with three lateral folds. The *male* has, behind the leaf, a large syphon or bag, and on either side a small orifice which is scarcely visible, but which is made more conspicuous by three minute pencils of hairs. The ears are broad, trumpet-shaped, with the margin as if partially cut off, and without a lobe. The two incisors above, not far apart, are broad, and either bi-lobed or smooth; the four below are more or less crowded, the small false molar of the upper jaw being found in some individuals in its usual place close to the heel of the canine. This anomalous molar is not found in the old; and except in a minute point rising from the gum, scarcely leaves a trace. The fur is copious, smooth, and bicoloured above. The head and neck are white, the tips of the hairs being chestnut coloured; the extent of this whitish portion, waved with chestnut, is not confined solely to the neck, but is continued in a pointed shape towards the upper part of the back, and prolonged between the shoulders, whose colour, as well as that of all the other superior parts of the body, is a pure chestnut, though each hair is of the party colour already described. The neck, middle of the chest, and abdomen, are light brownish-grey, and the sides of the chest, at the insertion of the wings, are dullish brown, darker than the belly. The *female* is generally of a redder hue than the male. She has not the two lateral orifices, and the bag of the nose-leaf with which her mate is supplied; a minute orifice which is scarcely visible upon the living animal, and on the dead leaves no other trace than a few brown hairs, indicates the locality of the syphon of the male.

From the manuscripts of M. Van Hasselt, we have an interesting note on this species. We captured, it is stated, a great number on the shores of the island *Dwars in de Weg*, on the eastern side of Java, in the grottoes where the *Salanganes* (Cypselus esculentus) construct their nests. Their cry is feeble, and their odour particularly disagreeable. The little bag under the forehead is formed by a fold of the skin, whence there is a small tube to the frontal muscles; by a slight compression the bag may be extended, and then resembles an inverted finger of a glove. A red powder is secreted by this organ, which always covers the neighbouring projection, and exhales a penetrating odour. The above account has been confirmed by M. Müller, who gives, moreover, a particular account of the separate retirement of the two sexes already mentioned, and adds, that the young animal remains fixed to the body of the mother during the whole period of lactation.

4. RHINOLOPHUS SPEORIS.—CYCLOPS HORSE-SHOE BAT.

Syn. et Icon. Rhinolophus Speoris.—Geoff. Ann. Mus. XX. 261.—pl. 5, (head,) copied in Temm. Mon. Mam. II. pl. 27.—Schreb. Saügth. pl. 59, B.
Rhinolophe Crumenifère.—Peron, Voy. pl. 35.—Temm. II. 17.

SPECIFIC CHARACTERS.

The Hair white, and brown above in the male; reddish-chestnut above in the female; white beneath.

The Nasal Appendage and Ears as in the last species. A round Odoriferous Gland in the centre of the forehead.

Inhabits Java and Amboyna.

The total length of this Bat is about three inches and a half, of which the tail and membrane occupy one inch: the extreme expanse is somewhat more than twelve inches. The nose-leaf and folicle are precisely the same as in the species we have just left; as are also the teeth and cranium; whilst it should be remarked, as it regards the former parts, that the male has only one opening or syphon, without any trace of a lateral orifice, and as to the other, as well as the general dimensions, they are on a somewhat smaller scale. The fur is short, smooth, and bicoloured above. All the superior parts are covered with hairs which are partly white and partly brown in the male, and reddish chestnut in the female; underneath they are completely white; the insertion of the wings along the sides is light red.

M. Geoffroy states that he had always found the little bag in front empty, and could not therefore assign its use,—suspecting, however, it might secrete an odorous fluid which might attract insects. Temminck remarks that the apparatus exactly resembles the eye of a Cyclops with the eyelids closed, and that both the powder already mentioned, and the unctuous matter which it secretes, exhale a smell similar to that which has been previously noticed in the Bull-dog Bats, (Dysopes,) and the Phyllostomes of America, in which the matter issues from a gland situate on the chest. In *Dysopes pedimanus*, and in *Taphozous saccolaimus* of Java, there is a very large one under the chin; and in these two species the females are possessed of them as well as the males. Some of the *Roussettes* and *Pachysomata*, it will be remembered, exhibit these secretory organs, and only in the males; and, finally, we shall discover similar odoriferous glands in all the species, and in both sexes in the great majority of the *Vespertiliones*, the organ existing in front of the eyes, or above the orbit, and still more frequently near the nostrils. The emanations produced by this apparatus more or less occasion the disagreeable smell exhaled by certain species, and Temminck suspects it is the especial means by which the different sexes discover each other in the obscure and hidden retreats which they inhabit.

Hitherto this species has only been found in Timor and Amboyna. The two specimens in the Paris Museum are from the former island; those of the Leyden Museum are from Amboyna.

5. RHINOLOPHUS BICOLOR.—PIEBALD HORSE-SHOE BAT.

Syn. et Icon. Rhinolophe bicolore.—Temm. Mon. Mam. II. 18, pl. 29, fig. 3.

SPECIFIC CHARACTERS.

The Hair chestnut red, marked with white.

The Nasal Appendage surrounded by a notched membrane.

The Lower Lip with a large wart in the centre.

Inhabits Amboyna, Java, and Timor.

The Piebald Rhinolophus has a total length of two inches, three lines, (French,) of which the tail and interfemoral membrane occupies ten lines, and its extreme width varies from eight and a half inches to nine and a half inches; the ears are broader than they are high, with a round terminal margin, not cut out; there is also a very small distinct lobe, with an internal fold. The nose-leaf is small, and transversal, with a marked protuberance, besides the horse-shoe, which is surrounded with a notched membrane at its two extremities; there is a large wart in the centre of the lower lip, and a longitudinal one at either side. The two incisors of the upper jaw are broad, nearly approximated on their inner side, but distant at their base; the inferior four are tri-lobed; there are five molars on both sides, and the upper false molar is scarcely visible. The fur is long, very fine, smooth, and of two colours throughout. Above it is of a very pure white from the base two-thirds upwards, and is then of a chestnut red to the point, so that the white presents an irregular medley; the white prevails

still more below, because here only the actual points are tipt with brown. The membranes are light brown. This accurate description is drawn up by M. Temminck from the examination of fourteen specimens.

This small species was found by M. Van Hasselt in the bamboo buildings on the coast of Anjer: he says nothing of its habits. M. Boié captured it in the solitary woods on the banks of the Tjetarem, where it infests the dwelling-houses. It has been procured in the islands of Amboyna, Java, and Timor, those specimens brought from the first named place being somewhat larger than those from the second.

6. RHINOLOPHUS TRIDENS.—TRIDENT HORSE-SHOE BAT.

Syn. et Icon. Rhinolophe Trident.—Geoff. Ann. Mus. XX. 260, pl. 5, (head and cran.,) copied in Temm. pl. 27.
Geoff. Descr. Egypt. Hist. Nat. II. pl. 2, fig. 1.
Temm. Mon. Mam. II. 19.

SPECIFIC CHARACTERS.

The Hair light ash-colour.
The Nasal Appendage trident-shaped above.
Inhabits Egypt and Nubia.

This species is about two inches three lines long, of which the tail occupies eight lines; the extreme expanse is eight and a half inches. The ears are higher than they are wide, they have a round terminal edge, and no distinct lobe. The nose-leaf terminates in three points, trident-shaped. The two upper incisors are extremely small, and wide asunder; the lower four are crowded and tri-lobed. There are four upper molars, and no appearance of an anomalous tooth, either in the young or old; five below. The fur is scanty, short, and smooth, of a light white ash-colour; the pubis and thighs are naked. The horse-shoe covers the whole surface of the muzzle; but the nose-leaf is not complicated; it is broad at the base, and rises like a broad lance, the upper part of which terminates in three indentations; the ears are also broad, but not close down in front, owing to their being partially attached to the chanfrin. The tail is short, but remarkable in this respect, that, for a third of its length, it is free above the interfemoral membrane, which is cut square off, but makes up in breadth what it wants in length, and thus the lower part of the tibia is free from membrane.

M. Geoffroy reports that this species is found in the deepest excavations of the mountains, and especially in the most retired portions of the sepulchres of the Egyptian kings at the temple of Denderah. M. Ruppell captured many of them during his travels in Egypt and Nubia.

7. RHINOLOPHUS TRICUSPIDATUS.—LEAST HORSE-SHOE BAT.

Syn. et Icon. Rhinolophe tricuspe.—Temm. Mon. Mam. II. 20, pl. 29, fig. 4.

SPECIFIC CHARACTERS.

The Hair reddish-brown.
The Nasal Appendage with three points above.
Inhabits the Molucca Islands.

This is the smallest of the known Rhinolophi; its total length being two inches and three lines, ten lines of which go to the tail; the extreme expanse is about seven and a half. The ears are small, higher than wide, and pointed. The nose-leaf is large, and nearly square, terminating superiorly in three points, that of the centre being spear-shaped, and the lateral one drawing to a converging point. The horse-shoe is surrounded by a small rudimentary membrane. The extreme expanse is very great when compared to the very small size of the body; the interfemoral membrane also is large cut square, and surpassed to the extent of two lines by the free extremity of the tail. The two upper incisors are very fine, distant, and converging at their points; the four inferior are tri-lobed: there is a false bi-lobed molar in the upper jaw. The fur is short, fine, smooth below; of a clear reddish-brown above, but light brown at its base, the points on the back being blackish-brown; the colour is pure brown upon the side, and towards the croup; the membranes are blackish. MM. Macklot and Müller discovered this small species during their sojourn amongst the Molucca group.

(B.) Nose-leaf more or less complicated, the posterior leaflet being spear-shaped, and a foot-stalk rising from the centre of the horse-shoe.—(Phyllorhina, Bonap.)

8. RHINOLOPHUS LUCTUS.—MOURNING HORSE-SHOE BAT.

Syn. et Icon. Rhinolophe Deuil.—Temm. Mon. Mam. II. 24, pl. 30.

SPECIFIC CHARACTERS.

The Hair sooty black, with ash-coloured tips.
The Nasal Appendage shaped like a Maltese cross, rounded on the edges, and consisting of several leaflets.
The Ears very large, pointed, almost united at the base, with a large rounded lobe.
Inhabits Java.

The Mourning Horse-shoe Bat is much larger than any of our European species, being five inches long, of which the tail and membrane occupy one inch eight lines, and the extreme expanse is fourteen inches two lines, thus equalling the dimensions of the *R. nobilis*, our first species. The cutaneous system is excessively developed in the breadth of the wings, the immense size of the ears, and the nasal appendages, which so overshadow the countenance that its usual features cannot even be discerned: the wings withal are short in proportion to the volume of the body; the tail is as long at the hinder limbs, and its point exceeds the limit of the interfemoral membrane. The enormous ears are almost united at their base, and their mesial margins nearly touch; they are much pointed at their tips, which turn somewhat outwards; the conchæ are very broad, and have a great rounded lobe which is used to close the external foramen. The nasal apparatus is composed of a great number of leaflets. The horse-shoe is formed of a great membrane which overhangs the whole of the upper lip; it is connected at its extremities, and by a lateral prolongation to the first set of membranous leaflets which form the spear-head; from the centre of the horse-shoe springs the great leaf-stalk, supporting four leaflets, which form precisely a Maltese cross, with rounded edges; and behind the leaf-stalk the spear-head rises, composed of three rows of leaves, the first two of which are rounded, and the third pointed and blunt. There are two triangular warts upon the lower lip. The cranium seems to be in an extraordinary degree compressed between the zygomatic arches, in which a triangular cavity is formed, uniting the protuberance of the chanfrin to the strong and large coronal crest. The two upper incisors are fixed in the cartilage, are obtuse, and somewhat removed from each other; the four lower ones are tri-lobed and crowded. There is a sixth small and obtuse molar tooth in the lower jaw, placed between the false and true molars, without any fellow above, not in the line of the others, and without any apparent function.

The fur in this species is exceedingly long, abundant, and woolly; the head is nearly entirely covered by the hair, which does not pervade the membranes, but abounds on the coccygeal and pubic regions. The colour of the coat is the same in the two sexes: it is dull sooty-black, with the tips of the hairs light grey, so forming a slight ash-coloured cloud over the whole robe. The membranes and leaflets are quite black.

A female of this species was first discovered by M. Boié in the wild district of Tapos in Java; but several others have since been added to the Leyden Museum.

9. RHINOLOPHUS EURYOTIS.—BROAD-EARED HORSE-SHOE BAT.

Syn. Rhinolophus Euryotis.—Temm. Mon. Mam. II. 26.
Icon. Ib. pl. 29, fig. 5, (head.)

SPECIFIC CHARACTERS.

The Hair brown, tending to reddish above, and whitish beneath.
The Nasal Appendage very complicated, (see description.)
The Ears very broad, points turned outwards, with a broad lobe.
Inhabits the Molucca Islands.

The dimensions of the Euryotis are about three inches in extreme length, and a foot in extreme breadth. The cutaneous system and ears are greatly developed; the tail very short, only one-third the length of the tibia. Owing to the shortness of this appendage the interfemoral membrane has the appearance of a curtain which is drawn up in the middle, and, after it is dried, and the specimen prepared, the membrane forms a large semicircle, the extremities of which are connected with the cartilages of the tarsi. The ears are not united, and their points are turned outwards; the conchæ are very broad, much sloped, and give rise to a large round lobe, which closes the organ. There is a large spear-head behind the leaf-stalk, supporting a solitary leaflet, which is oblong, straight, and having a point which is dome-shaped; there is a small descending lobe upon each side of the nostril apparently intended to close that avenue: the horse-shoe is surrounded by a very broad uniform membrane, which conceals the upper jaw, and is united on both sides to the spear-head starting from behind the leaf-stalk. There are four great warts on the margin of the lower lip, and the gape is very wide. The two incisors above are very small, widely separated, and at-

tached to the edge of the cartilaginous laminæ; the under ones are trilobed, and crowded: there is a blunt false molar in the upper jaw.

The fur is bushy, coarse, and of many colours. On the upper parts of the body the hairs are white at the base, then brown like a decayed leaf, and light red at the point; the back and neck are quite brown; the face and sides of the neck light brown, the chest is whitish, with a shade of brown; the flanks are deep brown, and the middle of the abdomen light brown; the ears and nose-leaf are dark brown, and all the other membranes blackish-brown.

This description of M. Temminck's is taken from the examination of five individuals which MM. Macklot and Müller procured during their residence in the Moluccas.

10. RHINOLOPHUS TRIFOLIATUS.—TREFOIL HORSE-SHOE BAT.

Syn. Rhinolophus trifoliatus.—Temm. Mon. Mam. II. 27.
Icon. Ib.—pl. 31.

SPECIFIC CHARACTERS.

The Hair ash-red above; ash-brown beneath.

The Nasal Appendage with three leaves, complicated, (see description.)

The Ears broad, pointed, and much sloped; the lobe one-half the size of the concha.

Inhabits Java.

The discovery of this singular species was made by the Dutch traveller Van Hasselt in one of his peregrinations in the wild district of Bantam, where he found two individuals suspended in a large tree in the depths of the forest. The native inhabitants denominate it *Tyoma-maat*; and it is free from any disagreeable odour.

The size of this Trefoil Rhinolophus is in extreme length three inches, and in extreme breadth twelve. The tail is as long as the tibia; the cutaneous system is very complicated, and much developed, the alar membranes being large, as are the ears, which are broad, pointed, and much sloped; the inferior lobe is half the size of the superior, and forms a transverse fold, which can completely shut the meatus. The nose-leaf is double, the anterior one being transversal, rounded, and united by a slip to the great posterior leaf, which is shaped like a spear-head: the horse-shoe is also formed of two membranes, the outer of which forms a large border; the leaf-stalk, composed of a thick membrane, springs from the middle of the horse-shoe, and ascends nearly as far as the great leaf; it is divided into three pointed leaflets, not unlike the Clover leaf: there are also two large warts upon the upper lip. In the adult there are no incisors in the upper jaw; the four of the lower are crowded, and the mesial ones sometimes fall out; there is no small anormal tooth between the canine and first molar of the upper jaw.

The fur is very long, copious, and fine: the base of the muzzle, the eyes, and a portion of the ears, being hid under it. The upper parts of the body are of an ash red colour, lighter towards the head than on the back; the head and neck are reddish-white, the chest and abdomen ash-brown; the auricle and nasal membranes are yellow and blackish-brown at the points. The flying membranes are naked, of a light brown colour, but blackish-brown where they adhere to the body and fore-arm.

11. RHINOLOPHUS UNIHASTATUS.—GREATER HORSE-SHOE BAT.

Syn. Vespertilio Ferrum equinum α Major.—Linn. Gmel. I. 50.
Horse-Shoe Bat.—Penn. Quadr.—Shaw, Zool.
Rhinolophus Ferrum equinum.—Jenyns, Man.[1] p. 19.
Icon. Rhinolophus unihastatus—(unifer.)—Geoff. Ann. Mus. XX. pl. 5, copied in Temm. Mon. II. pl. 27.
Grand fer à cheval.—Buff. Hist. Nat. VIII. pl. 17, fig. 2, copied in Schreb. Saügth. pl. 62, (upper figs.)

SPECIFIC CHARACTERS.

The Hair grey in the male, reddish in the female.

The Nasal Appendage lanceolate, complicated.

The Ears notched on the outer margin.

Inhabits Europe, (including Britain;) Northern and Southern Africa.

The Greater Horse-Shoe Bat inhabits the quarries, where solitary individuals are found, suspended by their feet, and enveloped by their membranes so as to permit no other part of the body to be seen.

At length we arrive at the first British animal, next to Man, in the natural series. These diminutive animals are found in caves in the South of England, or in old buildings, such as Bristol and Rochester Cathedrals, Dartford Powder Mills, &c. Their range extends eastward, over France and Germany, to the borders of the Caspian Sea, and southward to the Cape of Good Hope.

These Bats are usually observed in company with Vespertilio murinus and auritus, very seldom in woods or gardens, but most commonly in old buildings, behind the partitions or wainscotting. Their hybernation is not by any means profound. It is no uncommon thing to see them flitting about during a fine day in winter, at a season when other Bats would inevitably perish. In spring they are the first of the tribe to awaken, and thus seem less susceptible of cold than any other species with which we are familiar.

As they resume their active functions at an early period of the year, it would have been difficult for them to find adequate means of support had not a wise instinct directed them to the ponds for food. Here they flutter for hours, with the head hanging downwards, and touching the water in search of the larvæ of insects. It was probably in accordance with this instinct that Nature has supplied them with their singular nasal appendage, which, acting as an inverted bell, may steady the head, and prevent it from becoming immersed. Spiders also contribute to their support.

The female commonly bears two young, after a gestation of three weeks; they are deposited in some crevice of the walls, and are able to cling from the moment of their birth; hence the crevice in which they are placed is often little more than a simple depression.

In warm days they are seen hanging or sleeping under the roofs of houses, and the slightest stroke occasions them to fall down dead. Owls, Weasels, and Cats, prey on them; their bodies are subject to the attacks of Acarus ricinus, which is found even during hybernation.

This species sometimes attains the length of four inches nearly, the tail occupying rather more than an inch, and the extreme expanse fifteen inches. Its wings are long, and of medium breadth; the tail, which is enveloped in the interfemoral membrane, is two-thirds the length of the fore-arm. The ears are large, pointed, distant, and with a sloping edge; the inferior lobe is distinct but small. The nose-leaf is doubly festooned at its base, terminates in a spear-head, which is covered towards its point with hair and some slender bristles. The horse-shoe is formed by a broad lateral membrane divided in front; a leaf-stalk, which does not support the lance-shaped membrane, springs from the middle of the horse-shoe. A solitary transverse wart is situated at the margin of the lower lip. The two upper incisors are scarcely visible, and have a weak attachment to the cartilaginous laminæ; the four under ones are crowded; the obtuse false molar is very small.

The fur is long but smooth; the hair bi-coloured above, and of one colour below, is long and straight on the front of the neck, covering the half of the fore-arm, and of the side membranes; the ears likewise are clad at the base, and in the interior of their posterior edge. The superior parts of the male are ash-coloured, with a shade of blue more or less deep, although all the hairs are whitish at their base. Underneath the colour is light grey, somewhat darker upon the fore-arm and flanks, the long hair on the front of the neck being fairer. The membranes are a dull black. In the female, the roots of the hair are white, and they are red or reddish towards the points; the under parts of the body are of a slightly red ash colour. M. Temminck mentions that, judging from the numerous specimens he has examined, he concludes that there are slight local differences of shade in the colour of the fur; the males of temperate and colder countries having the upper parts of their body of a very deep grey, and the females of a lively russet hue, whilst individuals in the south of Europe, Egypt, the Cape of Good Hope, have brighter tints, ash-coloured in the male, and light red in the female.

This species is found in some parts of Europe, particularly the south; also in the northern and middle portions of Africa. The majority of those received by M. Temminck were captured in the ruins of the old castle of Heidelberg. Bechstein informs us that they are very common in Thuringia.

12. RHINOLOPHUS JAPANICUS.—JAVANESE HORSE-SHOE BAT.

Syn. Rhinolophus Nippon.—Temm. Mon. Mam. II. 30. a.
Icon.

SPECIFIC CHARACTERS.

The Hair in the male brown above, ash-grey, tipped with brown, beneath; in the female, dull red above, white, tinged with red, beneath.

The Nasal Appendage complicated, much developed.

Inhabits Java.

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[1] Jenyns, Man.—A Manual of British Vertebrate Animals. By the Rev. Leonard Jenyns.—Cambridge, 1835.

This species, which has recently been sent in considerable quantities from Japan, is somewhat larger in all its dimensions than the unihastatus of Europe. Its alar membranes are sufficiently developed, but not in the same proportion to the size of the body; the tail, somewhat larger than half the length of the fore-arm, is wholly enveloped in the large interfemoral membrane, which is cut horizontally across; the ears are large, long, and terminated in a point; the broad and great horse-shoe, which is surrounded with two membranes, springs from the stem deeply hollowed and furrowed in front, and rises in an obtuse point; the spear-head is simple, formed of a single membrane, which is long and pointed; and quite covered with long hairs. One single warty excrescence pervades the whole of the lower lip. The upper incisors, wide apart, are placed at the angles of the moveable cartilage; the four lower ones are crowded, and tri-lobed. There are only four molars above, owing to the complete want of the small false one.

The fur is very long and silky; the ears naked, but with the lobe clad at its base. All the superior parts of the *male* are brown, although the base of the hairs is of a whitish ash colour, which makes the whole appear greyish-brown; underneath the hairs are ash-coloured at their roots, and tipped with brown. The membranes of the male have a brown tint; those of the *female* a slight rosy shade. The upper parts of her robe are of a dull red colour, although the base of the hairs is whitish; underneath she is whitish, with a slight tint of red.

This animal invariably differs from the unihastatus of Europe in the relative dimensions of the tail with the total length, and though the body is more robust, the wings are shorter and broader; the nasal leafy apparatus is also more developed, and the ears are larger and not so hairy. Lastly, the fur is longer, more silky, and less lustrous than in the above named Bat.

13. RHINOLOPHUS AFFINIS.—AFFINIS HORSE-SHOE BAT.

Syn. Rhinolophus Affinis.—Temm. Mon. Mam. II. 31.
Icon. Ibid. pl. 29, fig 6, (head,)—pl. 32, fig. 16 and 17, (cran.)

SPECIFIC CHARACTERS.

The Hair in the male sooty-brown above, ash-brown beneath; in the female, russet-brown above, reddish beneath.

The Nasal Appendage complicated. The Lower Jaw with four warts.

Inhabits Java and Sumatra.

This species was first indicated by Dr Horsfield, but in terms so laconic that it could not have been recognised without difficulty. M. Van Hasselt captured them in great numbers, in certain grottoes in Java and neighbouring islands, where they associate in great bands, suspended to the roof of the caverns; they live upon nocturnal insects, utter an insignificant cry when on the wing, and exhale a powerful odour.

The Affinis is of smaller dimensions than the unihastatus of Europe; the tail is half the size of the fore-arm; the ears are large, and terminate in a point; they are slightly keel-shaped, possessing a considerable lower lobe, whose point is rounded at the sides. The lanceolate leaf is united with a rounded follicle, and there is a strong leaf-stalk in the centre of the horse-shoe, which is surrounded by two membranes. There are four warts on the lower jaw, the central ones of which are triangular, and the external longitudinal. The upper incisors are wide asunder, the laminæ on which they are supported being separated by the intervening cartilage, they are also very minute, and on falling out leave no trace behind. The four lower ones are also very small; the fifth molar above is in the same line with the others, and forms a pointed false molar; the number of six molars in the lower jaw is made up by a very small tooth which rests upon the last two molars. The fur is abundant, somewhat rough, and of a uniform colour, covering the membrane which runs along the flanks underneath. The *males* are above of a sooty-brown colour, beneath ash-brown. The *females* above are russet-brown, beneath brightish red. The membranes are blackish-brown.

14. RHINOLOPHUS ROUXII.—ROUX' HORSE-SHOE BAT.

Syn. Rhinolophus Rouxii.—Temm. Mon. Mam. II. 30. b.
Icon.

SPECIFIC CHARACTERS.

The Hair in the males brownish above, light grey beneath; in the females bright red above, golden red beneath.

Inhabits Hindoostan.

This species has been designated by M. Temminck after M. Roux, a French Naturalist, who, with uncommon assiduity, commenced his labours in the vast field of India, and there speedily found his tomb. It appears to range over a wide space, is common in the museums of Pondicherry and Calcutta, and has been abundantly sent from other quarters to this country.

So far as is yet known, it has no incisors in the upper jaw, the cartilage appearing too thin and diaphanous for their support. It is possible, however, that they may appear at an early period of life, and the more so that M. Temminck has only examined adult specimens. The upper molars are of the same number as in the affinis; whilst the lower are only five, or one less, owing to the absence of the very small one. The fur is very short, cottony, and frizzled, and covers the body only, without forming any fringe along the membranes where attached to the sides. The *males* are above of a brownish shade, although the base of the hairs is ash-grey; underneath they are light grey, somewhat darker on the arm and flanks. The *females* are above of a bright red, although the tips of the hairs are reddish brown; the inferior parts are of a beautiful golden red; more rarely the tints are a pale russet above and an ash red beneath. The total length of this species is about three and a half inches, the tail occupying nearly an inch. The extreme width is nearly a foot.

15. RHINOLOPHUS CLIVOSUS.—CLOVEN-LEAF HORSE-SHOE BAT.

Syn. Rhinolophus Geoffroyii.—Smith, in Zool. Jour. IV. 433.
Rhinolophus Clivosus.—Temm. Mon. Mam. II. 32.
Rhinolophus Capensis.—Lichtenst. Doublet. p. 6.
Icon. Rupp. Atl. pl. 18.—Tem. pl. 29, fig. 7, (head,)—pl. 32, fig. 18, (cran.)

SPECIFIC CHARACTERS.

The Hair greyish-white.

The Nasal Appendage lance-shaped; the leaf-stem cloven in front.

The Lower Lip with a single wart.

Inhabits Egypt, Southern Africa, Dalmatia, and the Levant.

The tail of this species is a third of the length of the fore-arm, and much longer than the tibia. The ears are large, terminate in a point, are somewhat cut away, and supplied with five rugæ; the lower lobe, very large, is covered with hair, and completely shuts up the organ. The nose-leaf is simple, lance-shaped, somewhat elevated, and clad with hair. The leaf-stem is completely naked, (a remark which extends to all the species of this section,) and furrowed or somewhat cleft in front, (whence probably its name,) and rises from the centre of the horse-shoe, which is formed of a single membrane though funnel-shaped. A single wart is conspicuous on the margin of the lower lip. The two upper incisors, imperceptible to the naked eye, are wide asunder, the four lower ones are crowded, and have each three cusps; there are four upper molars, though sometimes there may be also a small additional anormal one, and five lower. The fur is long and copious, and abundantly covers the side membranes both above and below. The hair above is bi-coloured, below of a uniform tint. The upper portions of the body are whitish, the base of the hairs, which are tipt with grey, being of the tint of wine lees; the lower parts of the body are likewise whitish and of the same shade; all the membranes are black and diaphanous, having the colour of a light shade of China ink. The total length is about three inches, the tail extending to about eighteen lines; the extreme breadth is about a foot.

Specimens of this species have been derived both from the northern and southern parts of the African continent. It is common near Cape-Town, and M. Ruppell captured it in Egypt. Individuals from these two regions have been carefully compared, and no other difference can be detected than that the specimens from the Cape have the fur somewhat darker than those from Egypt. This animal is also found in Dalmatia and in the Levant, so that it may be classed in our catalogues as one of the European Mammalia.

16. RHINOLOPHUS BIHASTATUS.—LITTLE HORSE-SHOE BAT.

Syn. Le Petit Fer-à-cheval.—Cuv. Reg. Anim. I. 118.
Vespertilio hipposideros.—Bechst.
Rhinolophus bihastatus.—Geoff. Ann. Mus. XX. 259.
Icon. Geoff. loc. cit. pl. 5. (R. Bifer.)
Buff. Hist. Nat. VIII. 17, fig. 2.

SPECIFIC CHARACTERS.

The Hair white, with the tips reddish.

The Nasal Appendage lanceolate, erect, reddish; a second lance-shaped membrane in the centre.

Inhabits France and Germany.

The R. Bihastatus is rare even in the districts it most frequents. It is found both in Germany and France, delighting in old buildings and

caverns; in these it prefers those nooks which are most inaccessible and obscure, and hence is scarcely ever found without much difficulty. The size of the largest individuals is about three inches in length, with an expanse of about ten.

The tail is two-thirds the length of the fore-arm, and enveloped in the interfemoral membrane. The ears are very large, with the point bent outwards, much sloped, and more approximated than in the *unihastatus*; they have very large and well marked lower lobes. The nose-leaf is straight, lance-shaped, and covered with a few hairs; the horse-shoe is surrounded by three ranges of membranous folds; there is also a leaf-stalk which supports a second lance-shaped membrane which springs from the midst of the horse-shoe. There is a single wart upon the margin of the lower lip. M. Temminck informs us that he has not found incisors in the upper jaw at any period of life; the chanfrin is simply cartilaginous, and there is no trace of laminæ. The four lower incisors are extremely small. The first of the five molars of the lower jaw is in the same line with the others, and not at the heel of the canine as in the unihastatus. The whole fur is of a beautiful shining white colour, although in the adult the tips of the hairs in the superior parts of the body are dark coloured, a tint which extends to about a half of each hair in the young. The membranes are diaphanous, of a deep ash-colour in the males, and yellowish in the females.

17. RHINOLOPHUS MINOR.—DWARF HORSE-SHOE BAT.

Syn. Rhinolophus Minor.—Horsf. Jav.
Icon. Temm. Mon. II. pl. 32, fig. 20 and 21, (cran.)

SPECIFIC CHARACTERS.

The Hair in the male dark-brown above, lighter beneath; in the female red, deeper above.
The Nasal Appendage lanceolate, complicated.
Inhabits Java, Sumatra, and Timor.

This Rhinolophus is about the size of the last species, the Bihastatus of Europe. The ears are shaped as in that animal, much sloped, and having a largely developed lobe on the side. The tail is of the length of the tibia and toes, or two-thirds the length of the fore-arm. The nose-leaf is complicated, consisting of a spear-head, bristled with hair at its point—a leaf-stalk divided at its upper part into indentations, the one of which points forward, and the other is bent to the right side, and the horse-shoe very large and festooned. The upper incisors approximate and are tri-lobed, as are also the four inferior; there is a pointed anomalous molar in the upper jaw. The fur of the *male* is dark brown, slightly tinged with grey above, and light brown ash beneath. The female is wholly red, deeper above than beneath. The *young females* are of the same markings with the males. The robe of some is found spotted with red and brown, and these are usually females, whilst passing from the one dress to the other. The length of the adult is about two and a half inches, the tail occupying about ten lines; the extreme expanse is about ten inches.

Dr Horsfield first supplied a succinct account of this species in his Zoological Researches, and the Dutch Naturalists in India have since more abundantly furnished materials for description.

18. RHINOLOPHUS PUSILLUS.—PIGMY HORSE-SHOE BAT.

Syn. et Icon. Rhinolophus Pusillus.—Temm. Mon. Mam. II. p. 36, pl. 29, fig. 8, (head,)—pl. 32, fig. 22 and 23, (cran.)

SPECIFIC CHARACTERS.

The Hair white, brown at the tips above, chocolate colour beneath.
The Nasal Appendage elevated, lanceolate, complicated.
Inhabits Java.

The Pusillus is a trifle smaller than the preceding species, and has ears of precisely the same shape; the tail is likewise of the length of the tibia and toes. The very high nose-leaf consists of the spear-head, which is supplied with bristles from the leaf-stem, in front of which there is a narrow leaf whose point bends forward, and the horse-shoe composed of a broad membrane. There are two warts on the lower lip. The two upper incisors, which are scarcely visible with a glass, are obtusely pointed and wide asunder, the false molar is also pointed. The fur of both sexes is strikingly party-coloured above, and of a uniform tint beneath. Upon the upper part of the body the hairs are long, and pure white from the base to about two-thirds of their length, the rest is ash-brown, so producing a mixture of white and light brown; underneath the only tint is fawn-colour, like that of *café-au-lait*, darkest towards the sides.

This species was discovered by those Naturalists from the Low Countries, who have been recently making investigations over the Continent of India. It prefers trees and old buildings. In many of its characters it might be mistaken for the R. minor, but is easily distinguished by its very distinct party-coloured fur, and also from there being scarcely any difference between the markings of the male and female.

19. RHINOLOPHUS CORNUTUS.—HORNED HORSE-SHOE BAT.

Syn. Rhinolophe Cornu.—Temm. Mon. Mam. II. 37
Icon.

SPECIFIC CHARACTERS.

The Hair light yellow, darker at the points above; whitish, and reddish-brown at the points beneath.
The Nasal Appendage complicated, lanceolate, broad.
Inhabits Japan.

The Horned Rhinolophus has within these few years been sent from Japan by M. Bürger to Leyden, where it fell under the investigation of M. Temminck. Its extreme expanse is somewhat less than that of the Bihastatus. The ears are very large, pointed, sloped at their inner margin, and are furnished with a very large lobe. The tail is completely enveloped in the interfemoral membrane, which is terminated by a horizontal line across; it is longer than the tibia. The membrane of the horse-shoe is broad; the leaf is complicated, consisting of the spear-head bristled with hairs, and the leaf-stem standing up like an obtuse horn, inclining forwards. The upper incisors are very small and widely spaced; the four lower ones are crowded and tri-lobed. The fur is long, silky, and party-coloured throughout; underneath it is pale yellow, the hairs being tipt of the colour of wine lees; on the upper parts the roots of the hairs, and half their extent, are whitish, and the points are reddish-brown; all the membranes are light black.

DOUBTFUL SPECIES.

1. R. Landeri.—(Proc. Zool. Soc. Part V. 101.)—Towards the close of the year 1837, Mr W. Martin exhibited to the Zoological Society a specimen of the above animal, accompanied with the following description.

This beautiful little species of Bat is a genuine Rhinolophus; the nasal appendages consist of a horse-shoe, a crest, and an elevated leaf. The horse-shoe is broad, with indications of a double furrow; its outer margin is free, and bifid anteriorly. In its centre is placed a little cup-like depression, with an elevated rim, from the back of which rises a bifid crest, not much elevated; the large apex is the posterior of the two. On each side of this crest and behind it, the skin, continued from the horse-shoe, and forming the base of the leaf, is furrowed by two deep but unequal *sulci*, with a marked posterior ridge, elevated across the base of the leaf, which latter ends in a short acute lanceolate point; posteriorly it is curved with short hairs, anteriorly it is nearly naked: its length is two lines. The ears are large, broad, and pointed, the outer margin is emarginate, and passes into a round accessory lobe, closing the ear anteriorly. The *antibrachia* are short, the thumbs small, the tibia slender. The fur is soft and delicate, and of a fine light or rufous chestnut, a little darker on the middle of the back; the wings are blackish. The length of the head and body of this specimen is one inch 4½ lines, of the tail 9‴, of the ear 7½, of the antibrachium 1″ 7½‴, of the leg 8‴, of the spur 4½‴, the extent of the wings 9″. It is to be regretted there is no accompanying plate.

Mr Martin named this species in honour of the late enterprising but unfortunate Mr Lander, during whose expedition it was taken at Fernando Po.

2. R. Commersonii.—Ann. Mus. XX. 263.—Tem. Mon. Mam. II. 21. —Under this appellation M. Geoffroy alludes to a Bat which was noticed in the drawings and notes of Commerçon, under the title of the Port-Dauphin Bat of the Island of Madagascar. M. Geoffroy published an excellent representation of the original drawing, whence it would appear to be a true Rhinolophus. M. Temminck again copies it in his Monograph. The characters assigned by Commerçon are so far from being specific, that, according to Temminck, they might be applied to all the known Rhinolophi, and probably to all that will ever be discovered. We need not therefore trouble the reader with them.

3. R. Lamatus.—(Horsfield's Java.)—M. Temminck puts into this same category the above species of Dr Horsfield, which, though detailed with minute accuracy in the Zoological Researches, yet wants specific characters to distinguish it from some three or four of its congeners. In addition to this important deficiency, there is the fact that, of the many Naturalists who, since Dr H.'s time, have been exploring the different districts of Java, none of them have sent home a specimen requiring a specific arrangement different from those already described.

4. R. Dukhunensis.—An animal under this appellation is enumerated in the "*Catalogue of the Mammalia observed at Dukhun, East Indies.*" By Major Sykes. The description is brief, and therefore we are not to

be surprised at M. Temminck's decision. "This description is so superficial, and the specific characters so loosely established, that it is impossible to admit this animal into the catalogue of the Rhinolophi."

IMAGINARY SPECIES.

1. R. Vulgaris (Horsfield's Java) is regarded by M. Temminck as nothing more than the female of the R. insignis.—(See sp. 3.)

2. R. Deformis of Horsfield, having been described from a very imperfect specimen, should be altogether removed from the catalogue.

GENUS XV. NYCTOPHILUS.—SOUTH-SEA BATS.

Syn. Nyctophilus.—Leach, Linn. Trans. XIII. 78.—Gray, Mag. Zool. and Bot. II. 496.
Nyctophile.—Temm. Mon. Mam. X. p. 46.—De Blainv. Ann. de Scien. Nat. 2d. Série, IX. 360.

SPECIFIC CHARACTERS.

The Dental Formula $^{2}\left|\frac{1+C+4\ M}{2+C+4\ M}\right.=\frac{12}{14}=26.$

The Ears very large, united over the forehead, the tragus lanceolate.
The Tail not forked.
The Membranes not so developed as in Nycteris.
Inhabit the Islands in the Southern Ocean.

The upper incisors in this genus are long, conical, and pointed; and, by their position, which is near the canines, and their conical and curious curved form, they have somewhat the appearance of a second pair of canines: the inferior ones are somewhat crowded, ill arranged, broad, and tri-lobed. The canines are so free that they do not interfere with the development of the incisors, as in the Bull-Dog Bats, (Dysopes.) All the molars are tubercular, the lower ones being most conical. This dental apparatus, so far as the incisors and canines are concerned, allies this genus to the Rhinolophi, whilst the molars, by their number and shape, associate it with Nycteris. Hence it is intermediate between these genera. It moreover agrees with the latter in the extraordinary development of the ears, (which are united in front,) as well as in the lanceolate operculum, and nasal follicles. The tail is not terminated by a forked cartilage, and the cutaneous system is less developed, thus approximating them to the true Bats.

This genus as yet consists but of one species; but the link is well characterized among the Nose-leaf Bats.

1. NYCTOPHILUS GEOFFROYII.—GEOFFROY'S SOUTH-SEA BAT.

Syn. Nyctophile Geoffroy.—Temm. Mon. Mam. II. 47.
Icon. Temm. Mon. Mam. II. pl. 34.

SPECIFIC CHARACTERS.

The Hair black at the root, brown at the point above, grey beneath.
The Ears very large, and joined in front by a transverse band.
The Tail not forked at the extremity.
Inhabits the South Sea Islands.

The ears of this species are very large, long, rounded at the point, and united in front by a large transversal fold; the internal border extending even to the commissure of the lips. The operculum, half the length of the ear, is broad at its base, and terminated by a rounded leaf. The muzzle is pointed. There are two small transversal leaflets upon the nose; the posterior one is most elevated, contracted in the centre; the other is rudimentary, and in a line parallel to the orifices of the nostrils. The tail is longer than the body, and is not forked at the point. The total length is nearly three inches, and the extreme breadth nearly nine.

The hair is bi-coloured: above it is black at the root, and deep brown towards the point; beneath the base is black, and the tip pale ash-colour. There are hairs upon the membranes, where they join the sides, and upon the upper part of the sides of the interfemoral.

GENUS XVI. NYCTERIS.—CHEEK-POUCHED BATS.

Syn. Les Nyctères.—Cuv. Reg. Anim. I. 119.—Geoff. Ann. Mus. XX. 11.—Desm. Mam.
Nycteris, (Nachtflieger.)—Illig. Prodr. 119.—Fisch. Syn. Mam.—Gray, Mag. Zool. and Bot. II. 494.
Vespertilio, (in part.)—Linn. Gmel. I.—Schreb. Säugth.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\frac{2+C+(\ F+3)M}{3+C+(2\ F+3)M}\right.=\frac{14}{18}=32.$

The Upper Incisors very small, continuous, and bi-lobed; The Lower tri-lobed or bi-lobed.
The Nostrils simple, the cartilage forming a moveable operculum.
The Chanfrin marked by a deep longitudinal furrow.
The Interfemoral Membrane longer and wider than the body.
The Tail long and bifurcated at the tip.
A Pouch at each side of the mouth, communicating with large membranous sacs.
Inhabit the African Continent, and perhaps Java.

The chanfrin in this Genus is hollowed out by a longitudinal fossa, which is indicated on the cranium, and bounded by a cutaneous fold, which partly covers it. The nostrils are simple. There are four incisors above, [generally] without any interval between them, and six below; the ears are large, [often] not united, and the tail is included in the interfemoral membrane. Daubenton has described one under the name of *Campagnol volant*, and M. Geoffroy has discovered others in Egypt.

The Genus Nycteris, instituted by M. Geoffroy, is distinguished by the following characters. The upper jaw has four incisors, which are bi-lobed, very small, and generally contiguous, then a canine, and four molars on each side; the six lower incisors are tri-lobed, and, in other particulars, agree with those of the upper jaw: the whole of the incisors are but little worn, owing to the points not meeting or fitting at all accurately. The intermaxillary bone is moveable, and always following the motions of the lip, makes the upper jaw appear shorter than the lower. The chanfrin is occupied with a longitudinal and wide groove, formed internally by means of laminæ rising from the frontal bone, and uniting at the top; the outer edges being formed by a fold of skin, well clad with fine hair. The nostrils are situate at the lower part of this fossa, having their orifice habitually closed with a tubercle, like the head of a nail, and which is, in fact, the cartilage of the nostrils. The ears are large, generally longer than the head, and extending far in front, and sometimes even meeting; there is an operculum or tragus which is not very large. Their integuments are more developed than those of the true Bats: the interfemoral membrane being both broader and longer than their bodies; their wings also are very ample, but more in breadth than extreme length. The index finger is composed of the metacarpal bone alone, and the others have only two phalanges proceeding from their metacarpals. The tail is composed of seven prolonged vertebræ, and in some of the species the last of them is distinctly bifurcated.

In addition to those very distinct generic characters, M. Geoffroy describes another very remarkable one, which is not only peculiar to this genus of Bats, but is not to be found in any other of the Mammalia. We shall describe this singular structure on M. Geoffroy's authority; at the same time, it would be satisfactory if his observations were confirmed. According to that ingenious Naturalist, the Nycteri are possessed of certain vesicles, which, like Birds, they have the power of filling, and which, of course, greatly diminishes their specific gravity. He informs us that their skin does not adhere to the parts underneath with its usual closeness, and that the cellular tissue by which it is attached is so loose and extensile that the air can be readily introduced, and easily retained: the only obstacles it encounters being certain bands of aponeurosis which occur on the sides; complete obstructions occurring only around the various apertures of the body. This great sac communicates with the mouth, by two considerable openings, one on each side, like the cheek-pouches of certain monkeys, and by means of these canals the animal has the power, at will, of filling and emptying these vesicles, there being conspicuous sphincters round the foramina, and also large valves situate upon the back and neck. The quantity of air that these animals can thus introduce is such that, like the fish of the genus Tetrodon, they can assume a shape nearly spherical, and thus become not unlike balloons supplied with great wings, a head, and feet.

These animals inhabit the warm regions of the Old World, and frequent dark and fulsome caverns.

1. NYCTERIS HISPIDA.—BEARDED CHEEK-POUCHED BAT.

Syn. Nycteris Daubentonii.—Geoff. Ann. Mus. XX. 19.—Desm. Mam. No. 191.
Vespertilio hispidus.—Linn. Gmel.
Bearded Bat.—Penn. Quadr. II. 313.
Icon. Campagnol volant.—Daubent. Mem. de l'Acad. 1759, pl. 33, fig. 7.
Autre Chauve-souris.—Buff. T. X. pl. 20, fig. 1, 2; copied in Schreb. pl. 56.

SPECIFIC CHARACTERS.

The Hair reddish-brown above, and whitish beneath.
The Ears large, oblong; The Nose-Leaf very small.

The Lower Lip simple.

Inhabits Senegal.

This first species of Nycteris was described by Daubenton in the Memoirs of the Academy of Sciences for the year 1759, under the appellation of the *Campagnol volant;* from this description Linnæus gave his account of his *Vespertilio hispida,* and Desmarest very properly applied to it its present name, N. hispida.

The head of this species is large; its muzzle bulky, and its forehead as if hollowed out by a deep furrow; the nostrils, which approximate, are placed in front of a small hollow; the furrow on the forehead is deep and naked, having long hairs round its edges. The hair of the head, except that on the crown, that of the neck, of the chest and abdomen, is whitish, with a fawn tint; that of the crown and occiput, the upper parts of the neck and shoulders, the back and croup, are of a russet brown, and nearly five lines long: the ears and membranes are of different shades of blackish and reddish-brown; the nails are yellow. The dimensions of the individual examined by Daubenton were from the tip of the snout to the origin of the tail, one inch and a half; the extreme breadth nearly eight inches, of the tail one inch and three lines; of the ears ten lines.

2. NYCTERIS HUZARDII.—HUZARD'S CHEEK-POUCHED BAT.

Syn. Nycteris Geoffroyii.—Desm. Mam. No. 190.
Nyctère de la Thébaide.—Desm. Nouv. Dict. d'Hist. Nat.

Icon.

SPECIFIC CHARACTERS.

The Hair brown above, brownish-grey beneath, soft and fine.

The Ears very high, united in front. The Opeaculum twice as broad as high. The Nose-leaf very complicated, (see description.)

The Lower-Lip as if cleft, with a large wart in the middle.

The Tail having the last joint deeply bifurcated.

Inhabits Senegal.

The description of the specimens examined at Senegal by the younger M. Huzard, as given by M. Desmarest, is by far the most satisfactory of any we have seen, and, therefore, though compelled to distinguish it as a new species, we submit it for the satisfaction of the reader. M. Desmarest identifies it with the next species, viz. that of Thebes, but immediately afterwards points out so many differences as to leave little doubt that they are distinct. This view is strongly corroborated by the remarks of M. Geoffroy, who says, "he presumes there are two species at Senegal; Daubenton," he remarks, "having described two varieties he had received from that neighbourhood;" and adds, "I have myself examined the cranium and osteology of the one of these, and these parts agree neither with the dimensions, nor the details in shape, of either the hispida or the Theban species."

The following is a condensed account of M. Huzard's excellent account. The head is large, and much prolonged in front; the cranium being voluminous, and much rounded behind; the muzzle is very full; the upper lip very broad, rising high; the lower is as if bifurcated, exhibiting two thick and naked folds of skin forming an angle, the point of which is produced below the chin, and the upper part embracing a great wart, at the edge of the lip. The canines are rather strong; the incisors very small, and bi-lobed or tri-lobed; the tongue is long, rounded at its extremity, and having its surface studded with very fine horny papillæ. The nose-leaf is very complicated, being composed, 1st, of the nasal appertures which closely approximate, and are situate at the anterior part of the great fossa of the chanfrin, extending from the lip to the commencement of the cranium, properly so called; 2dly, of a delicate fold of skin covered with hair, surrounding this fossa, and best seen when raised up by a sharp instrument; 3dly, of two still more delicate folds, longitudinal, hairless, lying parallel to each other at the bottom of the fossa; and, lastly, of two spiral and somewhat rounded pieces of the skin, covering the middle part of this fossa. The ears are placed within a third of the back of the head, and are nearly twice its height; their inner margins approximate, and are united on the forehead; they are thickly clothed close to the head, and a few hairs are scattered throughout both inside and out; the tragus small, twice as broad as high, and clad anteriorly. The body is very stout and muscular in front, the chest is full and broad, the wings are large and broad; the thumb slender, the nail weak. The interfemoral membrane is particularly ample, and supported by spurs as long as is the leg, embracing the tail, formed of seven vertebræ, and terminated by a cartilage in the form of the letter T, whose branches extend to right and left. The fur is soft and fine; the colour being brown above, and light brownish-grey beneath. The dimensions are from the tip of the snout to the origin of the tail two inches; of the tail two; of the ears one; extreme expanse almost ten.

3. NYCTERIS THEBAICA.—THEBAN CHEEK-POUCHED BAT.

Syn. et Icon. Nyctère de la Thébaide.—Geoff. Mém. de l'Instit. d'Egypte, Hist. Nat. II. pl. 1 and 2.
Nycteris Thebaicus.—Geoff. Ann. Mus. XX. 20; pl. 1, (head.)
Nycteris Thebaica.—Gray, Mag. Zool. and Bot. II. 494.

SPECIFIC CHARACTERS.

The Hair above bright brown, beneath of an ash-colour.

The Ears very large; Operculum shaped like a half trefoil leaf.

The Nose-leaf considerably developed, and somewhat in a spiral form.

The Lower-lip has a wart in the centre.

Inhabits Upper Egypt.

The Theban Bat is about two inches long from the tip of the snout to the origin of the tail, and its extreme breadth nearly ten. The length of its ears is one inch; of its tail two. Both the auricular and caudal appendages are in this way very large, and in no degree less are the alar and interfemoral membranes; the latter especially being amplified by the very long spurs, which descend nearly an inch from the ankle, and go so far to meet the singular bifurcated and curved points of the last caudal vertebra. The operculum or tarsus is not very large in relation to the ample auricles, and is shaped like an half trefoil leaf. The horse-shoe on the upper lip is broad and ample, and from its centre there ascends a leaf-stalk or tendril on to the outer side of the nostrils, from which, after making a spiral turn round them, it ascends on the chanfrin. The under-lip has a large wart in its centre, imbedded in a double fold of skin, shaped like the letter V. On the upper parts of the body it is of a bright brown, on the under of an ash colour. A specimen, Mr Gray states, is in the collection of the British Museum.

4. NYCTERIS JAVANICA.—JAVA CHEEK-POUCHED BAT.

Syn. Nycteris Javanicus.—Geoff. Mém. de l'Instit. d'Egypte, Hist. Nat. II. p. 123.—Geoff. Ann. Mus. XX. 20.—Desm. Mam. No. 192.
Nycteris Javanica.—Gray, Mag. Zool. and Bot. II. 494.

Icon. Geoff. Ann. Mus. XX. pl. I.

SPECIFIC CHARACTERS.

The Hair above of a lively red colour, below reddish-grey.

Inhabits Java.

This species was transmitted from the island of Java to Paris by M. Leschenault de la Tour, and is now in the Natural History Museum at Paris; Mr Gray states it is also to be found in the Museum of the Hon. East India Company. It is larger than any of the previously described species; its head and body being more than two and a half inches long. All the upper parts of the body are of a lively red colour, and the under of a reddish-grey. No more detailed description has yet been published.

5. NYCTERIS CAPENSIS.—CAPE CHEEK-POUCHED BAT.

Syn. Nycteris Capensis.—Dr A. Smith, Zool. Journ. XVI. 434.—Fisch. Syn. Mam. p. 662.

Icon.

SPECIFIC CHARACTERS.

The Hair above blackish-brown, below greyish; Membranes reddish-brown.

The Tail slightly forked; last vertebra but one the shortest.

Inhabits South Africa and its Eastern Coasts.

This and the next species were discovered by Dr Smith during his residence at the Cape of Good Hope. The neck above, he states, and the back of this animal, are blackish-brown, the sides of the neck dirty white, below it is cinerous white, with blackish shades. The membranes are reddish-brown; height of the ears from fur to tip seven-eighths of an inch, width better than six-eighths; tragus short, apex semicircular, and its upper edge clothed with a tuft of long, white, woolly fur; termination of the tail but slightly forked, last vertebra but one, if any thing, the shortest. Length from nose to root of the tail, better than two inches; expanse of the wings ten inches.

Found in the interior parts of South Africa, as well as upon the Eastern Coast.

6. NYCTERIS AFFINIS.—AFFINIS CHEEK-POUCHED BAT.

Syn. Nycteris affinis.—Dr A. Smith, Zool. Journ. XVI. 434.—Fisch. Syn. Mam. p. 662.

Icon.

SPECIFIC CHARACTERS.

The Hair tawny brown above, tawny white beneath; Membranes blackish-brown.

The Teeth of the upper jaw in pairs.

The Tail deeply forked; last vertebra but one the longest.

Inhabits South Africa.

Of this species, we shall give the description of the discoverer verbatim. Neck above, and back reddish-brown or tawny, sides of neck before wings

reddish-white; behind ears somewhat rufous; beneath tawny-white, membranes blackish-brown. Incisors of upper jaw in pairs, which are separated from each other by a distinct open space immediately in the front of the jaw. Length from nose to root of tail two inches; ears rather longer and broader than in the last species, tragus short, and its apex semicircular; termination of tail deeply forked, with the last vertebra but one the longest. The arrangement of the incisors of the upper jaw, the marked difference in respect to the last joint but one of the tail, added to the depth of the fork, and the greater proportion of transverse veins, in the portion of the interfemoral membrane connected with the joint named, tend, with other characters, to establish this as a distinct species from the last.

GENUS XVII. DESMODUS.—CURVED-TOOTH BATS.

Syn. Desmodus.—Pr. Max. Beitr. et Abbild.
Edostoma.—D'Orb. Voy.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\frac{1+C+2\ M}{2+C+3\ M}\right.=\frac{8}{12}=20$

The Head small. The Muzzle obtuse.

The Ears with opercula. The Nose with complicated membranes. The Thumbs very long and strong.

The Interfemoral Membrane narrow, lining the interior of the thighs. The Tail wanting.

Inhabit South America.

This genus, introduced by Prince Maximilian de Neuwied, seems unanimously to have been adopted by all the Zoologists who have subsequently laboured in this department of Natural History, among whom we may mention MM. Fischer and De Blainville, and Messrs Gray and Waterhouse. It seems well characterized by its dental formula, although this requires perhaps some further confirmation. Both the two upper and the four lower incisors appear to be peculiar; especially the former, which are very large, singularly conical, curved, compressed, with a very broad base, and acuminated; the latter, again, are somewhat flattened down, and have their edges deeply bifid, the lobes being cylindrical, and the apices roundish. The canines are large and sharp. Prince Maximilian does not seem to have ascertained the number of the molars in the upper jaw, though they are clearly given in D'Orbigny's plate: the number of the lower correspond accurately in the Prince's and the French traveller's drawings: the two upper are close to the great canine and to each other, the posterior being most indented; of the three lower the front one is somewhat removed from the canine, leaving room for the descent of the upper one, the second as well as the first have but one cusp, and are closely approximated; the third is bi-cuspid. The head, moreover, is very short, and not less the jaws, the lower being a trifle the longer; the nose-leaf is usually supplied with minute bristles; the anterior extremity is peculiarly robust; the alar membranes copious, the interfemoral very spare, being merely marginal to the thigh bones; there being no tarsal spur, and no tail.

1. DESMODUS RUFUS.[1]—RED CURVED-TOOTH BAT.

Syn. Der Rothbraune Bundelzahn.—Pr. Max. Beitr. II. 233.
Icon. Pr. Max. Abbild.—(Desmodus rufus.)

SPECIFIC CHARACTERS.

The Hair red, tinged with yellow.
The Ears short and broad; round at the points.
Inhabits Brazil.

"This interesting Bat," says the Prince of Neuwied, "was found at Fazenda of Muribeca, upon the river Itabapuna, between the 21° and 22° S. lat.; where, however, it appears exceedingly rare, as I was able to procure only a single individual." Its arm and alar membrane, and the fingers also, are remarkably strong; and the humerus, the lower extremities down to the foot, the great toe, and the membranes where they rise from the body, are covered with long and soft hair, as are also the face and nose-leaf, where, however, it is much finer, and not so abundant. Whilst the wings are very long, the interfemoral membrane is exceedingly curtailed, rising from nearly the top of the tibia. The cranium is very short, so that the lower jaw, though it projects somewhat beyond the upper, can scarcely accommodate the four molar teeth with which it is furnished. The ears are of medium size, and rather oblong than round; the operculum is narrow, pointed, and somewhat falciform; the nostrils obliquely approximate towards each other, and the nose-leaf, which is by no means complicated or copious, is of a circular shape. This Bat is destitute both of the tail and the tarsal spur. The base of each hair is a faint yellow, towards the tip it acquires a reddish or cinnamon tint, so that, throughout the whole body, the colour generally is ferruginous; paler below than above; all the membranes are brownish-black. The total length of this species is nearly four inches; its extreme breadth about fifteen. It is believed to frequent old buildings; but of its habits little or nothing is known.

2. DESMODUS CINEREUS.—GREY CURVED-TOOTH BAT.

Syn. et Icon. Edostoma cinerea.—D'Orb. Voy.

SPECIFIC CHARACTERS.

The Hair grey, tinged with brown.
The Ears long and pointed.
Inhabits

This Grey Edostome of M. D'Orbigny seems very properly placed in Prince Maximilian's Genus Desmodus by M. de Blainville;[2] but, as the illustrious traveller's description has not yet been published, we can derive our information regarding this species only from the beautiful representation which has appeared. It has a strong general resemblance to the former species in the strength of the anterior extremity, the extent of the alar membranes, which are also clad at their attachment to the body, and the curtailed interfemoral membrane, being a mere fringe which rises from about the lower third of the tibia; it is also destitute of spur and tail. The ear of this species is rather long and pointed; the operculum is also pointed; the nose-leaf, whilst having a general resemblance to that of the last species, is not so circular, the horse-shoe extending along the whole of the upper lip, and being scarcely as high as it is broad; it is irregularly triangular, and double the size of the one perforated by the nostrils, anterior, and including within the limits of the other; the lower lip seems to be deeply cleft. The fur, which is abundant, is soft and wavey. The colour generally is grey, being dark on the head, and light on the face, chest, and abdomen. The claws are yellowish, the membranes darkish grey.

3. DESMODUS D'ORBIGNYII.—CHILIAN CURVED-TOOTH BAT.

Syn. et Icon. Desmodus D'Orbignyi.—Waterh. in Zool. Beagl. p. 1. pl. 1.

SPECIFIC CHARACTERS.

The Hair deep brown above, ashy white beneath.
The Ears short, and broad; round at the points.
Inhabits Coquimbo, Chile.

Since the publication of M. D'Orbigny's elegant plate, a third species has been introduced into this genus, procured by Mr Darwin, and described by Mr Waterhouse in the "*Zoology of the Beagle.*"

"The fur of this Bat," says Mr Waterhouse, "is glossy, and has a silk-like appearance; that on the top of the head, sides of the face, and the whole of the upper parts of the body, is of a deep brown colour; all the hairs on these parts, however, are white at the base. The flanks, interfemoral membrane, and arms, are also covered on their upper side with brown hairs. On the lower part of the sides, and the whole of the under parts of the body, the hairs are of an ashy-white colour. The membrane of the wing is brownish. The ears are of moderate size, and somewhat pointed; externally they are covered with minute brown hairs, internally with white; the tragus is also covered with white hairs; it is of a narrow form, pointed at the tip, and has a small acute process in the middle of the outer margin. The nose-leaf is pierced by the nostrils, which diverge posteriorly, and is so deeply cleft on its hinder margin, that it may be compared to two small leaflets joined side by side near their bases. These leaflets lie horizontally on the nose, to which they are attached throughout, a slight ridge only indicating their margin. Behind the leaf there is a considerable naked space, in which two small hollows are observable, situate one on each side, and close to the nose-leaf; and, at a short distance behind the nose-leaf, this naked membrane is slightly elevated, and forms a transverse fleshy tubercle. The extreme length is 3″ 3‴; the extreme breadth 12″ 8‴; of the antibrachium 2″ 2‴; of the nose-leaf 2¼‴."

This Bat is a blood-sucker, and hence has been designated a Vampire by Mr Darwin. It is on this species he has the following note: "The Vampire Bat is often the cause of much trouble by biting the horses in their withers. The injury is generally not so much owing to the loss of blood as to the inflammation which the pressure of the saddle produces. The whole circumstance has lately been doubted in England; I was therefore fortunate in being present when one was actually caught on the horse's back. We were bivouacking late one evening near Coquimbo, in Chile, when my servant, noticing that one of the horses was very restive, went to see what was the matter, and fancying he could distinguish something, suddenly put his hand on the beast's withers, and secured

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[1] Mr Gray (Mag. Zool. and Bot. II. p. 89) considers Stenoderma rufum, Geoff. to be identical with Desmodus Rufus, Pr. Max.
[2] See Annales des Sciences Naturelles, 2d Série, T. ix. 361.

the Vampire. In the morning, the spot where the bite had been inflicted was easily distinguished from being slightly swollen and bloody. The third day afterwards we rode the horse, without any ill effects."

"The structure of this animal," says Mr Waterhouse, "is found perfectly to correspond with its habits. There is a total absence of true molars, [which, however, must surely have been accidental,] and consequent want of the power of masticating food. On the other hand, the canines and incisors are perfectly fitted for inflicting a wound, while the small size of the interfemoral membrane, giving freedom to the legs, together with the unusually large thumb and claw, enable the Bat to fix itself with security to the body of its prey."

GENUS XVIII. RHINOPOMA.—LID-NOSE BATS.

Syn. Les Rhinopomes.—Cuv. Reg. Anim. I. 119.—Geoff. Collect. du Mus.—Desm. Mam. p. 129, et al.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\begin{matrix}1+C+(F+3)M \\ 2+C+(2F+3)M\end{matrix}\right. = \frac{12}{16} = 28$

The Nose long, conical, truncated; Nose-leaf small; Nostrils narrow, transversal, and covered with a lid.

The Chanfrin broad and concave.

The Ears large, united, and connected with face; the Tragus external.

The Interfemoral Membrane narrow and truncated. The Tail long, and free towards the tip.

Inhabits Egypt.

The fossa upon the chanfrin of the Rhinopoma is less marked than in the preceding genus, Nycteris; the nostrils, at the end of the snout, and the small lid which overhangs them, resemble the knife used in dressing the hoofs of horses; their ears are united, and their tail extends considerably beyond the membrane. Only one species is as yet ascertained, which was found among the pyramids.

1. RHINOPOMA MICROPHYLLUM.—SMALL-LEAF LID-NOSE BAT.

Syn. et Icon. Rhinopome microphylle.—Cuv. Reg. Anim. I. 119.—Desm. Mam. No. 193.—Geoff. Descript. de l'Egypte, Part. d'Hist. Nat. II.

Vespertilio microphyllus.—Brunnich Descript. du Cabinet de Copenhague, p. 50, tab. 6, fig. 1, 2, 3, 4.—Schreb.

Chauve-souris d'Egypte.—Belon de la Nature des Oiseaux, liv. 2, chap. 39.

SPECIFIC CHARACTERS.

The Hair ash-coloured.

The Tail very long and slender.

Inhabits Egypt.

This Bat is rather more than two inches long, the tail being about two more; its extreme breadth is about eight inches. Its fur is long and thick, of an ash-colour; the tail, which is composed of eleven vertebræ, is black and smooth, and far surpasses the interfemoral membrane, which is extremely short; and receives no support from tarsal spurs. The nostrils and upper lip exhibit an apparatus which is sufficiently complicated, and which projects beyond the jaw; they appear truncated at the extremity, and terminate in a kind of circular fold, surmounted by a small leaflet, and pierced in the centre by two oblique clefts, which are the nasal apertures, and which, at the will of the animal, are very conspicuously opened and closed, as occurs in Seals. The leaflet, at the upper part of the nasal cartilage, also moves separately. The nostrils, which are prolonged across the lip of the upper jaw, are very narrow, and terminate in a chamber which is very short, but greatly widened by the curve of the intermaxillary bone above. The intermaxillary bone is entire, and fixed firmly into the maxillaries. The two upper incisors are wide asunder; the four lower are crowded. The ear projects anteriorly, and unites with its fellow. The tragus is on the edge of the meatus, projecting somewhat externally.

Belon was the first who discovered this Bat, and in the pyramids of Cairo. Hasselquist alluded to some which were taken in the pyramid of Gyzeh, but which were for a long time overlooked, until again described in the year 1782 by Brunnich. M. Geoffroy found this species in many of the tombs of Upper Egypt; he observed that, when provoked, it was very irritable, like our European Bats; but that when at liberty, what most attracted attention was the movement of its nostrils corresponding with that of the chest; sometimes closing them so completely that no trace can be seen, and then covering them with its leaflet.

DOUBTFUL SPECIES.

1. M. Geoffroy states, that he believes there is a second species of the same genus in Egypt, which differs from the former chiefly in having a shorter tail, and a less acute snout. He does not supply a name for it.

2. Rhinopoma Caroliniensis. (Geoff. Collect. du Mus.—Desm. Mam. No. 194.)

A specimen of this animal was presented to the Paris Natural History Museum by M. Brongniart, who thought, although by no means certain, that it came from Carolina. In length and breadth it corresponds with the microphyllum; its tail, however, is only one and a half inch long; its ears are somewhat triangular in shape, and do not appear to coalesce; the lower incisors are described as bi-lobed. The fur is brown, and the membranes dark.

3. Rhinopoma Hardwickii. Gray, Zool. Misc. 37.—Mag. of Zool. and Bot. II. 486.

Dark brown, rather paler beneath; tail longer than the body, more than two-thirds free. Inhabits Bengal. General Hardwicke's Collection; the Collection of the British Museum. Such is Mr Gray's description.

GENUS XIX. TAPHOZOUS.—WING-POUCHED BATS.

Syn. Taphozous.—Reg. Anim. I. 119.—Geoff. Mém. de l'Inst. d'Egypte, Hist. Nat. II. 129: et al.

Vespertilio.—Schreb. Muller,—Saccopteryx.—(Täschelfittig.)—Illig. Prodr. p. 121.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\begin{matrix}C+(2F+3)M \\ 2+C+(2F+3)M\end{matrix}\right. = \frac{12}{16} = 28$

The Chanfrin furrowed, but without overlapping edges or lids.

The Nose destitute of a nose-leaf.

The Upper-Lip very thick. The Muzzle produced.

The Ears of moderate size. The Operculum internal.

The Interfemoral Membrane large and salient. The Tail composed of six vertebræ, not so long as the membrane, and free on its upper side.

Inhabits the Old and New Continents.

The Taphiens have a rounded fossa on the chanfrin; but their nostrils are not furnished with any projecting laminæ; their head is pyramidal; and they have only two incisors above, (?) which are often wanting. They have four lower incisors, which are trilobed; their ears do not meet, and their tail is free above the membrane. The males have a transversal cavity under the throat, (?) and a slight prolongation of their alar membrane forms a kind of pouch near the carpus. M. Geoffroy discovered one of the species in the catacombs of Egypt.

This genus, as hinted above, was established by M. Geoffroy in the grand work of L'Institut d'Egypte. Recent examination has demonstrated that it has no incisors in the upper jaw; the four lower ones are tri-lobed. The canines are distinct, long, and conical.

1. TAPHOZOUS PERFORATUS.—PERFORATED WING-POUCHED BAT.

Syn. Taphozous perforatus.—Geoff. Descript. d'Egypte, Hist. Nat. II. 126.—Fisch. p. 120.

Le Taphien perforé.—Cuv. Reg. Anim. I. 120.—Desm. Mam. No. 197.—Less. Mam. No. 191.—Gray, in Mag. Zool. and Bot. II. 499.

Icon. Geoffroy, loc. cit. pl. III. fig. 1.—(Skeleton and cranium,) fig. 4, 4, 4.

SPECIFIC CHARACTERS.

The Hair reddish-grey above, ash-coloured beneath.

The Operculum in the form of a hatchet.

Inhabits Egypt.

The muzzle of this species is obtuse; the tail is longer than the thigh bone; the spur which supports the interfemoral membrane is longer than the foot; the operculum, or tragus, is in shape of a hatchet, and terminates in a round edge; the ears are oblong. The upper lip extends somewhat beyond the lower jaw; the nasal apertures are very narrow, of a circular form, and partly covered by a membrane. The chanfrin is hollowed out. The fur is plentiful; the roots of the hair are all white; but the points being coloured, the upper parts are reddish-grey, and the lower ash-coloured. The length of the head and body is somewhat more than three inches; the extreme breadth nearly ten.

It inhabits Egypt. Specimens are to be found in the Paris and British Museums.

2. TAPHOZOUS SENEGALENSIS.—SENEGAL WING-POUCHED BAT.

Syn. Taphozous Senegalensis.—Geoff. Descript. de l'Egypte Hist. Nat. II. 127.—Fisch. Syn. Mam. 120.
Taphien Lérot-Volant.—Desm. Mam. No. 195.
Lerot-Volant.—Daubenton, Mem. de l'Acad. des Sciences de Paris, 1759, 386.

Icon.

SPECIFIC CHARACTERS.

The Hair brown above, greyish-brown beneath.
The Operculum roundish.
Inhabits Senegal.

It was Adanson who first noticed the existence of this species; he transmitted a specimen to Paris, where it fell under the review of the accurate Daubenton. Its muzzle is broad and prolonged; its ears are of moderate size, and have a very short operculum, which is very broad and rounded; the extremity of the tail is free in the membrane; the head and upper part of the body are of a brown colour; the inferior parts are of a lighter brown, with a greyish tint.

3. TAPHOZOUS MAURITIANUS.—MAURITIUS WING-POUCHED BAT.

Syn. Taphozous Mauritianus.—Geoffr. Descript. de l'Egypte Hist. Nat. II. 127.—Less. Mam. No. 190.
Le Taphien de l'Isle de France.—Cuv. Reg. Anim. I. 120.—Desm. Mam. No. 196.

Icon.

SPECIFIC CHARACTERS.

The Hair chestnut-coloured above, and reddish beneath.
The Operculum with a sinewy edge.
The Tail shorter than the thigh.
Inhabits the Isle of France.

This Bat was discovered in the Isle of France by Colonel Mathieu of the Royal Artillery. It is not very unlike the preceding species; but differs in the proportion of the head, and the form of the operculum; also, in the tail being shorter, and in the extent of the interfemoral membrane. Its muzzle is more acute, and the tail shorter than the thigh bone. The spur is equal in length to the foot. The operculum is, at its origin, accompanied with a small lobe, and is terminated by a sinewy edge; the ears are short and round. Its length, from the muzzle to the origin of the tail, is about three inches and nine lines; its extreme breadth about ten inches. Its fur is of a chestnut colour on the back, and reddish underneath.

4. TAPHOZOUS LEPTURUS.—SLENDER-TAILED WING-POUCHED BAT.

Syn. Taphozous lepturus.—Geoffr. in Descript. de l'Egypte, II. 126.—Cuv. Reg. Anim. I. 120.
Vespertilio lepturus.—Schreb. I. 173.—Linn. Gmel. I. 50.—Slender-tailed Bat of Pennant and Shaw.

Icon. Schreb. Saügth. LVII.

SPECIFIC CHARACTERS.

The Hair grey above, and paler beneath.
The Tragus very short and obtuse.
The Alar Membrane folded near the tail.

This Slender-tailed Bat is about one inch and a half long; its muzzle is broad, and supplied with very fine bristles; the nostrils are tubular and approximate; the ears are large, obtuse, and rounded, with a very short and obtuse operculum; the four incisors are lobed, and the canines are long. The alar membrane is folded towards the tail, in such a way as to form a kind of pouch; the tail is prolonged beyond the interfemoral membrane. It is stated to be an inhabitant of Surinam; but this is doubtful. M. Geoffroy is inclined to think it has been procured from India.

5. TAPHOZOUS LONGIMANUS.—LONG-ARMED WING-POUCHED BAT.

Syn. et Icon. Taphozous longimanus.—Cuv. Reg. Anim. I. 120.—Fisch. Syn. Mam. 121.—Hardw. Linn. Trans. XIV. 525, pl. 17.

SPECIFIC CHARACTERS.

The Hair souff-brown above, paler beneath. Membranes black.
The Ears ovate, rugous. The Tragus broader above than beneath.
The Arms and Fingers remarkably long.
Inhabits Calcutta.

General Hardwicke, whose description and drawings are most accurate, informs us that this Bat is common in Calcutta, in dark store-rooms, whence it issues at night, and intrudes into dwelling-houses, attracted by the light of the candles, and the numerous insects which buzz round them. Its head is depressed, broad between the ears, and suddenly tapering to the nose; the nostrils terminal, approximating; the margins tumid, the upper jaw longest. The ears are obliquely ovate, erect, transversal, plaited internally; the inward margins hairy inwardly; the posterior lobe elongated to the chin; the tragus oblong, broader upwards than below. The interfemoral membrane extends considerably beyond the toes; is supplied with long spurs, and is truncated. The tail is an inch long, hardly tapering. The body is wholly covered with a very soft hair: in the adult, it is of a snuff-brown colour; the legs and membranes are black; but the full sized young Bats are of a deep black all over. Total length, 5″; total breadth, 14½″.

6. TAPHOZOUS RUFUS.—RED WING-POUCHED BAT.

Syn. Taphozous rufus.—Cuv. Reg. Anim. I. 120.—Fisch. Syn. Mam. 122.—Harl. Faun. Americ. p. 22.
Vespertilio rufus.—Warden, Descrip. of the United States, V. 608.
Red Bat of Pennsylvania.—Wilson's Amer. Ornith. VI. 60.

Icon. Wilson, loc. cit. pl. 50, fig. 4.

SPECIFIC CHARACTERS.

The Hair of a reddish-cream colour.
The Membranes of a dusky red.
The Tragus slender, rounded at the extremity, situate internally.
Inhabits North America.

The length of this Bat, from the nose to the tail, is four inches, of the tail four, with the breadth across the wings twelve. The general colour is a bright iron-grey, the fur being of a reddish-cream colour at bottom, then strongly tinged with lake, and minutely tipt with white; the membranes are dusky, their shafts light-brown; the ears are scarcely half an inch long, the tragus small; the nostrils are somewhat tubular; the wings have a single hook each, and are so constructed that the animal may hang either with its head or tail downwards. I have several times, says Wilson, found two hanging, feet fast locked together, behind a leaf, the hook of one fixed in the mouth of the other. I once, he adds, found a number of them, in the depth of winter, in a cave not far from Carlisle, Pennsylvania; they were lying on the projecting shelves of rocks, and, when the fire-brand was held near them, they wrinkled their lips, showing their teeth; they soon became active when held in the hand, and, when carried into a stove-room, flew about as lively as ever.

An incident regarding the habits of this species we must not omit. The female, says Dr Harlan, has been known to manifest the strongest maternal affection: a young lad having taken two young Bats of this species, was in the act of carrying them to the museum at mid-day; being watched by the mother, she followed him through the streets, fluttering round the thoughtless urchin, in whose grasp was centred all her hopes, and eventually settled in his bosom, preferring captivity to freedom with loss of progeny.

7. TAPHOZOUS NUDIVENTER.—NAKED WING-POUCHED BAT.

Syn. et Icon. Taphozous nudiventris.—Cretzchm. in Rupp. Atl. pl. 27 b.—Gray, Mag. of Zool. and Bot. II. 499.

SPECIFIC CHARACTERS.

The Hair, above, a greyish-brown; beneath, whitish.
The Membranes and Feet dark brown.
The Face, lower part of the abdomen, and inside of the extremities, naked, and flesh-coloured.
Inhabits Egypt and Nubia.

This Bat differs from the Taphozöus perforatus of Geoffroy, not only in the dimensions of its body, which is larger by one third part, but also in the nakedness of the lower part of the body and extremities, both in the young and adult,—parts which, in T. perforatus, are thickly covered with hair.

The face is pointed, and naked from the nose to the region round the eyes; the nostrils small, directed forwards; the eyes middle-sized, and black. The colour of the upper part of the body is a light brown, speckled with grey, of the lower whitish. On the nail-joint of each toe there is a pencil of stiff and crooked hairs. M. Ruppell procured his specimen from the pyramids of Gizeh.

Note.—Le Taphien filet, (Geoffr. Descr. d'Egypte, pl. I. fig. 1,) does not appear to be specifically distinct from Taphozous perforatus.

GENUS XX. MORMOOPS.—MORMOOPS BATS.

Syn. Les Mormoops.—Cuv. Reg. Anim. I. 120.—Fr. Cuv. Dents des Mam. 52.
Mormoops.—Leach, Linn. Trans. XIII. 76.—Fisch. Syn. Mam. 124. Gray, Mag. Zool. and Bot. II. 491.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\begin{matrix}2+5\ M\\2+6\ M\end{matrix}\right.=\frac{14}{16}=30$. (See Leach.)

Or, $^{2}\left|\begin{matrix}2+C+(3F+3)M\\2+C+(3F+3)M\end{matrix}\right.=\frac{18}{18}=36$, according to Fr. Cuvier, who says he had it from Leach.

The Ears large and coalescing; the tragus conspicuous. Forehead abruptly elevated.

The Nose-leaf single, erect, and conjoined to the ears.

The Tail not extending beyond two thirds of the interfemoral membrane; last joint free.

Inhabits Jamaica.

The Mormoops Bats have four incisors in each jaw, the upper being of considerable size, and the lower trilobed; their cranium is singularly elevated like a pyramid, above the muzzle; and from each side of the nose there projects a triangular membrane, which coalesces with the ear.

Though this Genus was established by Dr Leach with all due care, yet his materials were very scanty, and it evidently requires revision. As stated by Mr Gray, the genus described by M. F. Cuvier under this name appears quite different from that of Dr Leach. This gentleman's description is lucid, and the plate of the single species on which the genus was founded is excellent: it contains four figures; the face; a back view of the whole animal; the cranium; and the dental apparatus. The upper incisors are very unequal, the central being much the broadest, and having a deep notch in the middle; the outer ones are small, point obliquely, and are sharp. The lower ones are uniform in size, and trilobed.

1. MORMOOPS BLAINVILLII.—DE BLAINVILLE'S MORMOOPS BAT.

Syn. Leach, in Linn. Trans. XIII. 76.—Fisch. Syn. Mam. 124.—Gray, Loc. Cit. et Annal.; Nat. Hist. IV. 3.
Icon. Leach, Loc. Cit. pl. 7.

SPECIFIC CHARACTERS.

The Head nearly globular. The Nose rounded above, and obliquely truncated below.

The Ears very large and broad, united on the forehead; the tragus lunated.

The Lips variously expanded, and tuberculous.

The Interfemoral Membrane very large, truncated at the extremity.

The Heel-bone very long, and marginal.

Inhabits Jamaica and Cuba.

Mr Macleay having lately sent home a specimen of this Bat from Cuba, Mr Gray has been enabled very considerably to add to the information respecting the animal previously possessed, and which was confined to Dr Leach's notice. Mr Gray states that it has scarcely a true nose-leaf, and that it is closely allied to the Taphozoi. The head is nearly globular, with a produced muzzle. The nose is rounded above, with three warts on each side, and obliquely truncated below, with a longitudinal central rib, and a transverse rib between the margin and nostrils. The lips are variously expanded, and so complicated that they can scarcely be described by words. The large ears are dependent over the face; the lower side is expanded, and continued into the folded lower lip. The tragus is lunate; the antetragus large and tubercular. The wings are long, rather wide, hairy beneath near the sides. The interfemoral membrane furnished with many transverse lines; the tail is long, with the last joint free.

Mr Macleay's specimen was killed in his bed-room. Dr Leach's was sent from Jamaica by Mr Lewis.

TRIBE IV.—MONOPHALANGIA ANISTIOPHORA.

Syn. Anistiophori, (in part.)—Spix, Sim. et Vespert. Bras.
Vespertilionina.—Gray, in Mag. Zool. and Bot. II.—Less. Mam.

CHARACTERS OF THE TRIBE.

The Index with only one ossified phalanx; the other fingers with two.
The Nose without any leafy appendage.

GENUS XXI. EMBALLONURA.—LONG-NOSED BATS.

Syn. Emballonura.—Kuhl,'in Ann. Wetcrauischen Gesellschaft I.—Temm. Mon. Mam. I. 18.
Proboscidea.—Spix, Vesp. Bras.—Gray, Mag. Zool. and Bot. II. 499.
Vespertilio, (in part.)—Pr. Max. Abbild.—Fisch. Syn. Mam. 115.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\begin{matrix}2+C+(F+4)M\\3+C+(F+4)M\end{matrix}\right.=\frac{16}{18}=34$

The Head long and conical; Forehead flat.

The Muzzle long: the Upper-jaw the longest.

The Tail long, and partially involved in the interfemoral membrane.

Inhabit Brazil, and the Indian Archipelago.

That the small group of Bats included under the appellation Emballonura were entitled to a separate generic distinction, seems first to have been recognized by M. Spix, who applied to it the name of Proboscidea.

As the Baron Cuvier, however, had applied this same term to a family of the Pachydermata, this proposal could with no propriety be entertained; and hence, Kuhl, it would appear, was prompted to introduce another, and less objectionable one, which has been adopted by Temminck, though, in his published writings, nothing further than a mere indication is supplied. The upper incisors, it would appear, are very small, distant, and diverging; whilst the lower are lobed, and placed in a semicircle.

1. EMBALLONURA SAXATILIS.—THE ROCK LONG-NOSE BAT.

Syn. et Icon. Emballonura Saxatilis.—Temm. Mon. Mam. I. 18.
Proboscidea Saxatilis.—Spix, Sim. Bras. 62.—Gray, Mag. Zool. and Bot. II. 499.
Vespertilio Naso.—Pr. Max. Abbild.—Reise Nach Bras. Bd. I. 251.

SPECIFIC CHARACTERS.

The Hair brown above, streaked with grey; ash-coloured beneath.

The Nose with its tip prolonged; the spur is also long.

The Interfemoral Membrane is truncated; The Tail somewhat free at its tip.

Inhabits Brazil.

Prince Maximilian informs us that this small Bat is very abundant in numerous districts of the Brazils. During the day it is usually seen hanging to the great trunks of the trees of the virgin forests, or to the sharp rocks which overhang the rivers, where it enjoys the freshness of the stream, and does not quit its retreat till the evening twilight.

2. EMBALLONURA RIVALIS.—THE RIVER LONG-NOSE BAT.

Syn. Proboscidea rivalis.—Spix, Vesp. Bras. p. 62.—Gray, Mag. Zool. and Bot. II. 499.
Vespertilio rivalis.—Fisch. Syn. Mam. p. 116.
Icon.

SPECIFIC CHARACTERS.

The Hair dark brown above, light brown beneath.

The Nose prolonged, pointed, and somewhat pendant.
The Wings projecting far before the head.
Inhabits the Brazils.

The information we possess of this species is very scanty. It is somewhat less than the preceding; and is found in numerous bands on the copse which skirts the banks of the River Amazon.

3. EMBALLONURA CANINA.—CANINE LONG-NOSE BAT.

Syn. Vespertilio caninus.—Pr. Max. Abbild. et Beitr. zur Naturg. Bras. Bd. II. p. 262.—Fisch. Syn. Mam. p. 112.
Proboscidea canina.—Gray, Mag. Zool. and Bot. II. 499.
Icon. Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Hair of a uniform deep brown colour, as are the membranes.
The Snout prolonged, and somewhat turned up.
The Alar Membranes ample; the interfemoral long and truncated.
The Tragus very short. The Spur very long.
Inhabits Brazil.

The length of the head and body of this Bat is nearly three inches; of the tail not an inch; the extreme breadth is eleven. The fur throughout is dense, soft, and long. Prince Maximilian found it among old ruined edifices.

4. EMBALLONURA CALCARATA.—SPURRED LONG-NOSE BAT.

Syn. Vespertilio calcaratus.—Pr. Max. Abbild. et Beitr. zur Naturg. Bras. Bd. II. p. 269.
Vespertilio Maximiliani.—Fisch. Syn. Mam. p. 112.
Proboscidea calcarata.—Gray, Mag. Zool. and Bot. II. 499.
Icon. Pr. Max. Abbild.

SPECIFIC CHARACTERS.

The Fur reddish-brown.
The Membranes dark brown, and very ample.
The Muzzle somewhat pointed. The Tail short. The Foot small.
The Spurs very long, so as almost to touch, making
The Interfemoral pointed.
Inhabits Brazil.

The length of the head and body of this species is about two and a half inches, and its extreme breadth somewhat more than twelve. The ears are long, pointed, and distinctly rugous externally. Prince Maximilian observed this animal in the small river Joucou, near the Santo Spirito.

5. EMBALLONURA MONTICOLA.—THE HILL LONG-NOSE BAT.

Syn. Proboscidea Monticola.—Gray, Mag. Bot. and Zool. II. 500.
Icon.

SPECIFIC CHARACTERS.

The Face depressed. Forehead rounded.
The Spurs about four lines long.

A satisfactory account of this species has not hitherto, we believe, been published; at least, we have not been able to find it in any work of Kuhl to which we could refer. The animal, however, is preserved in the Leyden Museum, and is reported to have been received from Java. Mr Gray says that the wings are brown; expanse, six inches.

GENUS XXII. UROCRYPTUS.—CONCEALED-TAIL BATS.

Syn. Urocryptus, (Chauve-souris à queue Cachée.)—Temm. Mon. II. 144.

Although M. Temminck indicated the existence of this genus as far back as the year 1838, with the promise he would immediately publish the details concerning it, yet the work has hitherto been delayed. He states that this genus and the Emballonura form two small groups between the Taphozous and the True-Bats. In both groups the interfemoral is pierced by the tail as in Taphozous, but they differ from it in the dental apparatus, which corresponds to that of the Bats.

GENUS XXIII. NYCTICEJUS.—ROQUET-DOG BATS.

Syn. Nycticejus.—Rafinesque, Journ. de Phys. LXXXVIII. p. 417.—American Month. Mag.—Cuv. Reg. Anim. I. 122.—Temm. Mon. Mam. II. 145.
Atalapha.—Rafinesque, loc. cit.
Vespertilio.—Auct. (in part.)
Scotophilus.—Gray, (in part,) Mag. of Zool. and Bot. II. 497.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\frac{1+C+4\,M}{3+C+5\,M}\right.=\frac{12}{18}=30$

More rarely $^{2}\left|\frac{1+C+(F+4)M}{3+C+5\,M}\right.=\frac{14}{18}=32$

In the young $^{2}\left|\frac{2+C+4\,M}{3+C+5\,M}\right.=32$

More rarely $^{2}\left|\frac{2+C+(F+4)M}{3+C+5\,M}\right.=\frac{16}{18}=34$

The Ears small. The Muzzle simple.
The Chanfrin very broad. The Forehead narrow. The Occiput elevated.
The Interfemoral Membrane pierced by the tail, which is usually long.
Inhabits all the Continents, except Europe.

The Roquet-Dog Bats, with the ears of moderate size, and the simple muzzle of the Proper Bats, have only two incisors in the upper jaw. The known species are of South America, [as well as of the Old World.]

This genus was instituted by M. Rafinesque, upon the examination of some of the numerous species of Bats which he discovered in the provinces of Ohio, Indiana, and Illinois, in North America; and it is a matter of regret that these have not subsequently been re-examined by any competent scientific Naturalist. The incisors always nearly approximate to the canines, and are invariably long, conical, and pointed like the eye-teeth. The intermaxillary bones are rudimentary, and firmly united to the maxillaries throughout their extent. The lower incisors are always more or less crowded. When the false molar is present, it is always extremely small, not in the range with the other teeth, and placed behind the heel of the canine. The enlarged form of the chanfrin, and the elevated occipital bone, confer on this genus a strong resemblance to many dogs, more especially the Roquet-Dogs. Their mouth and muzzle are large, and their head appears so from the ears being so far apart: these appendages are not complicated, but always short and round; their tragus, too, is short and obtuse. Their fur is generally short, and very smooth, and some species are partially naked, more especially on the abdomen, croup, and thighs.

The genus may be divided into two groups, those which belong to the Old World, and those found in the New. These latter have the fur usually longer, and the interfemoral membrane more or less clad with hair.

(A.) Section I. Species belonging to the Old World.

1. NYCTICEJUS NIGRITIS.—SENEGAL ROQUET-DOG BAT.

Syn. Vespertilio nigritis.—Linn. Gm. p. 49.—Geoffr. Ann. du Mus. VIII. 201.—Desm. Mam. No. 217.
La Marmotte Volante.—Daubent. Mem. de l'Acad. 1759, 385.
Chauve-souris étrangère.—Buff. Hist. Nat. X. p. 82.
Senegal Bat.—Penn. Quad. No. 502.
Nycticejus nigritis.—Temm. Mon. II. 147.
Icon. Buff. loc. cit. pl. 18; copied in Scbreb. No. 58.—Geoffr. loc. cit. pl. 47.—Temm. pl. 47, fig. 1 and 2, (heads.)

SPECIFIC CHARACTERS.

The Hair fawn brown above, and dark brown beneath. The Membranes black.
The Ears are triangularly oval and short, being about one third the length of the head. The Tragus short and obtuse.
The two last joints of the tail extend beyond the membrane.
Inhabits Senegal.

This Bat is of large dimensions, extending, in extreme length, including the tail, measuring three inches, to more than seven; the extreme expanse is about twenty inches. The head is long; the ears wide apart; the lips also are long, but not warty, and the chanfrin projecting.

It was Adanson who sent this animal from Senegal; and it has long been preserved in the Paris Museum.

2. NYCTICEJUS HEATHII.—HEATH'S ROQUET-DOG BAT.

Syn. Nycticejus Heathii.—Horsf. Proceed. Zool. Soc. Aug. 1831, P. 1st, p. 113.—Temm. Mon. Mam. II. 149.
Scotophilus Heathii.—Gray, Mag. Zool. and Bot. II. 498.
Icon.

SPECIFIC CHARACTERS.

The Hair on the upper parts of the body of a deep brown, with a rosy tint, the lower parts a greyish fawn.—Covering the whole body.

The Lips covered with hair. The Ears shorter than the head.

The Tragus short.

Inhabits India.

Heath's Bat is likewise remarkable for its large size; in total length being upwards of six inches, and breadth nearly twenty; the fur also is abundant, silky, and shining. The head is of medium length, depressed, somewhat flat above, and compressed on the sides; the muzzle is large and obtuse; the gape not very wide; the lips covered with hair; the ears much shorter than the head; the concha straight, and roundly oblong at the point, somewhat keel-shaped at its posterior margin; the tragus is linear, and leaf-shaped. The fur is smooth and short, and covers every part of the body. The colour of the upper part is of a deep brown, covered with a rosy hue; beneath it is a somewhat greyish-fawn colour. No part of the body is naked.

Mr Heath transmitted an individual of this species from Madras to the Zoological Society, where specimens are to be preserved; Dr Horsfield described it to that learned body. It has been received also from Calcutta.

3. NYCTICEJUS TEMMINCKII.—TEMMINCK'S ROQUET-DOG BAT.

Syn. Nycticejus Temminckii.—Temm. Mon. Mam. II. 149.
Vespertilio Temminckii.—Horsf. Zool. Res. in Java.
Scotophilus Temminckii.—Gray, Mag. Zool. and Bot., who identifies it with the Vesp. Belangeri.

Icon. Vespertilio Temminckii.—Horsf. loc. cit., 5 figures.
Nyctické Temminck.—From the living animal; loc. cit. Temm. Mon. pl. 47, 4 figures.

SPECIFIC CHARACTERS.

The Hair often varying in colour, (see description 1,) very short and shining.

The Ears wide asunder, broad, round at the tip. The Tragus oblong, round at the point; inclined forwards.

Inhabits Java and surrounding Archipelago.

Dr Horsfield states that the entire length of this Bat is four inches and six lines, its extreme width is about eleven. The muzzle is full and obtuse; the ears very widely separated, broad, round at the point; the operculum is somewhat oblong, inclined forwards, and roundish at the extremity. The cranium is capacious, the occiput high, the chanfrin broad and flat. The fur is very short, abundant, and shining, with a brush of hairs on the lower part of the alar membranes. The colours of the robe are very variable, often party-coloured, so as to excite the suspicion that it sometimes changes. The examination of more than a hundred individuals has led M. Temminck to the conclusion that the following are the most common:—*a.* All the upper parts of the body bright and shining chestnut, all the lower parts a beautiful red. *b.* Upper parts a shining olive brown; lower parts a yellowish-grey brown. c. Upper parts of a shining red brown; the lower, a fawn red. In the *young* the most common liveries are, *d.* olive, or dull russet above, a fawn red beneath; and, *e.* in some individuals, the upper parts are party-coloured, chestnut and brown, whilst the lower are spotted, white, fawn coloured, and red.

Dr Horsfield first described this Bat, and the Belgian Naturalists have captured many of them in the Eastern Archipelago, especially in Java. They congregate in great bands of many hundreds in the roofs and trunks of trees, whence they issue about dusk. Their chief nourishment consists in the white ants, (*Termites.*)

4. NYCTICEJUS BELANGERII.—BELANGER'S ROQUET-DOG BAT.

Syn. Nycticejus Belangerii.—Temm. Mon. Mam. II. 151.
Vespertilio Belangeri.—Isid. Geoff. in Voy. de Belang. p. 87.

Icon. Vespertilion Bélanger.—Voy. ut sup. pl. 3.

SPECIFIC CHARACTERS.

The Fur olive chestnut above.

The Muzzle, cheeks, arm-pits, and groins, naked.

Inhabits India.

The ears of this species are wide asunder, roundish, short, their external border approximating to the lips; the tragus narrow and straight. The muzzle is short, broad, obtuse; the nostrils wide apart. The teeth exhibit that formula which is more rarely observed. The fur is of medium length, smooth, bi-coloured above, and uniform beneath: above, they are brownish-yellow at their root, and chestnut at their point; beneath, fawn coloured. The membranes are naked above, but are somewhat clad beneath along the arm and fore-arm. The total length is nearly five inches. The expanse fourteen. In the *young*, the hair is shorter, and not so scanty, and is brown above, and light yellow beneath, almost white on the throat and chest. It is frequent on the coast of Coromandel, and neighbouring parts of India; abounding in dwelling-houses.

5. NYCTICEJUS NOCTULINUS.—NOCTULINE ROQUET-DOG BAT.

Syn. Nycticejus Noctulinus.—Temm. Mon. Mam. II. 226.
Vespertilio Noctulina.—Isid. Geoffr. in Voy. de Belang. p. 92.

Icon.

SPECIFIC CHARACTERS.

The Fur of a rosy fawn colour above, yellowish beneath.

The Body in no part naked. The Membranes of a light brown.

Inhabits India and Singapore.

This Bat, in general appearance, corresponds to the preceding, but is of smaller dimensions, nor is any of its body devoid of hair. The muzzle is prolonged and naked at its point and sides. The ears are triangular, terminating in an oval shape; the inferior lobe is remarkably long; the tragus is long and straight, terminating in a blunt point. The tail is of medium length. The upper part of the head, the sides of the neck, and the upper parts of the body, are covered with short hair of a rosy fawn colour; the under parts are of a yellowish fawn, the sides of the chest being somewhat red; the lower side of the interfemoral membrane appears naked, till examined with a glass, when a few fine white hairs are discovered. The membranes are of a light brown, their edges white, and there is no difference in the sexes. The total length is three inches and three lines; the width about nine. It has been found at Bengal and at Singapore.

6. NYCTICEJUS BORBONICUS.—BOURBON ROQUET-DOG BAT.

Syn. Nycticejus Borbonicus.—Temm. Mon. Mam. II. 153.
Vespertilio Borbonicus.—Geoffr. Ann. Mus. VIII. 301.—Desm. Mam. No. 216.

Icon. Geoff. loc. cit. pl. I. tête; copied in Temm. pl. 47, fig. 7.

SPECIFIC CHARACTERS.

The Fur red above, pale beneath. The Ears oval, triangular.

The Tragus long, and demi heart-shaped.

Inhabits the Island of Bourbon.

The head of the Bourbon species is short and broad; the muzzle obtuse; the ears wide asunder, short, scarcely higher than the head, and triangular; the tragus long, leaf-shaped, bent towards the head. The fur is short, shining, and bi-coloured on the superior parts, being yellowish at the base, and shining red towards the tip; the under parts of the body are pure white, the tips of the hairs having a slight rosy tint. All the membranes are naked, and of a dull brown colour. The total length is nearly five inches, the breadth thirteen. M. Macé sent home specimens which are now to be found in Paris and Leyden.

7. NYCTICEJUS LEUCOGASTER.—WHITE-BELLIED ROQUET-DOG BAT.

Syn. Nycticejus Leucogaster.—Temm. Mon. Mam. II. 153.

Icon. Cretzschmar in Atlas Voy. de Rüpp. Tab. XXVIII. fig. 11.—1, 2, Heads.

SPECIFIC CHARACTERS.

The Fur olive brown above; yellowish-white beneath.

The Face naked and flesh-coloured. The Ears large and roundish. Tragus long.

Inhabits Kordofan.

In this species the head is short; the muzzle broad; the nostrils wide apart; the face and cheeks naked, and flesh-coloured; the ears distant from each other, large, roundish, having the inferior lobe distinct; the tragus long, leaf-shaped, and curved forwards; the abdomen of the male showing the skin, though covered with hair. The fur short and smooth; all the upper parts are of an olive brown colour; the lower are white, with a yellowish tinge. The total length is somewhat more than four inches; the extreme expanse twelve.

Specimens are to be seen in the museums of Francfort, and the Low Countries. M. Ruppell discovered this species at Kordofan.

(B.) Species belonging to the New World.

8. NYCTICEJUS PRUINOSUS.—HOARY ROQUET-DOG BAT.

Syn. Vespertilio Pruinosus.—Say, in Long's Exped. to the Rocky Mount. I. 331.—Harlan. Faun. Amer. p. 21.
Hoary Bat.—Godman, Amer. Nat. Hist. I. 50.
Vespertilio Villosissimus?—Geoff. Ann. Mus. VIII. 204.
Chauve-Souris Septieme, d'Azara.—Quadr. II. 284.
Nycticejus Pruinosus.—Temm. Mon. Mam. II. 154.
Scotophilus Pruinosus.—Gray, Mag. Zool. and Bot. II. 498.
Icon. Godman, l. c. fig. 3.

SPECIFIC CHARACTERS.

The Fur dark grey on the back, ferruginous near the tail; dark beneath.
The Membranes extensively covered with fur.
Inhabits the banks of the Missouri, North America.

The ears of this species are short, and broader than high, not so long as the head, and clad exteriorly throughout half their length; the tragus is leaf-shaped, and inclined towards the head; the muzzle short and obtuse; nostrils wide apart. The fur is long, and very abundant, extending on the alar membrane along the arms and flanks, and being very abundant on both sides of the interfemoral. "The hair on the back is black-brown at the base, then yellowish-brown, then blackish, and then white; towards the rump dark ferruginous takes the place of the brownish-yellow on the fur; beneath, the colours are similar to those of the back, but, on the anterior portion of the breast, the fur is not tipt with white, and on the throat is dull yellowish-white."—*Say.* The total length is four and a half inches. Mr Say states it is common in the Missouri; it has also been found in Philadelphia, and other parts of the United States.

9. NYCTICEJUS LASIURUS.—ROUGH-TAILED ROQUET-DOG BAT.

Syn. Nycticejus Lasiurus.—Temm. Mon. Mam. II. 156.
Vespertilio Lasiurus.—Linn. Gmel. I. 50.
Scotophilus Lasiurus.—Gray, Mag. Zool. and Bot. II. 498.—Geoffr. Ann. Mus. VIII. 200.—Desm. Mam. No. 215.—Penn. II. 315.
Icon. Schreb. I. t. LXII. B.—Geoff. l. c. pl. 2; copied in Temm. pl. 47, fig. 8.

SPECIFIC CHARACTERS.

The Fur reddish-yellow above, paler beneath. See description.
The Head very small. The Membranes well covered with hair.
Inhabits the United States and South America; common at Cayenne.

This Bat is remarkable for the smallness of its head; its ears are short and oval; the tragus, too, is short, and curved forwards; its large interfemoral membrane is uniformly clad above, and extensively, as is the alar membrane beneath. It has a spot of pure white on each side of the chest. The fur, in *summer*, differs from that of winter. During the former season, the hair on the head and neck is red, tipt with yellow; the rest of the upper parts of the body have the hairs yellow at the root, and tipt with cinnamon-red; the points in some are pure white: underneath the chin is bright red; the chest, with the exception of the white spots, yellowish red; and on the other parts red predominates. During *winter*, and in *the young*, the colour is a bright yellow, with a red tint; the neck is bright red, and the white spots at the origin of the wings are conspicuous; the abdomen is rosy white, the membranes red. The total length, including the tail, is somewhat more than four inches,—the expanse eleven inches; the size is seldom more considerable. The specimens from Cayenne are usually larger than those from the United States.

10. NYCTICEJUS NOVÆBORACENSIS.—NEW YORK ROQUET-DOG BAT.

Syn. Nycticejus Novæboracensis.—Temm. Mon. Mam. II. 158.
Vespertilio Novæboracensis.—Penn. Quadr. II. 313.—Linn. Gmel. I. 50.—Geoffr. l. c. 203.
Atalapha Americana.—Desm. Mam. No. 227, from Rafinesque.
Scotophilus Novæboracensis.—Gray, Mag. Zool. and Bot. II. 498.
Icon. Penn. l. c. pl. CIV. fig. Encycl. Méthod. pl. 34, fig. 5.

SPECIFIC CHARACTERS.

The Fur of a uniform reddish-brown colour, with small white spots at the origin of the wings.
The Muzzle short and obtuse. The Ears short, broad, and round.
Inhabits New York, and the Northern States of the Union.

This species differs but little from the preceding two, except in the colour, which is uniform throughout, with the exception of small white spots at the origin of the wings. The muzzle is short and obtuse, the ears short, broad, and roundish; the whole of the upper part of the interfemoral membrane is clad, and a portion of the under. The fur is long, copious, soft, and silky; the upper and under parts, and the interfemoral, have all the same light rosy brownish colour, with a small spot at the insertion of each wing. Its total length is about three and a half inches, its expanse nearly twelve.

11. NYCTICEJUS BONARIENSIS.—BUENOS-AYRES ROQUET-DOG BAT.

Syn. Nycticejus Bonariensis.—Temm. Mon. Mam. II. 158.
Vespertilio Bonariensis.—Less. Voy. de la Coq. I. 137.
Icon. Lesson, loc. cit. pl. 2, fig. 1, A, B, C, (cran. and teeth.)

SPECIFIC CHARACTERS.

The Fur yellowish on the back; yellowish-brown on abdomen.
The Ears short and oval. The Membranes dark red, the interfemoral clad above, naked below.
Inhabits South America.

We supply a description of this species in respect to M. Lesson, though we agree with M. Temminck, it will probably turn out to be only the *Nycticejus lasiurus*. Its muzzle is short and conical; the ears short, roundish, and wide apart. The face is clad with a few hairs; long and silky hairs cover the under part of the side membranes, and extend along the fore-arm; the interfemoral membrane is clad above, and naked beneath: the fur is abundant, and of many colours throughout; the muzzle is yellowish-red, the back a light fawn, each hair ending in first a black and then a white part; the upper part of the interfemoral membrane is of a deep dark red; the throat, chest, and abdomen, are light brown. The total length is about three inches, the expanse about nine. The individual just described was captured in a vessel lying at anchor in the River La Plata.

DOUBTFUL SPECIES.

In this category we place two species, upon which Rafinesque originally founded the genus, but which have not since been seen, or at least described, by any Naturalist, American or European.

1. Nycticejus humeralis.—The *Blackshoulder Bat* of Rafinesque, and noticed by him in Kentucky, North America. It is about three and a half inches long, including the tail; the ears are oval, longer than the head, and blackish, as is the muzzle; the eyes are small, and hid by the hair. The fur is a deep brown colour above, grey beneath, with black shoulders; the membranes are very dark.

2. Nycticejus Tessellatus.—The *Netted Bat* is about four inches long, one half of which is occupied by the tail, terminating in a projecting tubercle; the nose is bi-lobed; the ears almost hid in the fur, which is bay-coloured above, fawn beneath, with a narrow yellow collar, and white arm-pits; the wings are netted, and tipt with red. Like the former, it inhabits Kentucky.

IMAGINARY GENUS.

Atalapha.—The genus Atalapha of Rafinesque, which has been adopted by Desmarest, Lesson, and others, having been founded upon an aged individual of the New York species which had lost its incisors, must, of course, be blotted out from our systems.

GENUS XXIV. VESPERTILIO.—BATS PROPER.

Syn. Vespertilio, (in part.)—Linn. Gmel. I. 45.—Geoffr. in Ann. Mus. VIII. 187.—Fischer, (in part,) Syn. Mam. 100.—Desm. et Auct.
Vespertilio et Plecotus.—Les Oreillards.—Cuv. Reg. Anim. T. I. 120, 121.—Geoffr. loc. cit. et Cours de l'Hist. Nat. Leç. 14, 23, et alia.
Vespertilionina, (in part.)—Gray, Mag. Zool. and Bot. II. 494.—Lesson, et al.

GENERIC CHARACTERS.

The Dental Formula $^{2}\left|\frac{2+C+4M}{3+C+(2F+4)M}\right.=\frac{14}{18}=32$

Or, $^{2}\left|\frac{2+C+(2F+4)M}{3+C+(2F+4)M}\right.=\frac{18}{20}=38$

And also, according to the number of false molars, 34 and 36.

The Tail is invariably included in the interfemoral membrane.
The Nose without nose-leaf, ridges, tubes, &c.
The Middle Finger has three phalanges. The Ring and Little One two. The Index one.

Prey solely on insects.

Inhabit all countries of the world, with the exception of Australia.

The Common Bats have the muzzle devoid of a nose-leaf, and of any other distinctive mark; the ears are (generally) separated; they have four incisors above, of which the two mesial are somewhat separated, and six below, which are cutting and indented; the tail is included within the membranes. This subgenus is the most numerous of all, and species are found in every part of the world; there are six or seven in France alone. Some have the tragus awl-shaped.

Differing from what we have seen in so many genera, the incisors are, in the Bats Proper, at all periods of their life regularly four above and six below: if ever wanting, it is the result of accident, or extreme old age. The four upper ones are arranged in pairs, and are always at some little distance from the canines; the inner ones are the larger. The intermaxillary bone, though rudimentary, is larger than in the Nycticeji, and is to more than half its extent ossified with the maxillary. The six inferior are always crowded, and bi-lobed or tri-lobed. The canines are strong, often triangular, and always smooth, and without a head. Great differences occur as to the number of false molars, chiefly from the intrusion of the other teeth: in the upper jaw there are sometimes none, sometimes two, and they vary from one to two in the lower, and are both sometimes exceedingly small. The true molars are invariably four, both above and below, so that the difference in the number of molars arises solely from the varieties in the false molars. The cranium of the Bats Proper is more compressed and elongated than that of the Nycticejus; their muzzle is less obtuse, and the chanfrin more compressed; these circumstances, along with the greater narrowness of the zygomatic arches, causes their whole physiognomy greatly to differ.

All the species of Vespertilio, without scarcely an exception, are, like the *Rhinolophi*, and some other of the frugivorous Bats, provided with odoriferous glands, which distil an unctuous fluid more or less disagreeable, according to the species; these glands, unlike what occurs in the Roussettes, are found in both sexes, and are placed sometimes before the eyes, sometimes above them, or near the muzzle; sometimes they are numerous, and cover most of the side of the head. The intolerable smell is sometimes so powerful as to direct us from a great distance to the place of their retreat. Referring to the particulars stated in the introductory remarks on the Insectivorous group, (p. 15,) respecting the singular fact of the males, the females, and the young, isolating themselves for a great part of the year, we have only to add, that the European Bats usually associate again together towards the period of their hybernation, which often continues throughout the winter, though sometimes interrupted by a few days of mild weather, and that then, whole families, or rather great masses of individuals, link themselves confusedly together in retreats, where they are protected from the intensity of the cold.

According to M. Temminck, these Bats Proper present a somewhat anomalous circumstance in respect to their reproduction. Whilst the frugivorous Chiroptera produce but one at a birth, some species of these Bats have generally two, whilst others have only one, and others either periodically or accidentally, all produce sometimes the former number and sometimes the latter, which last observation has been made especially upon our first species, *V. Noctula*. When engaged in rearing their young, the females fix their arm-hook, and bind the tail under the abdomen; thus the interfemoral membrane forms a sac, and supplies a nest for the young, in which it is carried about in all the flights of the mother. In some of the frugivorous Bats we have previously noticed a not less curious or effective provision made for the care of the young.

Another trait we must mention of these Proper Bats, which is also seen in the Rhinolophi, and probably in all the Insectivorous Chiroptera with a long tail; it is, that they employ this member as we should do our finger, to introduce their prey into their mouth, or rather their throat, when it is at all of large dimensions, and by its exertions might otherwise escape; they approximate it to the head, bend their neck, and thus secure their victim. Thus, the tail has considerable influence on the habits of the different groups, and in the true Bats it is always formed on but one model, though it is different in those which really form distinct genera.

The number of species in the Genus Vespertilio is so great, that, even with the help of a somewhat minute description, (good figures being wanting,) there is a risk of their being confounded, and it is no longer possible to distinguish them according to the laconic Linnæan method. At the same time, regard must be had to the patience of the reader and the expense of publication; and, accordingly, we have determined, by some trifling alterations and curtailments, considerably to reduce the space occupied in description, without infringing on the information absolutely required for the distinguishing of species. Moreover, to avoid the confusion which might arise from the multitude of ascertained species, we shall, after the example of Temminck, subdivide the present genus according to the four great geographic divisions of the globe, and admit a fifth, if any of the group are discovered, as has not hitherto been the case, in the regions of Australasia. It is incontestible that species of this genus are found in all countries of the globe, with the exception of Australia, and that they are common to all climates, a result evidently contrary to the law of Zoological Geography indicated by Buffon, and admitted by many modern Zoologists.

Of the seventy-eight species that are now unexceptionably ascertained, twenty-eight belong to Europe, nine to Africa, to which we must add two common to it and Europe; twenty-four to Asia and India, to which two must also be added as found in Europe; and seventeen well known in America. To these, many unsatisfactorily described are still to be conjoined, so that the number of indicated species will be about 100. The genus *Plecotus*, as founded merely on the comparative length of the Ear, we altogether reject.

Section I. The European Species.

First, Those which belong to the British Fauna.

1. VESPERTILIO NOCTULA.—THE NOCTULE BAT.[1]

This species was first described by M. Daubenton in the Mem. de l'Acad. 1759, and has since been noticed by all systematic authors, foreign and domestic. The ears are ovato-triangular, and shorter than the head; the tragus small and incurvate; the head large and round, fur short, reddish brown all over; membranes dark coloured.

The fur of this species is of medium length, silky and shining, covering underneath a portion of the side membrane. The upper parts of the body are of a beautiful lively and shining red colour in both sexes; beneath the red is lighter, and that on the wing brown. On the Continent the length is about five inches, including the tail, and the expanse upwards of fifteen; in Britain the size is less.

This species is very widely spread abroad, and is more common in the central parts of Europe than in the extreme north and south. It is probably distributed over all the temperate parts of Asia, and it is impossible to recognize any distinction between those of Japan and Holland. It lives in towns and the country, in old buildings and trees. Pennant mentions that under the eaves of Queen's College, Cambridge, 185 were taken one night, sixty-three the next, and two the next. They huddle together by hundreds during their winter hybernation, and have a very disagreeable odour.—(Figured in Bonap. Faun. Ital.)

2. VESPERTILIO LEISLERII.—LEISLER'S BAT.

Although there is a specimen of this species in the collection of the British Museum, yet, as its origin is doubtful, it does not clearly appear that it is indigenous in Britain. On the Continent it exclusively inhabits the country, and appears to be solitary in its habits, rarely associating with other species; its habitual retreat is the hollows of forest trees, and the neighbourhood of stagnant pools. It is common in Germany, but has not been noticed either in Holland or France.

Leisler's Bat is about a third less in size than the foregoing species; the ears are very round, and the forehead and chanfrin depressed; the toes of the feet are very short, and the short tail is without a free point; there are glands conspicuous on the sides of the muzzle. The total length is about four inches; the expanse extends to about twelve. The fur is bicoloured throughout, long, and freely covering the side membranes and origin of the interfemoral, especially beneath. The hair of the upper part is brown at the root and reddish at the point; beneath it is blackish brown at the root, and brownish grey at the tip.

3. VESPERTILIO DISCOLOR.—THE PARTI-COLOURED BAT.

Dr Natterer discovered this species in the south of Germany, and considers it the most beautiful of European species. It abounds in the southern and eastern parts of the Continent, but is very rare in Britain and the northern parts. The specimen in the British Museum was taken in Plymouth, and M. Temminck informs us it is never found in Holland. The dimensions are about a fourth less than the Noctule. The forehead is very hairy, the muzzle broad, long, and tumid; the nose thick and broad; the lip thick, the upper furnished with small hairs; the ears broad, roundish, but triangular, bent outwards, and extending to the angle of the mouth, and half covered with thick fur; the tip of the tail is free. The fur is short and lustrous. The upper parts of the adult are veined longitudinally,

[1] Considering the immense number of species in this genus, our readers will excuse us for curtailing the lists of Synonyms, and altering our style of typography.

white or yellowish upon a chestnut ground: the under parts appear pure white.—(Fig. by Kuhl in Neue Ann. Wett. Gesellsch. pl. 25, fig. 1.)

4. VESPERTILIO SEROTINUS.—THE SEROTINE BAT.

This is a very common European species, and is widely distributed from the north to the south over the Continent; in Britain it has hitherto been found only in the vicinity of London. It lives in cavities of old trees, piles of wood and ruins, prefers the neighbourhood of water, flies slowly in dim twilight, and utters a piercing cry. The muzzle is long and nearly naked at the point; the ears are wide asunder, of medium size, and clad at their external base; the tragus is leaf-shaped and arched, with a round point; the tip of the tail projects beyond the membrane about a line and a half. There are odoriferous glands at the side of the muzzle of a pale yellow colour. The fur is of medium length, fine and silky. The *male*, above, is chestnut brown, beneath dull ash brown. The *female*, rosy brown above, and yellowish-grey beneath; the muzzle, ears, and membranes, black. Extreme length about five inches, breadth fourteen.—(Fig. in Bonap. Faun. Ital.)

5. VESPERTILIO AURITUS.—THE LONG-EARED BAT.

The ears of this species are nearly as long as the body, reaching to an inch and a half; they are inclined to the side, and have a longitudinal fold reaching almost to the lips; the tragus is straight, long, and pointed, with an external lobe at its base; the head is depressed; the snout long and pointed, and almost naked; the odoriferous glands on each side yellowish. The fur is long, black at the base; the membranes are naked, and those of the ears brownish-grey. Both sexes have the superior parts of a reddish ash grey, the inferior of a pale yellow-grey. The extreme length is about three and a half inches, the expanse ten, though those of the south of Europe are somewhat larger than our northern specimens. This species is one of the most widely distributed over the temperate and warmer regions of Europe; it is common in most parts of England, and in many parts of Scotland; it is also found in the north of Africa. It frequents great towns and villages rather than wooded districts, flying with a steady motion along narrow streets and alleys, and hybernating in towers and steeples. Mr Bingley says they have no peculiarly offensive smell.—(Fig. in Magaz. de Zool. II. pl. 2 and 3.)

6. VESPERTILIO NATTERERI.—NATTERER'S BAT.

The Bat denominated Natterer's by Kuhl and Temminck is the reddish-grey Bat of Mr Bell and some other English authors. It is found in Germany and Britain, in Holland, and the shores of the Adriatic. It has been found in Norfolk, Cambridgeshire, and Kent, but we believe not in Scotland. Mr Bell received three individuals from a shaft in a chalky cavern seventy feet deep, together with some of the preceding species. and the Barbastelle and Whiskered Bat still to be described. Its extreme length is about three inches, its breadth nine. Its muzzle is very short, scarcely extending beyond the bushy hairs of the face. The ears longer than the head, and without any distinct lobe; the tragus is long, filiform, and pointed; and there is a range of hairs at the margin of the interfemoral. The fur is very bushy and long, especially about the head and neck. Above, the hairs are brown at the base, and mouse-coloured at the tip; the tint of the neck is rosy, and of the under parts white.—(Fig. in Temm. Mon. II. pl. 50.)

7. VESPERTILIO DAUBENTONII.—DAUBENTON'S BAT.

We owe our first acquaintance with this species to M. Leisler, and it has been subsequently noticed by Kuhl and Desmarest. Temminck says, that its habitat is the centre and south of Europe, and that it is never seen in the north. According to Mr Bell, however, the *Emarginatus* of Mr Jenyns is the species now under consideration, and it has been captured by Mr Yarrell in Middlesex, as well as in Northamptonshire; and in Scotland by Dr Fleming in Fifeshire, and by Sir William Jardine in Dumfries-shire. Its total length is about three and a half inches, its extreme breadth about 10. The muzzle is short; the gape small; the ears nearly oval, and the tragus shaped like the willow leaf; the tail is very long, and free at the point to the extent of about two or three lines; the flank membranes are clad, and that of the fore-arm surrounded with *very fine hairs*. Odoriferous glands, of a white colour, are visible below the eyes. The fur is short, felt-like, and smooth; the membranes are clad both above and below, and hairs so small as to be scarcely visible to the naked eye cover the leg, and form a border to the interfemoral membrane. The superior parts are of a reddish-brown colour, the inferior parts of a greyish-white. To this species MM. Keyserling and Blaisius refer the *V. Ædilis*, a species lately proposed to be introduced by Mr Jenyns.—(Fig. in Bonap. Faun. Ital.)

8. VESPERTILIO MYSTACINUS.—THE WHISKERED BAT.

The head of this Bat is very small, and covered, like the rest of the body, with ample fur, a tuft of woolly hairs forming a striking moustache along the upper lip, which covers the under one. The ears are oval and not notched, the tragus lancet-shaped, but blunt at the point; the odoriferous glands in front of the eyes are of a citron yellow colour. The colour of the whisker is blackish-brown; the superior parts of the body are covered with long black hair, rufous tipt, the under are whitish; the membranes are much covered with the fur. Its extreme length is about three inches, and its breadth eight. Temminck states this species as rare. Leisler discovered it in Germany; Mr Gray pointed it out as British, and both Messrs Jenyns and Yarrell have seen it in England. Its winter abode is said to be in old houses, hollow trees, and caverns; it has a preference, too, it is said, for limpid waters, near which its flight is rapid, skimming along near the surface.—(Fig. in Temm. Mon. II. pl. 51.)

9. VESPERTILIO EMARGINATUS.—THE NOTCHED-EAR BAT.

The size and general form of this species, which was first described by M. Geoffroy, very nearly approximate to those of the preceding, with which therefore it may very readily be confounded. The distinguishing characters are the notch upon the external margin of the ear, the want of the moustache, and the reddish robe of the Notched ear. The ears are oblong, and as long as the head; the tragus long, awl-shaped, and pointed; they are well clad near the base. The colour of the head and upper parts is red, clouded with yellow and brown; all the under parts are ash-coloured, with a reddish tint, the ears and membranes dull brown. The entire length is three inches three lines; the breadth nine and a half inches. This species has been found in England, Holland, France, and Italy, but not in Germany. During the day it keeps its retreat; with the twilight it appears ranging with rapid wing for its food along lakes and stagnant waters.—(Fig. in Bonap. Faun. Ital.)

10. VESPERTILIO PIPISTRELLUS.—THE PIPISTRELLE, OR COMMON BAT.

This Pipistrelle of Daubenton and Schreber is the common Bat of Pennant; this last a name which was long given in this country to the *Murinus*, but which is thus much better merited by the present species. It is, according to Mr Jenyns, the most common kind in England, and according to Mr Macgillivray, who has given a minute description of it, (Nat. Lib.) it is very abundant in Scotland; it is widely spread over all the northern parts of Europe, but is rare in the south; it probably also inhabits Asia, M. Temminck having received many specimens from Japan. It lives in great bands, associating with other small species. The female has usually two young ones;—Kuhl says one. This latter author states that its hybernation is often interrupted. Its head is small; nostrils wide; ears small, distant; tragus leaf-shaped; odoriferous glands oblong. The fur is abundant and of medium length; the membranes quite naked. The superior parts are coffee-coloured, the inferior lighter, but not white, a character which distinguishes this species from the Whiskered Bat. The entire length is about three inches, the extent of wings between eight and nine.—(Fig. Geoff. Ann. Mus. VIII. pl. 47 and 48.)

The *V. Pygmæus* of Leach, (Zool. Journ. I.) and *V. Minutus* of Montagu, (Linn. Tr. IX.) are but the young of the Pipistrelle.

11. VESPERTILIO BARBASTELLUS.—THE BARBASTELLE BAT.

Seeing no occasion, as already stated, to adopt Mr Gray's new genus, Plecotus, still less will we, with Mr Bell, follow him in introducing another new genus, *Barbastellus*. The Barbastelle Bat inhabits the temperate and warmer regions of Europe, including Italy, but seems common in none of them. Mr Sowerby first detected it in England (Brit. Miscel.) Mr Montagu mentions (loc. cit.) its occurrence in Devonshire, Mr Jenyns in some of the Midland counties, and Mr Bell in Kent. The muzzle is extremely short, slender, and obtuse, and the head completely overshadowed by the ears, which are united by the base in front. These appendages are very much developed and wide; a tuft of hair covers the middle of the auricle, which is naked at the sides; tragus wide at the base, and slender at the point; the odoriferous glands are triangular. The fur is very long, fine, and silky, and the membranes partially clad on both sides. All the superior parts are black, the abdomen is pure white, the flanks light brown, as are the membranes. The entire length is between three and four inches, the width between nine and ten. —(Fig. Geoff. Ann. Mus. VIII. pl. 46 and 48.)

12. VESPERTILIO BECHSTEINII.—BECHSTEIN'S BAT.

This species, which was discovered by the late Dr Leisler, seems to be very rare in Britain, the only specimens having been taken in the New Forest, by Mr Millard; in France, too, it is rare, but more abundant to-

wards the south than the north; it is also found in Germany and Hungary; its sojourn is the trunks of trees, and it is said not to associate with its congeners. It is nearly the size of the Long-eared Bat, (No. 5,) but the ears are shorter, not united, and without a lobe; the membranes, likewise, are quite naked, and the tip of the tail free. The muzzle is rather long, pointed, and naked, the odoriferous glands, very large and whitish, are oblong; the teeth very white. The fur is long and copious. The markings, in which the sexes agree, are reddish-brown above, and silvery white beneath: in the young, silvery-grey above, and shining white beneath; the membranes are yellowish-brown and diaphanous; the ears dull yellow. The entire length is between three and four inches, the width about eleven.—(Fig. in Temm. Mon. II. pl. 50.)

13. V. MURINUS.—THE MOUSE-EARED BAT.

The *Murinus* of Linnæus, Geoffroy, and many others, is the *Myotis* of Bechstein and Kuhl; Pennant designated it the Common Bat of this country in his Synopsis, not in his British Zoology, and, as we have already stated, the *Pipistrelle* is the most common amongst us, for the English name of the *Murinus* we translate Bechstein's appellation. This Mouse-Eared Bat is, in fact, very rare in Britain, having been found only, we believe, in the gardens of the British Museum. It is the largest, not only of British, but also of European species. Its face is nearly quite naked, the nostrils open laterally, and the upper lip overhangs on each side. The ears incline backward, are very distant, lobeless, perfectly oval, and naked; the tragus shaped like the willow leaf, but broad at the base: the odoriferous glands are of a citron yellow colour. The fur is long, smooth, and bi-coloured throughout. The superior parts of the body are brownish-grey, reddish-grey, and pure grey, according to the age of the animal; the hairs being black at the root; all the inferior parts are pure white or yellowish-white, no difference occurring in the sexes. The entire length of the large animals is somewhat more than five inches, and the expanse nearly sixteen. The *adult of the first year*, with the fur shorter, and rarer, especially about the neck, and the markings less distinct, constitutes the *Murinus* of many modern authors. This animal is found in the temperate parts of Europe, and in North Africa. The female has usually two young ones, and they are not sociable; they bite cruelly, not sparing one another; they persecute the smaller kinds, and prefer a town to a country life; they seldom show themselves till it is nearly dark.—(Fig. in Bonap. Faun. Ital.)

Second, European Bats, unknown in Britain.

14. V. BRACHYOTOS.—THE SHORT-EARED BAT.

This Short-eared Bat, not that of Pennant, (British Zoology,) was found dead in the streets of Abbeville by M. Baillon, all of whose subsequent endeavours to discover another like it have been fruitless. Its forms are interesting, and have been detailed by M. Temminck in his monograph. Its muzzle is obtuse and naked, its forehead depressed; the ears are very small, much broader than high, triangular, about a line and a half; the tragus is very short, obtuse, and hid under the fur; the tail is short. The four upper incisors are in pairs; there are four molars above and five below, pointed. The fur is soft, silky, and of medium length, of a very vivid fawn colour above, the root of the hairs at the same time being quite black; the forehead, crown, nape, and upper part of the neck, marked with a broad black patch, the hair being shorter than elsewhere; the muzzle is naked, as also the upper part of the ears, their base hid in the fur. The inferior parts are less red than the upper, but the roots of the hair are quite black. The membranes are naked, tail of medium length, and white. Length, two inches seven lines; expanse, seven and a half inches.

15. V. SCHREIBERSII.—SCHREIBERS' BAT.

This Bat was discovered by M. Schreibers in the subterranean cavities of the mountains of Banat in Hungary, and is thus described by M. Kuhl. The head is small, the forehead elevated, the muzzle full; the ears small, and shorter than the head, broad, straight, roundish at the point; tragus lance-shaped. The fur of the superior parts is ash-grey, of the lower light grey, often yellowish-white; the thumb-nail is white. Entire length, three and a half inches; width, eleven; the measurements, however, were taken from a single individual.

16. V. LIMNOPHILUS.—THE NIGHT-BAT.

The muzzle of this Bat is very short, broad, obtuse, and nearly wholly covered on both lips with long diverging radiating hairs; the ears of medium size, quite oval, with a lobe or prolongation forwards; the tragus is short, straight, broad, and rounded at the point; the tail short, its tip free; the interfemoral membrane supplied underneath with very fine hairs. The odoriferous glands are large, yellow, and placed above the eyes. The fur is soft and silky; in the male, the superior parts of the body, and most of the sides of the neck, are mouse-coloured; in the female, inclined to russet; the chin, front of the neck, and inferior parts, are white at the point, and black at the base; the abdomen pure white. The white tip of the hairs is prolonged according to the age of the individual. When a year old they are both indifferently clad, and are above of a dull brown colour, below bluish-black; abdomen whitish. The total length is about four inches, width eleven. This species was introduced to notice by M. Temminck in his recent monography, and he accounts for its remaining so long unknown from its habits, appearing only when the night has set in, and flying with extreme velocity. It flies generally also over the surface of the water near the overhanging trees and brushwood. It is common in Holland.

17. V. ORSINII.—ORSINI'S BAT.

To the Prince of Musignano we are indebted for our acquaintance with this Bat, which was found in the caverns of Mont Corno 8000 feet above the level of the sea. From its dental formula he proposed to form a new subgenus of it; but from the great variability to which the teeth are subject, we deem it preferable, following M. Temminck, to maintain it in a situation at once more simple and suitable. The head of this species is short and very globular; the nose obtuse; the nostrils approximated; the forehead prominent; the eyes are hid under the fur, and are placed near the ears. These appendages are small, and nearly as broad as long, roundish, and more than a third shorter than the head; though so wide apart, they are united by a membrane; the tragus is slender, filiform, and one-half the size of the auricle. The mouth is cleft to the angle under the eye, and the face is clad with hair, which inclines upwards. The wings are very long, the thumb-nail very small. The tail, which is much longer than the body, is exceedingly stout, and enveloped in the membrane at its tip. The teeth are precisely the same as in the *auritus*. The fur is soft, cottony, abundant, and nearly of a uniform colour over the body; above it is of a marron brown, beneath of a light-grey. The entire length is four inches, two of them being occupied by the tail; the extreme width thirteen. This animal is the *Miniopterо dell' Orsini* of the Prince.—(Fig. in Temm. Mon. II. pl. 49.)

18. V. CORNUTUS.—THE HORNED BAT.

The Horned Bat is smaller than the long-eared, but the ears are proportionably longer, and the body smaller in comparison of the extent of wings. The muzzle is short, broad, and obtuse; the nostrils somewhat tubular; the mouth large; the ears conical; one inch four lines long; precisely the length of the body, and united in front; the tragus is half the length of the ear, lancet-shaped, and so disposed that the two look like a pair of ears. There is a fringe of fine hairs along the external edge of the interfemoral membrane. The fur is long and more abundant than in most other European species; a white moustache ornaments the lip. The superior parts are of a brownish-black colour, the lower bluish-black; the abdomen appears bluish-grey, from the tips of the hair being white; the membranes are blackish. The length is three inches and one line, the breadth nine and a half inches, (Danish measure.) This species was discovered by the celebrated Naturalist Faber, who captured an individual in Jutland.

19. V. CAPACCINI.—THE CAPACCINI BAT.

The Prince of Musignano describes this new species, which was caught in Sicily, in nearly the following terms. The tragus is slender; the thumb-nail large and strong; the feet robust, enveloped in a thick interfemoral membrane, well clad, though not very extensive. Its head is large, the muzzle conical and obtuse; the eyes are almost three times nearer the ears than the nostrils; the mouth is not remarkably large; the ears are about once and a half longer than they are broad, and are about two-thirds the length of the head; their form is oval lance shaped; the muzzle and lips are supplied with scattered hairs, which are abundant between the eyes. There is a great gland under the chin. The interfemoral membrane is cut obliquely in form of a triangle, leaving the feet free, as is also the point of the tail; it is clad, to half its extent, both above and below, with long hairs; the feet also are covered with hairs, which are white, as are the nails. The fur is soft and bushy, and of a cinnamon colour: the under parts are yellowish-red; the skin is reddish-brown. The total length is three inches two lines, the breadth ten inches.—(Fig. in Bonap. Faun. Ital.)

20. V. MEGAPODUS.—THE LARGE-FOOTED BAT.

The habitat of this Bat is Sardinia, whence M. Cantraine has sent many specimens to Leyden. It is remarkable for its feet, which, like

the preceding, are quite free above the spur, the membranes taking their origin near the extremity of the tibia. Its muzzle is very short and obtuse; the ears of medium size, and not much sloped; the tragus long, like the willow leaf; the interfemoral membrane short, and covered above and beneath with scattered hairs. The fur is short, smooth, and bi-coloured. The upper parts are of a greyish-brown colour, the lower whitish; the membranes are brown, and there are no conspicuous differences between the sexes. The total length is about three inches, the breadth nine.

21. V. HUMERALIS.—BLACK-SHOULDERED BAT.

This Bat was procured by M. Baillon, in the neighbourhood of Abbeville, and was there examined by M. Temminck. It has not been seen out of France. It might be readily confounded with the *mystacinus* and *emarginatus;* it differs, however, from the former, by its smaller size, larger and more sloped ears, its longer tail, and the complete nudity of the membranes; and from the latter, by the *emarginatus* being larger, having its ears more sloped, and its fur always of a more or less red hue. This Bat is distinguished from all its congeners, by a large black spot on the shoulders, at the base of the humerus, and its long and sloping ears. The fur is long and cottony; it has a considerable beard, which is black; the tragus is long and lance-shaped; the membranes are blackish and naked, the tip of the tail free. As to colour, the superior parts have the hair black at the base, and then ash-brown; the inferior also black at the base, but whitish towards the point; the black spot covers the insertion of the wings. The entire length is near three inches, the expanse seven.

22. V. VISPISTRELLUS.—THE VISPISTRELLE BAT.

The Vispistrelle Bat has received its name from its close resemblance to the Pipistrelle. Inhabiting Italy, and the southern countries of Europe, they seem, remarks the Prince of Musignano, to maintain the same relation that the Cisalpine sparrow bears to our common domestic one, and their habits are scarcely distinguishable. The present species is, however, always somewhat larger than the other, perhaps a sixth, and wants a false molar in the upper jaw, which the other possesses; the marking, too, is somewhat different. The fur is long and silky, each hair on the upper parts of the body having a brown base, and a reddish-ash point, which assumes a yellowish hue on the forehead and base of the ears; on the inferior parts the hairs are throughout of a brown tint, but their tip is light red. The cutaneous system is fulvous brown. In the young the tints are somewhat darker. The entire length is three inches, three lines (French), the breadth eight inches and a half.—(Fig. in Bonap. Faun. Ital.)

23. V. KUHLII.—KUHL'S BAT.

M. Natterer conferred its name upon this Bat, which he captured at Trieste; it has also been found in Dalmatia and Central Italy, and is probably common throughout the Levant. Kuhl's Bat is about the size of the *Pipistrelle*, with which it may very readily be confounded. The head is large, the muzzle obtuse, the eyes surmounted by a bunch of hairs, the ears completely triangular, regular at their external margin, and large at their base; the tragus is wide, leaf-shaped, round at the point; the cutaneous system is black; the alar membranes, and half of the interfemoral, are clad. The upper incisors are in pairs, most unequal in size, the internal pair being large, and those next the canines very small. The entire length is three inches, the expanse eight and a half. The fur is bi-coloured throughout, more abundant, and somewhat longer than in the *Pipistrelle*, and a broad riband of hair goes round the whole body; the half of the interfemoral membrane is covered. Above, the colour is reddish-brown, ochre-like; and beneath it is somewhat lighter than in the *Pipistrelle;* the riband above alluded to is greyish; the membranes are very smooth, and wholly black; there are a few hairs on the thumb and toes.—(Fig. in Temm. Mon. II. pl. 51, fig. 5 and 6.)

24. V. SAVII.—SAVI'S BAT.

Savi's Bat is accurately depicted in the *Icon. del. Faun. Ital.* by the Prince de Musignano, and had previously been sent to Leyden by M. Cantraine. It has been found on the eastern shores of the Adriatic, in Dalmatia, and Sardinia. Its body is somewhat more robust than that of the two foregoing species, but the expanse is less; the tail is very long, and has a fine free point; the muzzle is broad and obtuse. The ears broad, with a fold forwards, triangular, but round at the point, and clad to about a half; the tragus short and wide. The fur is bi-coloured, and not unlike that of the *parti-coloured* Bat. The superior parts of the body are of a lively marone colour; the cheeks and chin brown; the inferior parts are blackish-brown; the interfemoral membrane is quite naked. The dimensions, taken from one specimen, were three inches entire length, breadth eight.

25. V. ALCYTHOE.—THE ALCYTHOE BAT.

This, and the two succeeding species, have lately been introduced to notice by the Prince de Musignano, with coloured portraits, and detailed descriptions; they all belong to the south of Europe. The cranium of this one is depressed; its incisors unequal, the ears pointed, and the fur bi-coloured. The nose is depressed at the point, and slightly indented between the nostrils; the orbital region is naked, and the eyes surmounted with long and silky eye-brows; the ears are small, terminate in a round point, and their breadth is equal to half their length; the tragus is half as long as the auricle; the tail quite included in the interfemoral membrane. The fur is long, bushy, and of two colours. The muzzle and forehead is of a greyish isabelle colour; the hairs are blackish from their base to half their extent, and then of an isabelle tint; those of the abdomen are the same at their base, but cinnamon coloured at the tip. The membranes are reddish, and clad along the flanks and thighs with tufted hair, of a reddish-grey colour. The total length is about three inches, the breadth somewhat more than eight. It inhabits Sicily.—(Fig. in Bonap. Fauna Ital.)

26. V. LEUCIPPE.—THE LEUCIPPE BAT.

This species is to be distinguished by the beautiful silvery tint of its inferior parts, and the cinnamon colour of the back. The muzzle is large, wide, and roundish, describing nearly a semicircle; the commissure of the lips reaches to the ear. This appendage is a fifth less in length than the head, and a third less wide than long; it is roundish, and somewhat sloped away at its upper parts; the tragus is a third shorter than the concha, and of a semi-orbicular form. The interfemoral membrane is polygonous in shape, and has no tiny bristles, nor lobule. The fur is long, bushy, and bi-coloured throughout; on the upper parts of the body it is black at the root, and light-cinnamon at the tip; on the lower, of a deep grey at the base, and silvery-white at the points. The membranes are sooty black; the lips, nose, and ears black, with the external margin flesh coloured, a character which is constant. The entire length is three inches, the breadth nine.—(Fig. in Bonap. Fauna Ital.)

27. V. ARISTIPPE.—THE ARISTIPPE BAT.

Its pointed muzzle serves to distinguish this species from the Leucippe Bat, to which it has a great resemblance in its general forms and dimensions; there is also a slight difference in the ears, the external border being scooped out at the base in our present animal, and towards the point in the other. The muzzle, which is straight, and somewhat angular, has a slight furrow between the nostrils, which are small and narrow. The ears are small. The interfemoral membrane is provided with an external lobule, and terminates in a free point. The feet are small; the nails slender, and adorned with slender hairs.—(Fig. in Bonap. Faun. Ital. fasc. 21, fig. 3.)

28. V. MARGINATUS.—THE EMBROIDERED BAT.

The Embroidered Bat is common in Sardinia, and therefore is to be classed with the European species. It is not less so, however, in Africa, being very common at Tripoli, and also in Nubia and Arabia. Here it was found by Rüppell, and has been described by him and figured in his atlas, though not, according to M. Temminck, very correctly. It is about the size of the *Pipistrelle*, though it has not the same expanse across the wings; the tail is much larger, and the interfemoral membrane very ample; the spur is also very long, carrying the interfemoral externally with it. All the edges of the membranes are bordered with pure white. The muzzle is naked, the ears small, triangular, and rounded at the point; the tragus is long, leaf-shaped; a third of the interfemoral membrane is clad. The fur is soft, cottony, short, and of two colours. On the head and upper parts of the body, the hairs are half black at the root, and pure isabelle-coloured at the tip; on the chest the points are a light isabelle, and on the abdomen, pure white. The membranes are blackish-grey, and diaphanous. The total length is a trifle above three inches, the expanse a little above eight.—(Fig. in Temm. Mon. pl. 52, figs. 3 and 4.)

Section II. African Species.

29. V. LEUCOMELAS.—THE BLACK AND WHITE BAT.

This Bat was discovered by Rüppell, on the shores of the Red Sea, on the coast of Abyssinia, and Arabia Petræa, frequenting old ruins. Its size and forms are not unlike those of our *Barbastelle*. The muzzle is very slender, and overshadowed by the aural appendages, which are very large, and united by their bases in front, then diverging to the point, and falling over to each side, after the fashion of the Dog's Cap; their

external membrane is deeply scooped, and abuts at the commissure of the lips; the tragus is long and pointed; the posterior parts of the ears are clad. The cutaneous system is highly developed, very thin, and diaphanous: the tail is very long, and the interfemoral membrane wide. The fur is very long, bushy, fine, and silky, bi-coloured throughout. The superior parts of the body are black, somewhat grizzly, from the tips of the hair being light brown; the inferior parts are also black, but more grey, the tips being white; the whole of the pubis and the base of the flanks and interfemoral membrane, are pure white. The ears are black, the membranes diaphanous, ash-grey colour veined with white. Their entire length is nearly three and a half inches, their expanse ten. —(Fig. in Rüpp. Zool. Atl. p. 73.)

30. V. D'ASYTHRIX.—THE BUSHY-HAIRED BAT.

This new species has been transmitted from the interior of Caffraria, by M. Verreaux, of Paris, and now forms a part of the Leyden Museum. It is remarkable for the great development of its membranes, its broad, obtuse muzzle, its great ears, and its woolly fur. Its great muzzle is covered with abundant fur to the very point, and two braids of hair are conspicuous, arrayed like moustachios; the ears are broader than high, orbicular, and somewhat angular at their points; a fold projects to the commissure of the lips, and externally they are half covered with fur; the tragus is short and roundish. The articulation of the foot, with the metatarsus, is quite free. The tail is very long, with the membrane developed. The fur is of medium length, but extraordinarily bushy, cottony, and heavy; the face is also remarkably hairy; the base of the interfemoral membrane is clad only on the upper side, while the alar is only below, with transparent hairs. The membranes are very ample. The colour of the upper parts of the body, the head and whiskers, is a dull black, that of the lower smoke-black; the membranes are a light black. The total length is nearly four inches, the breadth ten.

31. V. ISABELLINUS.—THE ISABELLE BAT.

This is another new species which has been sent to the Leyden Museum, by the Dutch Consul, M. Clifford van Breugel, from Tripoli, where it abounds. It is about the size of the *Parti-coloured* Bat of Europe, with forms nearly resembling the *murinus*. The muzzle is obtuse, the ears broad, ovoide, with a longitudinal and salient fold at the anterior margin; a distinct lobe terminates the posterior border, and extends to the commissure of the lips; the tragus is short and leaf-shaped, the tail free at the point. All the membranes are naked, and very distinctly veined. The two central incisors are bilobed in the young, and pointed in the adult. The fur is of medium length, fine and silky. The superior parts in the adult are of a beautiful isabelle tint; the point of the muzzle and lips are black; all the inferior parts of a very light isabelle hue; the external base of the ear is covered with hair; the membranes are blackish-brown, abundantly veined with yellowish lines; a considerable portion of the tail is free at the tip. The total length is about four and a half inches, the expanse twelve.—(Fig. in Temm. Mon. II. pl. 52. Figs. 1 and 2.)

32. V. MEGALURUS.—THE LARGE-WINGED BAT.

The body of this Bat is slender, with a depressed head, the muzzle pointed, and the nostrils approximated, whilst the membranes are exceedingly developed. The ears are moderate, distant, pointed at the extremity. The tragus very long, shaped like the willow-leaf; the tail is very long, and the extremity free; the internal incisors are long and converging, the external scarcely visible. The fur is long, smooth, silky, and bi-coloured throughout; above, blackish at the base, and olive-brown at the point, and brown at the root, beneath; the colour of the neck and abdomen is ash-brown, of the flanks, isabelle, of the pubis, white. The entire length is about four inches and three lines, the breadth twelve. The *V. Capensis* of Mr Gray, (Zool. Journ. IV. p. 435,) M. Temminck suspects to be the young of this species. This animal was sent to Leyden from Central Africa, but nothing is known of its habits.

33. V. TRICOLOR.—THE TRI-COLOURED BAT.

An account of this species was supplied in the *Fauna Capensis* of M. Smuts, (p. 106.) Its head is longer than it is broad; the muzzle is obtuse, and the mouth not much cleft; the ears are long, turned over at the point, and cut out externally; the tragus is long, leaf-shaped, inclined outwards; the hair is smooth, short, tri-coloured above, bi-coloured below. The fur on the upper parts of the body is black, brown at the root, yellowish-white in the middle, and a beautiful red at the point, so that, on the whole, these parts appear of a very yellow hue; all the inferior parts have the fur brown at the base, and yellowish-white towards the tip; a slight rosy tint is distributed over the sides of the neck and chest, the membranes are dark brown. The length is nearly four inches, the breadth between twelve and thirteen.

34. V. EPICHRYSUS.—THE GOLDEN BAT.

The Golden Bat is described in M. Smut's Fauna, (p. 106,) and is regarded as new by M. Temminck. Its habitat is the environs of the Cape. The total length is about four inches, the expanse twelve. The ears are of medium length, straight, pointed, and much scooped out at their upper external margin; the tragus is straight, and lance-shaped; the muzzle somewhat obtuse, the nostrils approximated, the tail very long. The fur is abundant, short, and smooth; the hairs parti-coloured; those on the upper part of the body brown at the root, yellowish-white in the middle, bright red and shining at the tip; underneath, they are brown at the base, and of a light rosy hue at the point; the membranes are brown and perfectly naked.

35. V. PLATYCEPHALUS.—THE FLAT-HEADED BAT.

As expressed by the name, the head of this Bat is extremely depressed, and the chanfrin flattened; the face is obtuse, very broad, and the mouth has a large gape; the ear extends laterally, and is as broad as high, half clad above, rounded towards the point; it is prolonged beneath, and abuts at the commissure of the lips in a large membranous appendage; the operculum turns inwards. The fur is bushy, woolly, and parti-coloured; above, blackish at the base, and very brown at the tip; beneath, blackish-brown at the root, and a brownish-white at the point; the pubic region is white; the interfemoral membrane is half clad above and naked beneath. The entire length is three inches, breadth nine. It is common in the neighbourhood of the Cape, and has been described by M. Smuts.—(*Diss. Zool. Cap.* 107.)

36. V. MINUTA.—THE PIGMY BAT.

Dr Horstok, of Cape Town, has transmitted several specimens of this Bat to Leyden, from which its celebrated professor has supplied the description. In its habits it resembles our *Pipistrelle*, preferring woody districts supplied with water, in the southern regions of Africa. Though smaller than the *Pipistrelle*, it much resembles it in its general forms. The ears are oval, and as broad as high; the tragus, leaf-shaped, round at the point, and half the length of the auricle. The muzzle is naked, studded with a few transparent hairs. The fur is short, bi-coloured throughout, being, above, black at the root, and dark-brown at the point; and beneath, black at the base, and light-brown at the tip; the membranes black, the outer incissors are in close apposition with the canines, and very small; the inner are long and bifid. The entire length is two and a half inches, the breadth seven.

37. V. TEMMINCKII.—TEMMINCK'S BAT.

It will be noted that this is not *Vespertilio Temminckii* of Dr Horsfield and others, which has been described in a former page as a Roquet-dog Bat, (see p. 44.) This animal was discovered by Rüppell in a woody district in Nubia; seven were captured near Dongola, and are now in the Francfort and Leyden Museums. The muzzle is obtuse; the ears large, nearly round, and without any distinct lobe; the tragus leaf-shaped, round at the point, and inclined towards the head; the membranes totally naked and diaphanous; the interfemoral alone slenderly clad on the upper side. The external incisors are so small that they scarcely rise above the gum; the others are like canines. The fur is short, but abundant and smooth. The head, round the ears, part of the neck, and all the superior portion of the body, is light grey; the lower part of the neck, and inferior part of the body, are pure and shining white, the hair being white from the root to the tip; the membranes are grey, and have no borders. The markings do not differ either in the sexes or young. The length is three inches, the breadth seven. (Fig. in Rüpp. Zool. Atl. p. 17, pl. 6.)

38. V. HESPERIDA.—THE EVENING BAT.

Although not represented in Rüppell's Atlas, this Bat seems to have been procured by that able Naturalist: it was found on the shores of the Red Sea, near the coast of Abyssinia, and specimens are found in the German and Dutch Museums. The cutaneous system is not greatly developed in proportion to the animal's size, which is nearly three inches long. The muzzle is short and obtuse; the ears also short, and as broad as high; the tragus leaf-shaped, and curved, with a round point; the interfemoral membrane veined lozenge-wise, slenderly clad at its base, and all the limbs naked. The fur is short, smooth, and abundant, bi-coloured throughout, being, above, black at the base, and rosy-brown at the tip; and beneath, black at the root, and rosy-grey at the point; the end of the

muzzle is very hairy, and black; the membranes brown, and veined with lines of a lighter brown colour.

Section III. Asiatic Species.

39. V. MOLOSSUS.—THE DOG-MOUTHED BAT.

This is a new species, which has been lately sent to Holland, from Japan, by M. Bürger, and which will be represented in the forthcoming *Fauna Japonica*. The muzzle is extremely obtuse, large, and broad, similar to the snout of the Bull-dog Bats, and is clad to the nostrils, which are wide apart. The cheek-bones are high; the ears large, and nearly round, and a fold extends from them to the commissure of the lips; the tragus is short, and lance-shaped, and the external half of the auricle is covered with hair. The wings, which are far from broad, are abundantly clad beneath, along the flanks; the interfemoral membrane is large, and has a jutting out lobe at the heel. The inner pair of the incisors are canine shaped, and the external quite resemble a strong and short canine; the six lower ones are tricuspid. The fur is silky, smooth, and lustrous, and of one colour throughout. The *male*, above, is of a deep rosy-brown, beneath, of the shade of a decayed leaf. The *female*, above, is of a lively rust-colour, beneath, like the male; the membranes are brownish-black. The length is five inches, the breadth fourteen.

40. V. NOCTULINA.—THE NOCTULINE BAT.

This species is described by M. Is. Geoffroy in Belanger's *Voyage aux Indes*, and a specimen was sent by M. Duvaucel to the Paris Museum from Bengal. The size of this individual was three inches two lines (French) long, and eight inches six lines of expanse. It approximates in characters to the *Noctule* Bat, and hence its name. Its dimensions are nearly those of the *Pipistrelle*. The upper parts of the head and body are of a russet-fawn colour, the under of a very light fawn, all the hairs being lighter nearer their root than at the point. The alar membranes are almost entirely naked, but the base of the interfemoral, on its upper side, is covered with a few hairs of the same colour as those on the back. The ears are of a triangular form, somewhat rounded; the tragus is straight, and elongated. The muzzle is naked at the point and sides.

41. V. BLEPOTIS.—THE EAR-SEEING BAT.

M. Temminck is the first who described this Bat, of which a great many have been captured in the Indian Archipelago by the Netherland Naturalists. It is characterized by the spheroid development of its external ear, which nearly surrounds the orbit, and has led to its appellation, for it may truly be said to be a Bat whose eye is comprehended within its ear. Its livery is different, at different periods of the year, the result, it would appear, of a double moult. A great many have been examined, and they are wonderfully constant in their markings. The face of this animal is obtuse, the ears very short, quite round, and not united, with their external margin directed forwards nearly to the commissure of the lips, and having a few short hairs within; the tragus is leaf-shaped, and inclined inwards. The head is small and short, and the eyes nearly hid by the ears; the body is stout; and the tail as long as it and the head put together; the membranes very ample. The fur is bushy, very short, close, cottony, smooth, and shining above, crisp beneath. The *adult*, in both sexes, has the head, neck, and shoulders, of a deep marone colour, and the remaining superior parts perfectly black and shining; the chin, throat, and chest, are rosy-brown; and the under part of the body is a dull black; the abdomen is a light brown, and the alar membranes are clad underneath: this is their livery in the *spring*. In *autumn*, all the upper parts are sooty-black, without a trace of the marone-tint, and below greyish-black. In the month of January the fur is parti-coloured, being of the marone-shade on the neck, and brown on the chest. The entire length is between four and four and a half inches; the expanse twelve. This Bat is very common in Java, where, however, it rarely appears in the plains, but in rocky and woody regions. It is also noticed in the neighbouring islands, as far as Japan; its retreats are in caverns and clefts of the rock, and hence its capture is difficult.—(Fig. in Temm. Mon. II. pl. 53, figs. 1 and 2.)

42. V. CIRCUMDATUS.—THE EDGED BAT.

We owe the discovery of this new species to MM. Boie and Macklot, who have transmitted many specimens from Java to Leyden. The tail and interfemoral membrane are short, and the latter is clad above, near its base; the muzzle is very short and obtuse; the ears are broad, black, and edged with a white margin, whence its name; they are more broad than high, and scooped out at their external margin. The fur is long, bushy, and very lustrous. The hairs are bicoloured: its robe above is deep black, the tips being reddish-marone; beneath the chest is black, with red tips; the abdomen black, with ash-coloured tips; the base of the ears is yellow, their edges yellowish-white; the rest of the ears, and all the membranes, are quite black. The length is four and a half inches, the breadth twelve.—(Fig. in Temm. Mon. II. pl. 53, figs. 3 and 4.)

43. V. BRACHYPTERUS.—THE SHORT-WINGED BAT.

The individual which supplied M. Temminck with the characters of this Bat was captured at Padang, in Sumatra. The dimensions of this animal were in length 3″. 3‴. in breadth 8.″ (French.) It is remarkable for the shortness of its wings in relation to the size of its body. The muzzle is obtuse, and remarkably broad; the nostrils apart; the ears are large, and developed sidewise; they would be perfectly round save for the scooping out on the external margin. The tragus is like an oval leaf, of which the point is bare, and the base well clad. All the four upper incisors are remarkably small. The fur is short and smooth, and extends along the upper part of the flanks, and round the coccyx, with the appearance of a ribbon. The colour, above, is nearly a black-brown, beneath, amber-brown, with the membranes black.—(Fig. in Temm. Mon. II. pl. 53, figs. 5 and 6.)

44. V. IMBRICATUS.—THE IMBRICATED BAT.

This Java species, there called *Low-o-lescar*, is a striking representation of the European *Pipistrelle*, and hence M. Kuhl transmitted many to Europe, under the name of the Pipistrelloid Bat; as, however, Dr Horsfield had the right of priority, (Zool. Research. Sp. 51,) the name he affixed should, of course, be retained. One of the specimens in the Leyden Museum is pie-bald, having the cutaneous system pure white, irregularly marked with large brown spots, and is probably an albino. The entire length of this species is about 3″.; the expanse 9″.; the ears are broad, short, and nearly round; the muzzle obtuse; nostrils apart; the tragus short, obtuse, round; a band of small and very fine hairs runs the whole length of and underneath the vertebræ of the tail, hence the animal's name. The fur, short, smooth, and abundant, is differently coloured in the two sexes. The *male*, above, is black-brown, or *bistre*-coloured; beneath, is black, tipped reddish, giving the parts a falcon cast. The *female* is, above, reddish-brown, and beneath, redder than in the male; the young is generally fawn-coloured.—(Fig. in Temm. Mon. II. pl. 54, figs. 1, 2, 3.)

45. V. PACHYPUS—THE THICK-FOOTED BAT.

The size of this species is less than the common Bat of this country—the *Pipistrelle*—and the expanse, especially, is less; the thumb nail is remarkably short, and supplied with a callosity. The head is very depressed; the muzzle obtuse; the ears broader than high, and the lower lobe large; the tragus is short and roundish. The feet are remarkable, the metatarsus being very long, and the toes very short; the point of the tail is free; the cranium, likewise, and chanfrin, are depressed. The fur is bicoloured, and without any apparent difference in the sexes; above, it is of a beautiful marone-colour, more or less shining, the points of the hair being of this colour, and their base golden red; on the chest the hairs are brown, tipped with red; the abdomen is dull brown. The entire length is about 3″., the expanse 7. This animal is well known in Java and Sumatra, whence M. Van Hasselt has sent many to Europe.—(Fig. in Temm. Mon. II. pl. 54, figs. 4, 5, 6.)

46. V. MACROTIS.—THE GREAT-EARED BAT.

This remarkable species may be easily distinguished, at the first glance, from all its congeners, by the large size of the ears, compared to that of the body, and by its cutaneous system, which is delicate, diaphanous, and much veined. The face is obtuse; the nostrils apart; the ear is large, and prolonged to the cheek; the tragus is also large, like a curved leaf. The inner pair of incisors are broad and bifid, the outer short and pointed; the six below are very small, fine, and smooth. The fur is of mean length, smooth, and of one colour over the whole body, being a bistre-brown, like the peel of the onion; the muzzle is black. The membranes are very diaphanous, somewhat brownish near the body, and elsewhere of a pale white, covered throughout with numerous brown veins; the ears and all the toes are brown, and there is no difference in the markings of the sexes. The entire length is 3″., the expanse a trifle more than 8″.—(Fig. in Temm. Mon. II. pl. 54, figs. 7, 8.)

47. V. HARPYIA.—THE HARPY BAT.

The Harpy Bat is remarkable for the shape of its snout, which, though very obtuse, yet appears elongated, owing to its two nasal tubes, which separate from each other, advance beyond the lips, and exhibit precisely the configuration we have before described in the formation of Pallas', Tube-nosed Roussette, *Harpyia Pallasii*. It is, moreover, distinguishable from all others, by its feet being clothed to the very nails, and from its interfemoral being clad with transparent hairs above, and painted below with numerous diagonal and concentric lines, formed by small papillæ, whence the diverging hairs arise. The incisors above are of unequal length, those below are crowded, and bi-lobed. The fur is abundant, long, and frizzled, cottony, and bi-coloured above, of one colour beneath. The head, neck, and body, are of a beautiful whitish-grey, but the points of the hair being of a lively red, confers on these parts a rosy ash tint; the alar membrane above, and the feet and toes, are covered with bright red hair. Underneath the marking is reddish-grey, the sides of the chest being red. The female is somewhat paler than the male. The total length is four and a half inches, the width thirteen. Its habitat is Java, where, however, it appears to be scarce, residing in caverns.—(Fig. in Temm. Mon. II. pl. 55, figs. 5, 6.)

48. V. PAPILLOSUS.—THE PIMPLED BAT.

The body of this Bat is slim in proportion to the great expanse of the wings; the cutaneous system is much developed, and there is a row of very small pimples, forming a border, which runs all along the interfemoral membrane, and distinguishes this species from any other. The ears are very distant, and broader than high, nearly round, and internally provided with a marked fold of the skin; there is, moreover, a longitudinal fold, whereby the organ may be closed; the tragus is very long, filiform, and bodkin-like. The forehead is elevated, and the cranium round. The fur is abundant, very bushy, soft, cottony, and frizzled; above it is of a deep brown colour, with a rosy tint at the point, all the rest, to the root, being silvery-grey. The neck, chest, and coccyx, are reddish; the flanks are brown; and the abdomen red. The membranes are very diaphanous, and much veined; the row of pimples is whitish, and not supporting any hair. Total length, nearly four inches, breadth, twelve. This animal has been procured both from Java and Sumatra, but appears scarce, M. Temminck informing us that, whilst MM. Kuhl and Van Hasselt sent home hundreds of others, they have only transmitted two specimens of this.—(Fig. in Temm. Mon. II. pl. 55, figs. 1, 2, 3, and 4.)

49. V. ADVERSUS.—THE CROSS-TOOTHED BAT

This species is described by Dr Horsfield, in his Zoological Researches, (No. viii. 2,) but must be rare, as M. Temminck has never received a specimen of it. The teeth come within the usual formula, but the upper incisors, though they have plenty of room, have such diverging points, that the lobes of the teeth, on both sides, cross each other. The head is conical; the chanfrin oblong; elevated at the back part; the muzzle is broad; the ears straight, obtuse, as long as the head, bent backwards, and terminating by a small basal lobe. The interfemoral membrane is irregularly veined, and marked with obscure points. Its length is three inches, three lines; its breadth ten inches.

50. V. HARDWICKII.—HARDWICK'S BAT.

General Hardwick's Bat was also first introduced to notice by Dr Horsfield. It is not very common in Java; nor in Sumatra, where it has also been found, does it appear to abound. In size it is somewhat less than our *Pipistrelle*; the ear is broader than high, scooped out in the middle, furnished with a lobe, and abutting near the commissure of the lips. This Bat, like the *pimpled* one, has a longitudinal fold, whereby the organ is closed, the external border folding over the internal; the tragus is very long, and filiform. The muzzle is short and pointed; the membranes diaphanous; the fur soft, cottony, and somewhat frizzled; above, it is of a light brownish-grey colour, and beneath, of a brownish-grey, with the points of a rosy hue. The entire length is three inches, breadth, eight.—(Fig. in Temm. Mon. II. figs. 7, 8, and 9.)

51. V. PICTUS.—THE STRIPED BAT.

The *Pictus* of Linnæus, Pallas, Horsfield, and others, the *Striped Bat* of Pennant, seems to be widely spread over the Continent of India; it also abounds in Java, Borneo, and Sumatra, although its existence in Ceylon is more doubtful. During the day it finds a retreat at the foot, and hides under the great leaves of the *Musa sapientium*. The ears are large, oval, and slightly cut out at the external margin; the operculum is long and oval-shaped; a border of short hairs runs along the edge of the interfemoral membrane; the feet are well covered with fur; the forehead is elevated, and the cranium rounded. The fur is cottony, and much frizzled; above, it is of a very shining golden-red colour, below, reddish, the sides of the neck and flanks more decidedly so. The alar membranes, as far as the fingers, and the whole of the interfemoral, are more or less reddish, and are especially red near the flanks, and at the coccyx; between the fingers they are of a dull black; a tinting which, though conspicuous on the living animal, cannot be perceived on the preserved one. The length is three inches, the width, nine.—(Fig. in Temm. Mon. II. pl. 56, figs. 1, 2, and 3.)

52. V. SUILLUS.—THE SWINE BAT.

This singular little Bat is most readily distinguished from its congeners by many peculiar characters. Its small head terminates in a prominent snout, in which there are two prominent tubes. Its ears, at their outer margin, have a projection, which is furnished with a longitudinal fold; the tragus is long, filiform, and pointed; the alar membranes are very ample, and take their attachment from the feet, not at the first articulation of the metatarsus of the external toe, but at its unguinal phalanx. The tail is short, and the membrane cut transversely, so that its point extends somewhat beyond it. The fur is bushy, long, woolly, and bi-coloured; the whole of the interfemoral membrane, having edges curved, as are the toes, with transparent hair. The upper parts of the body are bright-red, the under, a pale isabelle-colour, the flanks ash-coloured, the skin reddish. The total length is two and a half inches, the breadth, seven and a half. This new species has been sent from Java, by the Netherland Naturalists: it flies very rapidly, and, during the day, conceals itself under the *Musa sapientium*. It is also found in Sumatra.—(Fig. in Temm. Mon. II. pl. 56, figs. 4, 5, and 6.)

53. V. HASSELTII.—HASSELT'S BAT.

This remarkable species is distinguished by a dark fur, which is cottony, and a very diaphanous cutaneous system; the alar membrane takes its attachment from the apophysis of the tibia, leaving the metatarsus free; the muzzle is somewhat long; the ears larger than wide, round at the points; the tragus is lance-shaped, and obtuse at the extremity. The very short fur is cottony throughout; above, the colour is light mouse-coloured, grey at the point, the roots being black, beneath, white; the interfemoral membrane has a fringe of transparent hairs, the nails are white. The entire length is a trifle above 3″, the width 9″. This species was captured by M. Van Hasselt in Java, and sent to Leyden.—(Fig. in Temm. Mon. pl. 56, figs. 7 and 8.)

54. V. HORSFIELDII.—HORSFIELD'S BAT.

Horsfield's Bat is a new species, which has recently been sent from the neighbourhood of Buitenzorg, in Java, to Leyden, and which the distinguished Professor has designated after the able Naturalist whose labours have added so much to our knowledge of the Natural History of Java. Its size corresponds to that of the Barbastelle. Its muzzle is pointed, and its nostrils somewhat tubercular. The ears of mean length, are narrow, and somewhat inclined backwards, round at the end, and scooped in the margin; the tragus is straight, lance-shaped; the toes are long and strong; the alar membrane takes its attachment from the base of the metatarsus, and some very minute white bristles are studding over the lower part of the interfemoral; the point of the tail is free. The odoriferous glands are large; they commence beneath the nasal tubes, and completely go round the orbits. The fur is of mean length, and smooth, extending over the base of the interfemoral. In the *male*, all the superior parts are black, the sides of the neck and the chest brown; the flanks dark grizzly; there is a whitish streak along the medial line of the abdomen; the *female* is somewhat more grey above. The length is somewhat above 3″, the width, 10″.—(Fig. in Temm. Mon. pl. 56, figs. 9, 10, and 11.)

55. V. TRALATITIUS.—THE TRALATITE BAT.

The Tralatite Bat of Dr Horsfield, the *Lowo-manir* of the Malays, is very common in Java, and is also found in Sumatra. The females have one, and sometimes two, at a birth; its habits are not unlike those of the *Pipistrelle*. Its muzzle is very short, somewhat pointed; the ears oblong, and much scooped at their external margin; the tragus is shaped like the willow-leaf, with a round point; the toes are very short, and the membrane rises from the outer one. The interfemoral membrane is chagrined beneath, and very fine, small, grey bristles rise in transversal lines from the projecting points. The odoriferous glands are placed on each side of the muzzle, near the nostrils, and extend above the eyes, without surrounding the organ, their colour being light yellow. The fur is cottony, very abundant, though short and smooth; above, it is quite black, with a drab-brown tip; beneath, it is also black, with the tips white. The length is three inches, the width about eleven.—(Fig. in Temm. Mon. II. pl. 57, figs. 1, 2, 3, and 4.)

56. V. TENUIS.—THE SLENDER BAT.

The Slender Bat, though nearly resembling, and very difficult to distinguish from, the preceding, (*Tralatite,*) nevertheless, presents a few constant characters, on which the specific differences are based. These are—a shorter and more obtuse muzzle; form generally more slender; ears decidedly shorter, less wide, and more pointed. The cranium also presents this difference, that the maxiliaries are shorter, the cranial cavity is also smaller, and less projecting, and the chanfrin shorter and wider. The similar characters, on the other hand, are, the length and dimensions; a similar tragus; very short toes; the attachment of the membranes; and the same appearance of the under face of the interfemoral. But besides, this animal has only one false molar in each side, which is strong, whilst the *Tralatite* has two of very unequal sizes. The Slender Bat thus has five molars, both above and below; the other has six above and six below. The nature of the fur and the markings are the same in both. They likewise inhabit the same localities in Java and Sumatra; but this species has also been discovered in Borneo.—(Fig. in Temm. Mon. II. pl. 57, figs. 5, 6, and 7.)

57. V. MACELLUS.—THE TINY BAT.

This is another new species, which has been discovered in Borneo by the Dutch travellers, who have sent four specimens to the Leyden Museum. Like the preceding, it may most readily be confounded with the *Tralatite*, but is distinguished from it not only by slight modifications in the forms, but by one striking character. The feet of the *Tralatite*, as of the *Slender Bat*, are extremely small, with very short toes, and with the metatarsal bones comprised within the attachment of the membranes; whilst in our present species the feet are strong, the toes are long, and the claws crooked, with the metatarsal bones quite free; the muzzle, too, is stouter; the wings not so long; the interfemoral membrane less ample, and the tail shorter. In the two preceding, the tail is quite enveloped, whilst in this one the point is free, and the ears are a trifle longer. There is also a difference in the dental formula; the *Tralatite* has six molars above and beneath, the *Tenuis* has five above and below, and the *Macellus* has four above, without any trace of a false molar, and five below. The only difference in the robe is, that in this animal the fur is short and shining: the colours and size are nearly the same.

58. V. OREIAS.—THE OREIDE (OR MOUNTAIN) BAT.

This beautiful species, strongly characterized, and easily distinguished from its numerous congeners, has been received by M. Temminck from India. The size and forms are like the *Pipistrelle* of Europe, but the membranes are larger and more developed, rising from the toes: the thumb is armed with a strong crooked claw; the ears are distant, broad, and long, with a round point, of a clear or yellowish colour at their base, and quite naked; the narrow tragus is long, straight, and filiform. The muzzle is short and compressed, terminating in a point; the upper lip has a double row of moustachios on it, the lower one short, the other long, with the hairs turned upwards; there are also a few transparent ones on the lower lip. The fur is every where abundant and long; the membranes are naked, with the exception of a few hairs at the base of the upper surface of the interfemoral. It is bi-coloured throughout; above, blackish at the root, the rest umber-brown, and shining; the moustachios are black; beneath the roots are dull black, the lips grey; the membranes and ears are blackish-brown. Length about 3″; width 9″.

59. V. MACRODACTYLUS.—THE LARGE-TOED BAT.

This is one of the Japanese species of Bats, which the natives confound under the appellation of *Komuli*, and which has been distinguished in Europe. It is about the size of Daubenton's Bat; the muzzle is somewhat long and pointed; the ears are long and straight, not wide, and lobeless, scooped on the outer margin, and pointed at the extremity; the tragus is long, narrow, awl-shaped, and pointed. The feet and toes are very long, and the latter are studded with a few hairs; the claws are strong and whitish; the tail very short, and free at the tip. The fur is short, cottony, and abundant; the base of the upper side of the interfemoral is clad. The colour, above and below, is that of smoke-black, the points of the hair beneath being grizzly, so that the abdomen appears whitish. The cutaneous system is a deep brown. The length is 3″, the breadth between 9″ and 10″.—(Fig. in Tem. Mon. II. pl. 58, figs. 3, 4, and 5.)

60. V. ABRAMUS.—THE ABRAME BAT.

The Abrame Bat of the Japanese, whose name is here retained, has been sent to Leyden by M. de Siebold. It is somewhat less than the *Pipistrelle;* the ears are oval, and round at the point, the outer margin being prolonged by a great lobe, to the commissure of the lips; the tragus is leaf-shaped, somewhat curved. The muzzle is very short, and slightly pointed; the feet too are short; the side membranes, and the base of the interfemoral, being clad. The fur of the superior parts of the body is black, with fawn-coloured tips, the stripe along the flanks, and at the base of the interfemoral, being fawn. Underneath, the colour is black, tipped with whitish-grey. The length reaches to 3″, the expanse to 8″.—(Fig. in Temm. Mon. II. pl. 58, figs. 1 and 2.)

61. V. AKOKOMULI.—THE AKOKOMULI BAT.

This new species, like the preceding, has been discovered in Japan by MM. de Siebold and Bürger. It is a trifle larger than the preceding, and has a longer and broader muzzle, and larger ears; the feet and toes are very short; strong and long moustachios adorn the lips; the tragus is leaf-shaped, round at the point. The base of the interfemoral membrane is clad above. The fur of the *male* is mouse-coloured above, the tips having a reddish fawn tint; beneath black, with light grey points, the flanks and abdomen white. The *female* is of a russet-brown above; beneath, black tipped with light red. The length is 3″, the width 9″.—(Fig. in Temm. Mon. II. pl. 57, figs. 8 and 9.)

Section IV. American Species.

62. V. PHÆOPS.—THE BLACK-FACED BAT.

This is probably the *Phaiops* of Rafinesque, which is alluded to in a note in Desmarest's Mammalogie, (p. 135, nt. 5;) but M. Temminck has taken his description from individuals he has himself received from Tennessee. It is about the size of the *Murinus*, but the tail is not at all free, and all the membranes are smooth; the ears are of medium length, much scooped out at their exterior margin, so that a lobe is formed at their base, and the rounded point is bent backwards; the tragus is shaped like the willow-leaf. The fur is short, uniform in colour throughout, and smooth; above, it is bay-coloured or brown, strongly tinted with red; beneath, a lighter bay; the face and membranes are black. The length is 4½″, the breadth 13″.

63. V. PULVERULENTUS.—THE POWDERED BAT.

The Powdered Bat, which derives its name from the appearance of its coat, was discovered by Prince Maximilian de Wied, during his journey in the Rocky Mountains of North America, on the banks of the Missouri. It closely resembles our *Parti-coloured Bat*, in its general form, and in the markings of the upper parts of the body; but is specifically different from the European species, by its being smaller in size, by its interfemoral membrane being clad all over on both sides, and by the under part of its body being differently coloured. Its muzzle is broad and obtuse; the ears are broader than high, roundish, and clad half way up; the tragus is hatchet-shaped; the tail short; the interfemoral membrane abundantly clad above, though less at the edge than the origin; clad also beneath, but with white transparent hair, and in concentric lines; the toes are also clad on their upper surface. The fur is long, silky, and bi-coloured throughout, and yet the animal is all of one uniform colour. The hair is of a very deep marone colour, tipt with white, so that the whole surface appears as if besprinkled with white powder. The length is 3½″, the breadth 10″.

64. V. URSINUS.—THE URSINE BAT.

This is another new species which was discovered by the Prince de Neuwied, on the banks of the Missouri, and the description of which has been supplied by that eminent individual to M. Temminck; it is based on the examination of seven individuals. The head is large; the muzzle long, broad, and somewhat depressed; the nostrils are large, opening cross-shaped at the side, and separated by a groove; the ears are oval, and much higher than the summit of the head, vertical on their posterior margin, and somewhat scooped near the point; the tragus is long, and lance-shaped, blunt at the point; the concha is clad at the base externally, the thumb of the strong wings is armed with a very crooked claw. The tail is long, with its tip free, and the membrane is marked beneath, with parallel rays, which give origin to a few fine bristles. The toe nails are very long, strong, and curved. The four incisors above are close set; the six below are tri-lobed. The fur is long, silky, and shining; above, of a lustrous umber-brown, beneath lighter; each hair is grey near its root. The membranes and ears are black. The total length about 4″, the expanse about 11″.

65. V. CAROLINENSIS.—THE CAROLINA BAT.

The Carolina Bat of Geoffroy, Godman, and others, has its ears as long as its head, oblong, and half clad externally; the muzzle is somewhat pointed, and the nostrils approximate; the tragus shaped like a

willow leaf, and half the length of the concha; the point of the tail is free. The fur is bi-coloured throughout, the upper parts being of a marone-brown, the roots being dark ash-colour; the inferior parts are ash-yellow, having the roots brown. The total length about 2½″, the expanse 10″. This species is frequently captured at Charlestown.—(Fig. in Temm. Mon. II. fig. 1.)

66. V. CAROLII.—PRINCE CHARLES' BAT.

The Prince of Musignano has presented many specimens of this Bat to the Leyden Museum, which, not having been previously described, M. Temminck has affixed his name to: it has been captured in the neighbourhood of Philadelphia and New York. It is of the size and forms of the *Pipistrelle*, but with longer ears. The face is obtuse; the nostrils wide apart; the ears of medium size, oval, somewhat scooped out at the external margin, without lobe or anterior prolongation. The fur is everywhere bi-coloured. The cheeks, sides of the neck, and all the upper parts of the body, are of a russet-brown, the roots of the hair being black; beneath, the colour is yellowish-white at the point, and deep brown at the root, so that, on the whole, the tint is yellowish-ash. When a year old, the wing is more sombre. The total length is nearly 3½″, the expanse 9″.

67. V. ERYTHRODACTYLUS.—THE RED-TOED BAT.

It is to the same distinguished Naturalist we are indebted for the discovery and first description of this Bat, which has been procured in the neighbourhood of Philadelphia. It is less than the *Pipistrelle*. All the fore-arm, the base of the fingers. and the interdigital membrane of the first finger, are red, the other parts of the membranes are black. The ears are clad from their base to more than a half of their extent; they are small and oval; the tragus is willow-shaped; the tail is very long, and has the tip exclusively free; the interfemoral membrane is about half clad above, and radiated beneath, in lozenge-shaped veins, whence very short bristles arise, somewhat distant from each other. The fur is long, fine, and silky above; tri-coloured, and bi-coloured below. All the superior parts have a reddish-brown tint, somewhat yellowish about the head and neck, the hairs being black at the base, then yellowish, and lastly, reddish-brown; the upper part of the interfemoral membrane is abundantly clad; beneath, it is deep brown at the base, and reddish-brown towards the margin. The length reaches to 3″, the breadth to 8″.

68. V. FERRUGINEUS.—THE FERRUGINOUS BAT.

This species has been sent to Leyden from Dutch Guiana. It is about the size, and has the general appearance of Daubenton's Bat; the muzzle is short and obtuse; the ears narrow, scooped out at the posterior margin, and towards the point; the tragus short, and shaped like the willow leaf; the tail very long, with a free point, with a part of the root covered with hair; the toe nails of a yellow-white colour. Of the four upper incisors, the two internal are long, broad, and sharp edged, the external short and bifid. The fur is short and smooth, and bi-coloured throughout. Above, the colour is of a dead leaf, or reddish, more or less pure, the base being blackish-brown; beneath, all the hairs at the root have a reddish-black hue, and are pure white towards the tip. These two tints in a short fur form a medley of black and white. The membranes and ears, in the specimens kept in spirits-of-wine, are reddish-brown. The total length is somewhat above 4″, the expanse about 12″.—(Fig. in Temm. Mon. II. pl. 58, fig. 2.)

69. V. VELATUS.—THE VEILED BAT.

This is the *Plecotus Velatus* of M. Isidore Geoffroy, (Ann. des Scien. Nat. III. p. 446,) but as the ears are not united in the front, it could, with no propriety whatever, be so placed. It is somewhat less than the Long-eared Bat of Europe, (No. 5,) and the ears are not so long, but broader, and more developed; the two ears, without being united, touch each other, on the menial line of the cranium, through means of a lateral prolongation; they have two longitudinal folds, one internal, running from the base to the point, and the other forms the sloping prolongation. The tragus is half the length of the ear, and is shaped like a long leaf; the muzzle is long, the nostrils approximate, and are tubular; a part of the face is naked; the interfemoral membrane is broad, and supported to half its extent by the metatarsal spurs. The fur is short, but fine and soft. The superior parts are of a shining blackish-brown hue; the inferior are of an ash-brown colour, shaded with grey near the pubis, and becoming whitish-grey on the fur of the posterior extremities. The interior incisors are long, strong, and converging; the external so small as to be scarcely visible. The entire length is about 4″, the expanse 12″. This species is common in Brazil.—(Fig. in Temm. Mon. II. pl. 58, fig. 3.)

70. V. HILARII.—ST. HILAIRE'S BAT.

The size of this Bat does not quite equal that of the Serotine of Europe. The ears are small, triangular, nearly as broad as high, but little scooped out at the external margin, and clad at their base; the tragus is of a prolonged form. The body is nearly as long as the arm and fore-arm put together; the tail as long as the fore-arm, and supporting an interfemoral membrane, which is quite naked. The fur is variable, passing above, from a black-brown to a marone-brown, and below, from grey to reddish-brown. The total length, according to M. Geoffroy, (Ann. des Scien. III. 441,) is 4½″, and the expanse 11½″, (French.) This species, which was captured in the Brazil missions, requires further elucidation.

71. V. NIGRICANS.—THE DARK-COLOURED BAT.

Prince de Wied Neuwied, who was the first to take notice of this species, (Natur. Brasil, p. 267,) states, that captured near the river Iritiba, it has resemblance to the *Obscure Brown*, the 12th Bat of D'Azara, and indicated by M. Geoffroy (Ann. du Mus.) as the *V. Albescens*. It is a very small species, with a very small head and short snout; the ears are of medium length, roundish at their internal edge, straight at their external, and with a round point turned outwards; the tragus is nearly half the size of the concha, very narrow, linear, and pointed; the tail is half the length of the body, and wholly engaged in the membrane. The alar membranes are straight and long. The fur, over the whole body, is a very deep greyish-brown, approaching to black, although the abdomen is a trifle lighter than the back. The total length is nearly 3″, the expanse 9″.

72. V. LEUCOGASTER.—THE WHITE-BELLIED BAT.

It is to the Prince de Wied Neuwied that we are also indebted for our knowledge of this Bat, which was discovered on the banks of the Mucuri, in the forests which bordered the streams, where it hooked itself during the day to old trees, after almost touching the water. The head is short, the muzzle very short, and obtuse, with the nostrils apart; the ears are long, straight, with the terminating edge round, and not sloped; the tragus of medium size, straight, slender, and pointed; the delicate point of the tail is free. One-third of the interfemoral membrane is covered with hair; the claws of the toes are strong, and covered with hair. The fur is bushy and silky, especially over the muzzle, and the former is covered with hair. The superior parts are of a blackish-brown colour, the tips of the hair being yellowish-grey; the throat and sides of the chest are blackish-brown; the middle of the chest is pale brownish-grey, and the abdomen greyish-white. The hairs of the sides which cover the alar membrane are whitish. The total length is 3″, the width 10″.—(Fig. in Atlas Beiträg. Natur. Brazil, 13 livraison.)

73. V. ALBESCENS.—THE HOARY BAT.

This is the Bat, No. 12, of D'Azara, (Quad. du Parag. II. 294,) which cannot with any propriety be identified with the Nigricans dwelt upon above. M. Natterer likewise found it in the Brazils, and has supplied specimens to many of the European Museums. It is nearly of the same dimensions of the most common Bat of this country, the *Pipistrelle*; the expanse, however, and the ears, are somewhat larger; the ear is rather long, pointed, and curved backwards; the tragus is straight, awl-shaped, pointed; the muzzle, too, somewhat prolonged and pointed, the nostrils tubular and divided. The fine points of the hair of the back are brown, those of the coccygeal region brownish-grey, often whitish. The fur is long and abundant. The entire length is little more than 3″, the width than 8″.

74. V. LACTEUS.—THE MILKY BAT.

This is a new species introduced to notice, like many others, by M. Temminck. It possesses the size and general appearance of the *Pipistrelle*; but the flying apparatus is scrimp and feeble in relation to the size of the animal's body; the base of the interfemoral is clad; the ears are short; the tragus very short, and lance-shaped. The fur is long, very bushy, and smooth, and pure white all over. All the hairs on the upper parts of the body are of two colours, blackish-brown at the base, and pure white near the point; on the inferior parts they are reddish-brown at the base, and pure white at the points; the membranes are yellow. The robe, therefore, is completely white when the hairs are lying down, but parti-coloured when the hair is disturbed. The total length is nearly 3″, the expanse 7″. It is clear that this species should not be regarded as an Albino, two individuals in every respect similar having been observed. Another and stronger reason also opposes this idea, namely, that if these individuals were Albinos, the whiteness of the hairs

would be general, whereas the hair generally is black, and it is only the points that are white. Their habitat is far from being ascertained, though it is probably South America, as the individuals in the Leyden Museum were discovered in a collection which was made in that part of the world. The examination of those which have come to hand proves that they were young, and probably the adult will be of much larger dimensions.

75. V. PARVULUS.—THE LITTLE BAT.

M. Natterer, of Vienna, captured this Bat in the Brazils, and deposited specimens in Austria and Holland. M. Temminck considers it as new. It is less than the *Pipistrelle* of Europe. The ears are small, straight, pointed, with a very distinct lobe at the lower part; the tragus too is straight, shaped like the willow-leaf, with an external leaf at its base; the muzzle is very short and obtuse, and there is a very large wart on the lower lip: the interfemoral membrane is clad both above and below. The fur is bushy, but not very long; the superior parts are of a dull black; the sides of the neck, and lateral parts of the chest, are more dingy than the back; the front of the neck, and the mesial line of the abdomen, and the sides, have the points of the hair brown; an isabelle hue towards the limbs. The total length is 2½″, the expanse 7″.

76. V. ÆNOBARBUS.—THE RED-BEARDED BAT.

The size of this animal is much less than the *Pipistrelle* of Europe, and the expanse, especially, is very limited. The muzzle is short; the ears as broad as long, round at the point; the tragus is curved towards the head. The tail is very short, and its delicate point is free; the base only of the upper surface of the interfemoral membrane is clad. The fur is long, and bi-coloured throughout. Above, it is reddish-brown, the base of the hair being black; the forehead, cheeks, and chin, are red; the sides of the neck reddish; the pubic region pure white; the abdomen whitish, the flanks light reddish, but in all these places the roots of the hair are black. The total length is 2″ 3‴, the breadth 6½‴, (French.) The habitat of this species is not ascertained, being grounded on a single female specimen which was sent from South America.—(Fig. in Temm. Mon. II. pl. 58, fig. 4)

77. V. ARSINOE.—ARSINOE'S BAT.

M. Temminck regards this as a new species, an old female having reached Leyden from Surinam. It has the same dimensions and forms as the Whiskered Bat of Europe. (See No. 8.) Its head is short and depressed; its muzzle obtuse; its ears conical, with a round point, and no scooping out; the tragus straight, and lance-shaped. There are six molar teeth above and below, two of which, in each jaw, are false. The fur is very short, smooth, and spare, and the membranes are totally naked. The upper parts of the body are perfectly black and shining; the lower of a blackish-brown, the tips being fawn-coloured. The robe on the flanks, and round the coccyx, are larger than on the chest, of a blackish brown, tipt with white; this marking forms, round the body, a kind of whitish grey. The total length is upwards of 2½″, the expanse more than 8″.

78. V. POLYTHRIX.—THE POLYTHRIX BAT.

This, and the preceding species, were transmitted by M. Auguste St Hilaire from the Brazils, and were described by his brother, M. Isidore, in the *Ann. des Scien. Nat. t.* 3. They are unaccompanied, however, with figures, which is a great deficiency, so much so, as to leave some doubt as to their being distinct from those described by the Prince de Wied. However, they probably are. The size of this one is somewhat greater than that of the *Pipistrelle*. Its ears are small, larger than they are broad, and scooped out at their external margin; the body is nearly as long as the arm and fore-arm; the tail as long as the fore-arm only. The interfemoral membrane is sparingly covered on its upper face with hair; the face is much clad, being covered with very long hair; and only the end of the snout is left naked. The superabundance of fur gives it a remarkable and hideous appearance. The fur is soft, abundant, and substantial; above, it is of a very deep marone colour, and below, a marone, slightly verging to grey. The total length is 3½″, and width 9″, (French.) There is a specimen in the Paris Museum.

79. V. LEVIS.—THE SWIFT BAT.

This second species, described by M. Isidore Geoffroy, from the Brazils, is smaller than the *Pipistrelle* of Europe, but is not less remarkable for the large development of all its membranes. Its ears are nearly twice the size of those of the preceding species, and its tragus is prolonged in nearly the same proportions, at the same time resembling them in shape. The tail is as long as the body, and the interfemoral membrane is greatly developed, almost equalling the length of the fore-arm. The face is sensibly less covered with hair than the *Polythrix*, and the interfemoral membrane is scarcely at all clad. The colours are nearly the same as the preceding. The total length is 2″ 9‴, the expanse 9″.

80. V. CHILOENSIS.—THE CHILOE BAT.

This species was discovered by Mr Darwin, in the recent expedition of the Beagle, and has been described by Mr Waterhouse, in the "Zoology of that voyage." The colours and size of this species likewise resemble the *Pipistrelle;* whilst, at the same time, the wings are broader, the fore-arm, leg, and tail, are longer, and the tragus is also longer and straighter. The snout is obtuse, and supplied with numerous small bristles. The forehead is concave; the ears narrow and pointed, marginated externally, and supplied with four transversal folds; the tragus is long, filiform, pointed, and notched externally. A small protuberance is placed on the chin, from which proceed a few radiating hairs; the tail is free at its point. The fur is of medium length, and of a beautiful uniform brown colour; it extends to the base of the interfemoral, both above and below; the rest of this membrane is naked and black, as are also the wings. The total length is 2″ 1½‴, the expanse is 8″ 3‴. This species was captured in the island Chiloé.—(Fig. in Zool. Voy. of the Beagle, pl. 3.)

These eighty species, which we have now discussed as amply as our limits admit, include the whole number of those which M. Temminck, in his late Monograph, considers as established on sufficient and satisfactory grounds. To these he adds a short notice of many other species, of which the original notices have been more superficial, and somewhat incomplete; and as this information may be useful, under certain circumstances, to many inquirers, we shall here give an abridgment of his valuable remarks. To these, still following his guidance, we shall subjoin an account of ten species, of which there are specimens in the Paris Museum, and which were recently described by the late M. F. Cuvier, in the first vol. of the *Nouvelles Annales du Mus. d'Hist. Nat.* And this accomplished, we believe we have omitted nothing whereby we may bring our account of this genus, as of those which have gone before, up to the level of the most recent intelligence which has been accumulated upon this very extensive order.

DOUBTFUL SPECIES.

(*European.*)

We adduce first the five European species which M. Brehm of Reuthendorf *pretends* (we use M. Temminck's expression) to have discovered in his immediate neighbourhood. He describes them in his *Ornis*, 3d No., in these terms. The measurements are upon the scale of the Rheinland foot:—

1. Vespertilio Submurinus.—The ears are much shorter than the head; the upper canine has no conspicuous edge behind, so that the first false molar is isolated, the second false is most conspicuous; the two false molars are tolerably long and pointed. The expanse is from seventeen to eighteen inches. The upper parts of the body are brownish, the lower light grey, passing into white; the muzzle dark grey. It delights in the hollows of fruit trees. This animal, M. Temminck says, may be a variety of the *Murinus*.

2. V. Wiedii.—Ears very small; the free part of the tail 2½‴ long; breadth of the wings medium size; the fur long and silky; expanse from 15½″ to 16″. The upper parts of the body of a deep brownish-grey; the lower, light grey; the muzzle greyish-black; the membranes above blackish-grey; beneath, greyish-black. M. Brehm says, that this species is very rare in his locality. It is not much smaller than the *Myotis*, but is distinguished from it by its small ears, its narrower wings—by its long fur, and peculiar marking.

3. V. Okenii.—Ears small; teeth large; wings of medium size; tip of the tail 3‴ free; fur of medium length, and soft; above, brownish-black, beneath, schistè colour. Expanse from 14½″ to 15″. This is stated to be somewhat less than the preceding; the free tip of the tail is longer, and the marking different. M. Brehm says it is rare.

4. V. Ferrugineus.—The ears short, and roundly oval; fur short, rust coloured; the wings very narrow; expanse from 15″ to 15½″. This appears to be only the *Noctula*, with a slight variation in the colouring.

5. V. Schinzii.—The ears are 6‴ long, and 2‴ shorter than the head; the tragus is long, and lance-shaped; tip of the tail free, only a ½‴; wings broad; so long and soft, that the very short muzzle is entirely hid; the expanse from 9″ to 10″; above, it is brownish-black,

beneath, whitish, or blackish-ash. This is, unquestionably, according to M. Temminck, a new European species. Its distinguishing characteristics are its very long and bushy fur; the hair 3‴ or 4‴ long, which so completely covers the muzzle, that its point only is visible; the black ears are of medium length, inclined outwards, and scooped out externally; the tragus is long, awl-shaped, and pointed: the membrane brownish-black, lighter beneath. The marking above is blackish-brown, each hair being black at the root, and brown at the point; beneath, it is greyish-black, the tips of the hair being greyish-white. It appears to be very rare.

(*Asiatic.*)

6. V. Timoriensis.—This species is described by M. Geoffroy, (Ann. du Mus. t. 8,) and was discovered by MM. Peron and Lesueur. Its ears are broad, the length of the head, and united by a small membrane; the tragus shaped like a half heart; its fur is blackish-brown above, ash-brown on the abdomen; the fur is very bushy, and long, and soft to the touch. The dimensions are, body, 2″ 7‴; tail, 1″ 5‴; expanse, 10″. It was procured at Timor.—(Fig. in Temm. Mon. II. pl. 56, fig. 10.)

7. V. de Peron.—The *Oreillard de Timor* of M. Isid. Geoffroy, (Etudes Zoolog.) It approaches the Long-eared Bat of Europe, resembling it generally in size, form, and marking. It is, however, distinguished by the size of the tragus: in the European species, this part, far from reaching the half of the concha, scarcely surpasses the third; whilst in Peron's it exceeds the half. There is also a difference in the marking, the fur being lighter, especially beneath, where it is nearly quite white; the hairs being black at the root, and white for half their length towards the point; the hairs beneath, and on the sides of the head, are indeed wholly white. In two individuals, a male and female, which M. Geoffroy examined, their markings were precisely the same. The habitat is not ascertained. —(Fig. in Temm. Mon. II. pl. 56.)

8. V. Malayanus.—It was M. Alfred Duvaucel who transmitted this species to the Paris Museum. M. F. Cuvier describes it as not unlike the *Murinoides;* the ear is funnel-shaped; the tragus petal-like. The body throughout is of a light fawn colour, the superior parts somewhat darker than the inferior; the membranes are light brown, and moustachios are conspicuous. The length is 3″, the expanse near 9″.

9. V. Noctula of Sumatra.—Under this title M. A. Duvaucel has sent home another Bat, very like its European namesake, but somewhat smaller;—very likely to be, in M. Temminck's apprehension, the *V. Noctulina* previously described.

10. V. Javanæ.—M. Busseuil, Surgeon of the Thétis Corvette, captured this animal in Java. It is very like the *Noctulina*, the ears scooped, and the tragus knife-shaped. The colour above is uniform brown, below, whitish, all the hairs being black at the root. Its length is 2″ 8‴, its width 7″. M. Temminck thinks it extremely probable this is the young of the *V. Imbricatus.*

11. V. Coromandelli.—This species has been transmitted by Leschnault from Pondichery, and is unknown to M. Temminck. Its head is like the Noctulina; its ears notched; its tragus knife-shaped. The upper parts of the body are of a yellowish-grey brown, the lower, whitish; the hairs are black three-quarters of their length, and of a yellowish-white at their extremity. The total length is 2″ 5‴, the expanse 6″ 6‴.

(*American.*)

12. V. Maximus.—This Great Bat of Geoffroy, (Ann. Mus. t. 8,) and of Desmarest, (No. 218,) is the *Great Scrotine* of Buffon, (Suppl. t. 7,) and the *Nasutus* of Dr Shaw. Its ears are described as oval, shorter than the head; the tragus awl-shaped; the muzzle long and pointed; the hair on the back four lines long; of the belly, very short; marking, marone-brown above, light yellow on the flanks, white on the abdomen; the nails white, and hooked; membranes blackish. The total length, 5″ 8‴, the expanse, 17″ 9‴. It inhabits Guiana.—(Fig. in Buff. Supp. pl. 32, fig. 1.)

13. V. Ruber of Geoffroy, (loc. cit.) is the *Canelle* of Azara, (II. 292.) The ear is very acute, 5‴ high; the tragus awl-shaped; the muzzle pointed; the upper jaw surpassing the under; the membranes arising from the metatarsal articulation. The fur is short, cinnamon coloured, a bright red above, pale yellow, with a rosy tinge beneath. The length is 3″ 1‴, the expanse 9″ 2‴, (Fr.) It inhabits Paraguay.

14. V. Maugei.—This species, as we are informed by Desmarest, (No. 225,) was discovered in Porto-Rico by M. Maugé, and is described as somewhat larger than the *Barbastelle* of Europe. The ears are very large, united, and scooped externally towards the point, which is round; tragus pointed half the length of the ear; the muzzle is short, slender, pointed, forming a right angle with the ears; muzzle broad; nose separated by a cartilage, lyre-shaped; the eyes small, situate at the base of the tragus. The inner incisors are the largest, somewhat distant and bifid. The fur is long, silky, blackish-brown above, lighter beneath, chiefly near the interfemoral membrane, where it is almost white; membranes dull grey; the tail almost as long as the body.

15. V. Arcuatus.—The *Arcuated Bat* of Say (Long's Exp. Rocky Mount. I. 168,) and Godman, (Ann. Nat. Hist. I. 70,) is described as having a large head, and ears somewhat shorter, round at the point, and hairy at the base; the posterior margin is doubly notched, and the anterior base is distant from the eyes; the tragus is arched, and obtuse at the point; the interfemoral membrane is naked; the point of the tail free. Length 5″, expanse 13″.

16. V. Subulatus.—This North American Bat, mentioned by Godman, (Ann. Nat. Hist. I. 71,) has its ears larger than they are wide, and nearly as long as the head; they are half-clad, bulging at their anterior margin, and extending below the eyes; the tragus is long and awl-shaped. The hairs above are black at the root, and ash-coloured at the point; the interfemoral is clad at its base; some scattered hairs are found in the other part, and along its margins. The fur below is yellowish, the base blackish; the feet are long; the point of the tail free. The length nearly 3″.

17. V. Gryphus.—This is one of the Bats which has been recently noticed, as already hinted, by M. F. Cuvier, and which was received from the neighbourhood of New York. It has the head of the *Murinoides*, and has two false molars on each side of each jaw; the ear is scooped out, and the tragus knife-shaped. All the upper parts of the body are yellowish-white, the under grey; all the hairs, however, being black at the root. The naked parts of the body are violet-coloured; there are mystachial bristles on the upper lip and chin. The total length is 2″ 11‴, the expanse 7″ 11‴.

18. V. Salarii.—M. Milbert sent this species also from the neighbourhood of New York to Paris. According to M. F. Cuvier, its head resembles that of the *Murinoides*, and it has two false molars on each side of each jaw; the ear is scooped out, and the operculum knife-shaped. All the upper parts of the body are of a greyish marone-brown, and the lower parts whitish-grey. Where the fur is brown, the hairs are darkish near their root, and they are black where grey. The unclad parts are brown, and there are moustachios and a slender beard. The total length is 2″ 1‴, the expanse 7″ 7‴.

19. V. Georgianus.—It was Major Leconte who sent this Bat from the State of Georgia to the Paris Museum. The head is like that of the *Murinoides*, the ear scooped out, and the tragus awl-shaped. The upper parts of the body are coloured with a mixture of black and yellowish-white, the black prevailing, on account of the shortness of the white points; the lower parts are, from the same cause, grey; there are mystachial bristles on the upper lip and chin. The total length is 2″ 8‴, the expanse 7″, (French.)

20. V. Subflavus.—The habitat of this Bat, according to Major Leconte, is the same as the last, and the head and ears much resemble it. The tragus is shaped like half a heart; the superior parts of the body are a light greyish-white, variegated with brown, the inferior are yellowish-white; the hairs above being, at their root, black, then white, and brown at the tip, and below, being first black, and then yellowish-white; mystachial bristles occur as in the last species. Total length 2″ 9‴, expanse 7″.

21. V. Creeks.—This Bat is also from Georgia. Its head is like that of the *Scrotinoides*; it has no false molar above, and only one below; the ear is scooped; the tragus knife-shaped. The upper parts of the body are yellowish-brown, the under dull grey; the hairs throughout being black at the roots. Mystachial bristles are present, as in the preceding. Total length 3″ 6‴, expanse 9″.

22. V. Crassus.—M. Lesueur transmitted this species from New York to Paris. Its head resembles the *Murinoides;* there are two false molars on each side of both jaws; the ear is obtuse; the tragus knife-shaped. The upper parts of the body are of a greyish marone-browo, the lower flaxen, the hairs being darker near the root than at the points. The same mystachial bristles are present. The total length is 3″ 8‴, the expanse 8″ 8‴.

M. Rafinesque very superficially indicates six other species, which he describes in nearly the following terms. They all belong to the United States:—

23. V. Cyanopterus.—The *White-winged Bat* of Desmarest, (Mon.

p. 133, note 1.) The whole length 3″, one half being allowed for the tail; the ears are longer than the head, and have a tragus; the fur, dark grey above, is blueish-grey beneath; the alar membranes are of a deep blueish-grey; the toes are black.

24. V. Melanotis.—Rafin. Total length 4½″, tail occupying one half, the expanse 11½″; the tragus roundish; the fur blackish above, whitish beneath; the membranes dark grey; the toes black.

25. V. Calcaratus.—Rafin. Total length 4″, expanse 12″; it has a kind of spur on the inner side of the first phalanx; the fur is blackish-brown above, and deep fawn-colour beneath. The wings are black; the toes rose-coloured; the feet are black.

26. V. Monachus.—Rafin. The size of the preceding; the tail equal to a third of the length, clad above, and wholly enveloped in the membrane; the ears are small, and hid under the hair, which is very long; the fur above is deep reddish-fawn, and beneath fawn; the feet are black; the membranes dark grey, and the toes and nose rose-coloured. This is probably the *Red-toed Bat* already described, (No. 67.)

27. V. Phaiops.—Rafin. Total length 4½″, expanse 13″, that of the tail 2″ 3‴; the external pair of upper incisors are larger than the interior, and bi-lobed; the fur is dull bay-brown above, and paler beneath; the face, ears, and alar membranes, are blackish. This seems the identical animal already described, (No. 62.)

28. V. Megalotis.—Rafin. Total length 4″, expanse 12″; tail somewhat less than 2″. The fur is of a deep grey colour above, and of a pale grey beneath; the ears, very large and double, are provided with a tragus as long as themselves. This is probably our *Long-eared Bat* already described, (No. 5.) also found in North America.

South America will probably yet supply many new species of Bats. M. D'Orbigny has indicated one, which is a Red Bat, in his beautiful work, *Voyage dans l'Amer. Merid.* (pl. II. fig. 5.) As the descriptive letter-press has not yet been published, we of course cannot more particularly describe it.

GENUS XXV. FURIA.—THE FURY BATS.

Syn. Furia.—Fr. Cuv. Mem. Mus. XVI.—Fisch. Syn. Mam. 552.—Temm. Mon. Mam. II. 363.

GENERIC CHARACTERS.

The Dental Formula $\frac{2.2+C+(2\ F+3)M}{3+C+(3\ F+3)M}=\frac{16}{20}=36$

The Cranium rises nearly at a right angle from the face.

The Upper Jaw is exceedingly depressed. The face is flat-nosed, and bristled with hairs.

The Nail only of the thumb projects from the membranes.

This Genus, established by M. Fr. Cuvier, and subsequently adopted by others, is based upon a single individual Bat which the French Naturalists received from M. Leschenault, who captured it in his first journey in America. There is no difference, as will be perceived, in the number of teeth, from what is found in many of the Genus Vespertilio; their form, however, materially differs. The upper incisors are of the same size, and are pointed, and are not in contact with the canines. The lower incisors, again, are placed regularly upon the arc of a circle, but in pairs, trident-like, at three different parts of it. The upper canines are much stronger than the lower, tricuspid, one point anterior, the other posterior, and the central one by much the largest, and conical. The lower ones have the same shape; and the false molars appear much more associated with them than with the true molars, on which we have no remark to make. M. Cuvier conferred the name Fury upon this genus, on account of its singular appearance. It is very small, flat-nosed, and bearded; the frontal and parietal bones rise almost at a right angle from the face, and the other parts of the cranium follow in their train. The zygomatic arch is not horizontal, but rises high in projecting backwards; the height of the upper jaw is nothing almost when compared with the Proper Bats, and the ascending branch of the lower jaw is very great. The organs of motion present nothing particular, with the exception regarding the thumb already specified.

FURIA HORREUS.—THE RUGGED FURY.

Syn. et Icon. Furia Horreus.—Fr. Cuv. Mem. Mus. XVI. p. 150, pl. 9.—Temm. Mon. Mam. II. 264.—Fisch. (loc. cit.)

SPECIFIC CHARACTERS.

The Muzzle very flat, and studded with hairs. The Ears large, and as broad as long. The Fur of a uniform black colour.

Inhabits South America.

The eyes of this Bat are very prominent, and remarkable for a size which is not often witnessed in this order. The nostrils are terminal, and are separated from each other only by a margin which surrounds them, and which forms a furrow at their upper part. The lips are entire, but, along the upper, there are four or five warts, and, upon the lower, eight similar ones, which are the more conspicuous, as they are white, and situated amidst the black hair. The ears are large, nearly as broad as long, simple in structure, and provided with a tragus of a particular structure, having three points, which are arranged in the form of a cross. The fur is soft and thick, except at the muzzle, where it is longer, stiffer, and more shaggy than in the other parts of the body. The colour is a beautiful uniform black. The total length is only an inch and a half; the expanse six inches. The individual possessed by M. Cuvier was a male, which was discovered at Mona, by M. Leschenault, during his first journey in America.

THE END OF THE ORDER CHIROPTERA, AND OF THE SECOND VOLUME.

LIST OF THE PLATES

OF THE

ANIMALS REPRESENTED IN VOLUME II. OF THIS WORK.

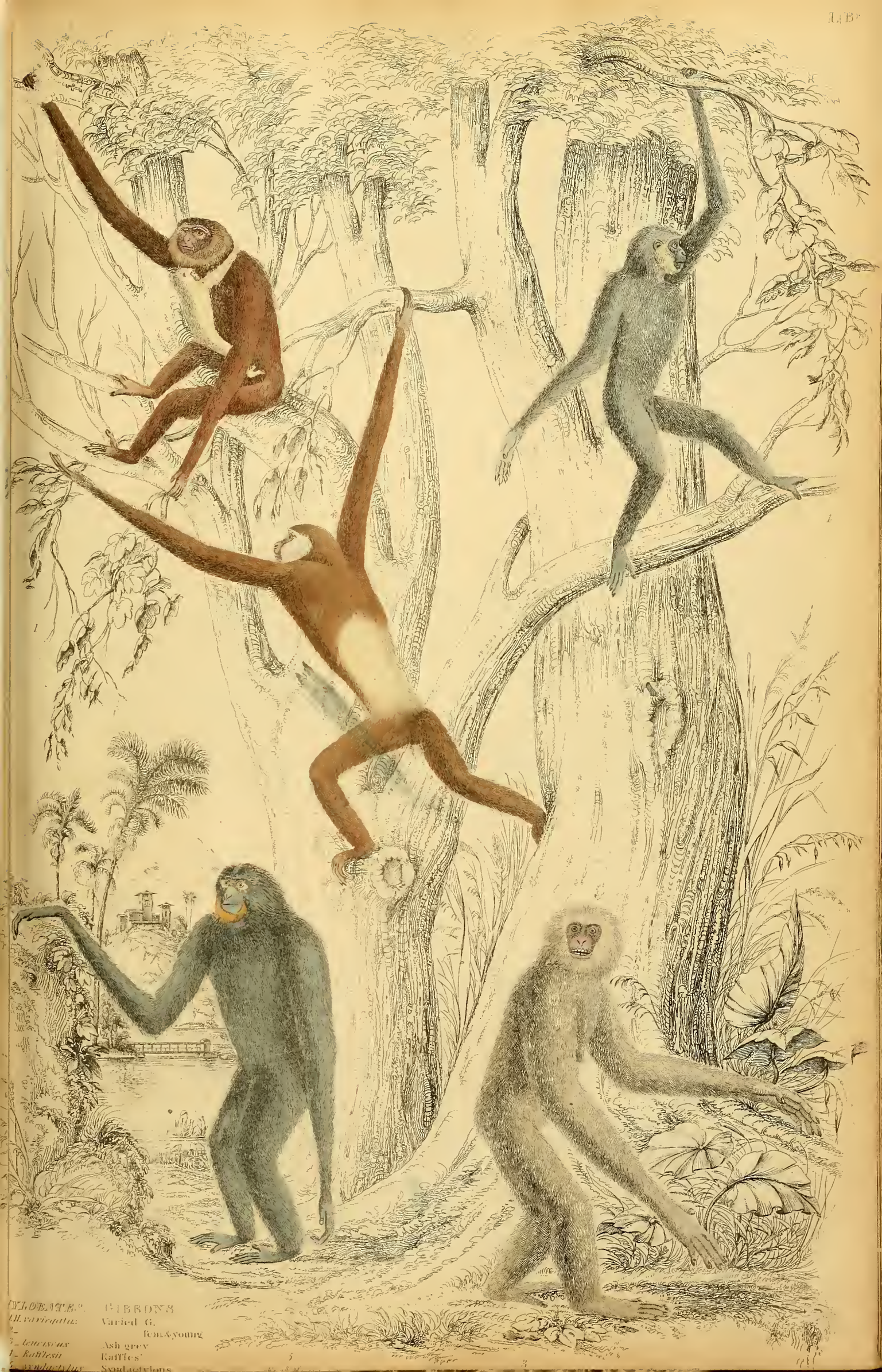
DIVISION I. VERTEBRATA.—CLASS I. MAMMALIA.

Plate.	Genus.		Figures.
I. B.	Hylobates,	Gibbons,	5
I. D.	Cercopithecus,	Guenons,	6
I. E.	do.	do.	6
VII.	Pteropus,	Roussette Bats,	12
VII. B.	do.	do.	3
	Pachysoma,	Stout-Bodied Roussettes,	3
	Macroglossus,	Great-Tongued do.	2
	Harpyia,	Tube-Nosed do.	5
	Cephalotes,	Cephalotes,	1
VII. C.	Dysopes,	Bull-Dog Bats,	14
VII. D.	Diclidurus,	Box-Tailed Bats,	3
	Noctilio,	Hare-Lipped do.	4
	Vampyrus,	Vampyre Bats,	3
	Phyllostoma,	Javelin Bats,	5
VIII.	Erinaceus,	Hedge-Hogs,	3
	Ericulus,	Tendracs,	2
	Centetes,	Tenrecs,	3
VIII. B.	Gymnura,	Oriental Hedge-Hogs,	1
	Cladobates,	Tupaias,	3
	Macroscelides,	Long-Snouted Shrews,	2
XXIII.	Phoca,	Seals,	4
	Otaria,	Eared Seals,	4
XXVIII.	Phalangista,	Couscoos,	6
XXX. B.	Sciurus,	Squirrels,	5
XXXI.	Dipus,	Jerboas,	7
XLVI.	Equus,	Horses,	2
XLVI. B.	do.	do.	2
LIII. B.	Antilope,	Antelopes,	3
	Catoblepas,	Gnoos,	1
LXX.		Whales, &c.	5
17 Plates.		Total,	125

DIVISION I. VERTEBRATA.—CLASS II. AVES.

Plate.	Genus.		Figures.
IV. D.	Caracara,	Caracara Eagles,	4
V.	Morphnus,	Eagle-Hawks,	4
XX.	Coracina,	Fruit-Crows,	2
	Casmarhynchus,	Summer-Birds,	5
LXVI.	Icterus,	Troopials,	6
LXXIII.	Corvus,	Crows,	5
LXXX.	Paradisea,	Birds of Paradise,	4
XCVI.	Alcedo,	King-Fishers,	6
XCIX.	Buceros,	Hornbills,	6
CVII.	Ramphastos,	Toucans,	5
CIX.	Trogon,	Trogons,	5
CXI.	Palæornis,	Ring-Parakeets,	6
CXXVI.	Perdix,	Partridges,	4
CL.	Ibis,	Ibises,	5
CLXXVI.	Diomedea,	Albatrosses,	5
CLXXXVI.	Cygnus,	Swans,	5
15 Plates.		Total,	77

	Figures.	Plates.
Total of Mammalia represented	355	52
of Birds	379	63
of the Mollusca	35	2
of the Insecta	32	2
In all,	801	119

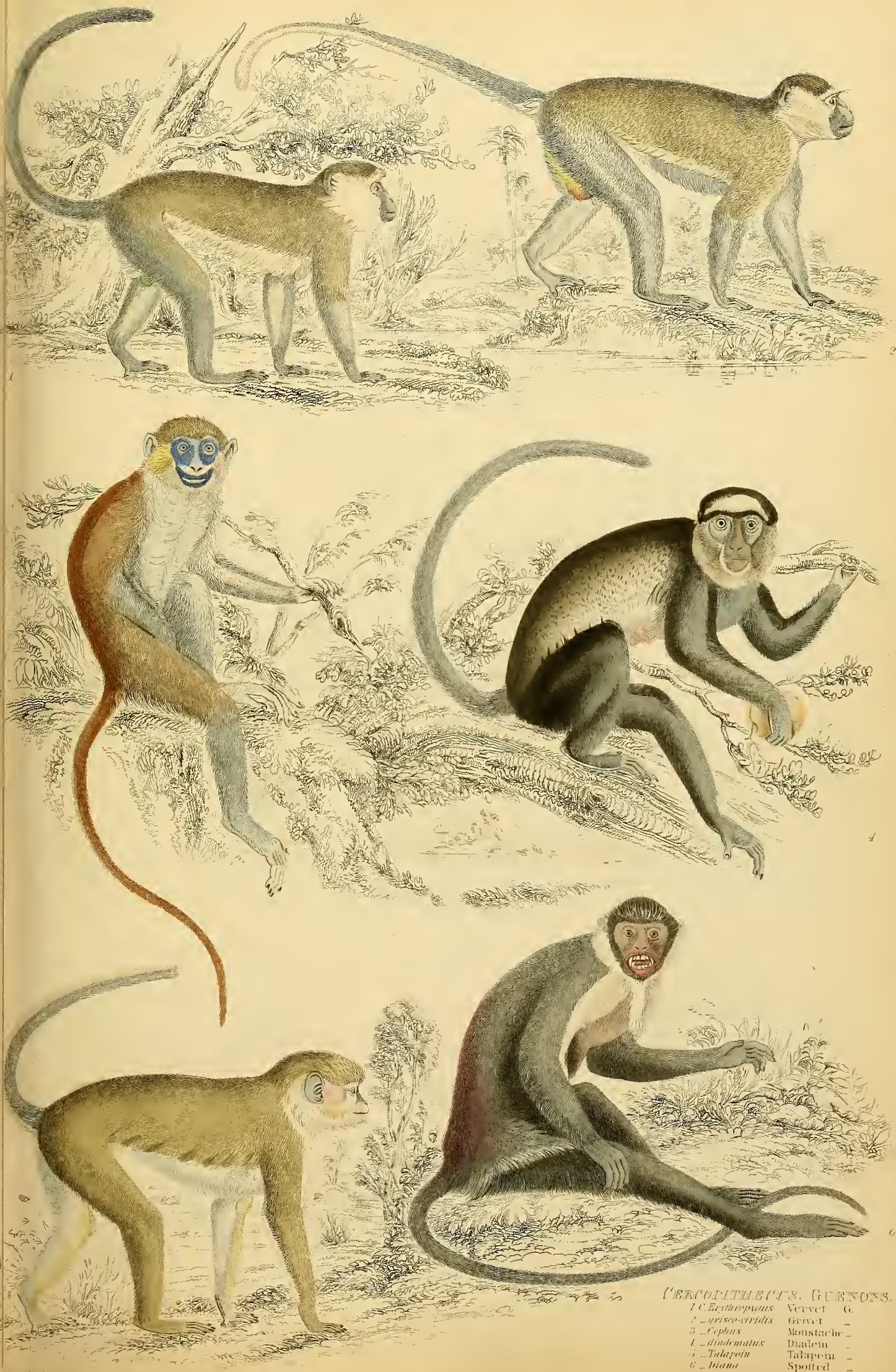


HYLOBATES. GIBBONS
1. H. variegatus. Varied G.
2. — female & young
3. — leuciscus Ash grey
4. — Rafflesii Raffles'
5. — Wuhulus Syndactylous

TERICOPITHECUS, GUENONS

1 *C. ruber*	Red	6
2 *Ethiops*	Collared Mangabey	
3 *Fuliginosus*	Collarless Mangabey	
4 *Sabæus*	Green	
5 *Fuunus*	Malbrouck	
6 *Pyrrhonotus*	Ehrenberg's	

Figs Milne sc. Landsc. Turvey del. & sc.



CERCOPITHECUS. GUENONS.

1	C. Erythropyus	Vervet G.
2	— griseo-viridis	Grivet —
3	— Cephus	Moustache —
4	— diadematus	Diadem —
5	— Talapoin	Talapoin —
6	— Diana	Spotted —

Eng.d Milne sc. — Landsr. Tarver del.t & sc.

VII.

PTEROPUS. ROUSSETTES.

1. *P. edulis*	Edible R.	6. *P. ursinus*	Ursine R.
2. _ *funereus*	Funereal	7. _ *Tonganus*	Tonga _
3. _ *Phaeops*	Black-faced	8. 9. _ _	skull & teeth _
4. _ *chrysoproctus*	Golden-backed	10. _ *griseus*	Grey _
5. _ *Macklotii*	Macklot's	11. 12. _ *labiatus*	Long-lipped

Engd. Milne sc.

Landsc. Turvey del. & sc.

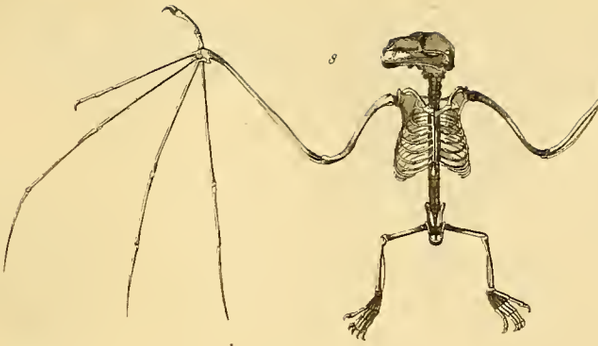

1


2


3


4


13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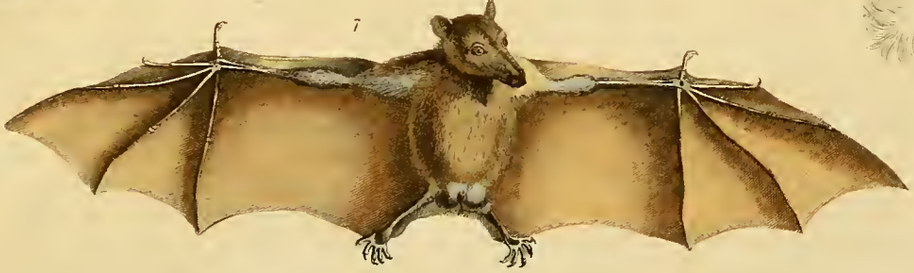
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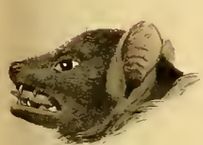


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9

PTEROPUS. ROUSSETTES

1. P. amplexicaudatus	Long-tailed R
2. _marginatus_	Bordered
3. _Whitii_	Whitei's

PACHYSOMA. STOUT-BODIED ROUSSETTES

4. P. Tetthoecheilum	Wart-lipped S
5. _melanocephalum_	Black-headed
6. _brevicaudatum_	Short-tailed

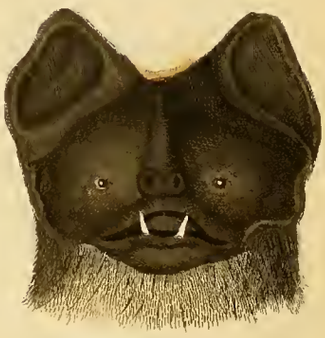
MACROGLOSSUS. GREAT-TONGUED ROUSSETTES

7. M minimus	Riodote
8.	(Skeleton)

HARPYIA. TUBE-NOSED ROUSSETTES

9. H. Pallasii	Pallas' T
10. 11. 12. 13.	(Head Teeth & Cranium)

CEPHALOTES. CEPHALOTES



DYSOPES, BULL DOG BATS.

1. 2.	*D. rufus*	Rufous
3.	*velox*	Long Winged
4.	*obscurus*	Sooty
5. 6. 7.	*Moxensis*	Notcheared
8. 9.	*tenuis*	Slender
10.	*Egyptiacus*	Geoffroy's
11. 12.	*Cestonii*	Cestoni's
13.	*torquatus*	Collared
14.		foot

D[illegible]LIDURUS, BOX-TAILED BATS.
1.2. *D albus* white
3 (tail)

N[illegible]TILIO, HARE-LIPPED BATS.
4. *N leporinus* Rufous ll
5. — *rufipes* Red footed
6 7 (skull)

VAMPYRUS, VAMPYRE BATS.
8. *V Spectrum* Common V.
9.10. (skull & teeth)

PHYLLOSTOMA, JAVELIN BATS.
11. *P hastatum* Common J
12. — *perspicillatum* Spectacled
13. — *crenulatum* Notched
14.15. *elongatum* Short tailed

1

2

7

8

5

5. INSECTS	HEDGE-HOGS
1. vulgaris	Common H.
2. auritus	Long eared —
3. frontalis	White fronted
REPTILES	TENDRACS
4. nigrescens	Swarthy T.
spinosus	Prickly (double)
6. setosus	Silk T.

GYMNURA ORIENTAL HEDGEHOGS.

1 *G. Rafflesii* Raffles O. H.

CLADOBATES TUPAIAS

2 *C. Tana* Tana. T.

3 *Javanicus* Bangsring

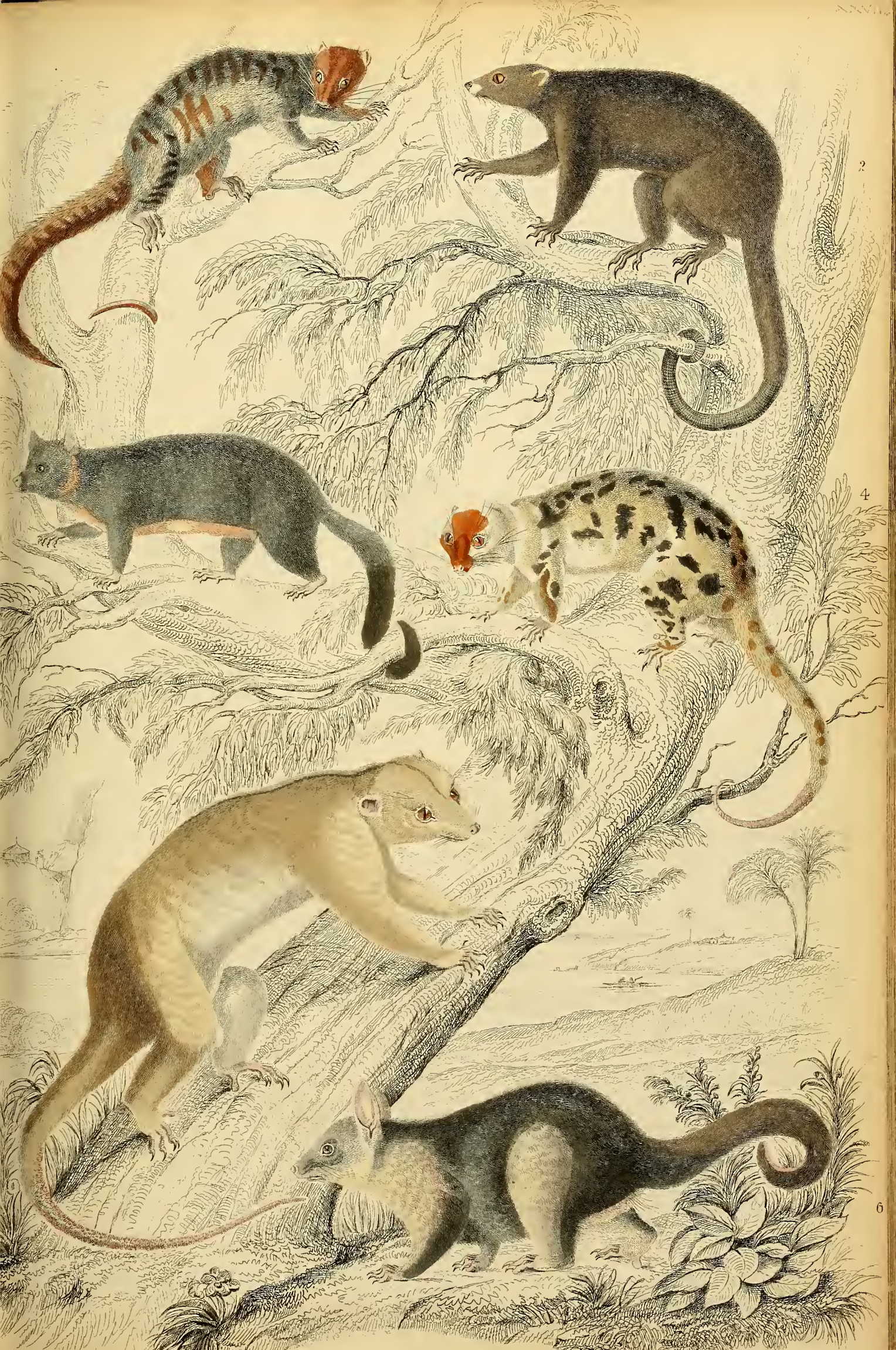
4 *Terrunoneus* Press

MACROSCELIDES LONG-SNOUTED SHREWS

5 *M. Typicus* Southern L. S. S.

PHOCA, SEALS.
1 PHOCA vitulina Common Seal
1 — undulata Fetid —
OTARIA, EARED SEALS.
3 Otaria nabossina Smaller Sea-Lion
4 — cinerea Great cinereous & young
7 —

Milne sc.—Turvey etc.



PHALANGISTA COUSCOOS.

macroura Great Tailed C.
ursina Ursine

3 *P. vulpina* Vulpine C.
4 „ *maculata* Spotted „

5 *P. cavifrons* Rapouna C.
6 „ *Cookii* Cook's

SCIURUS. SQUIRRELS

1. *S. Alpinus*	Alpine S
2. — *vulgaris*	Common —
3. — *Capistratus*	Masked —
4. — *pyrropus*	Fire footed
5. — *erythropus*	Hottentot

A.T. Ackman sc

2

4

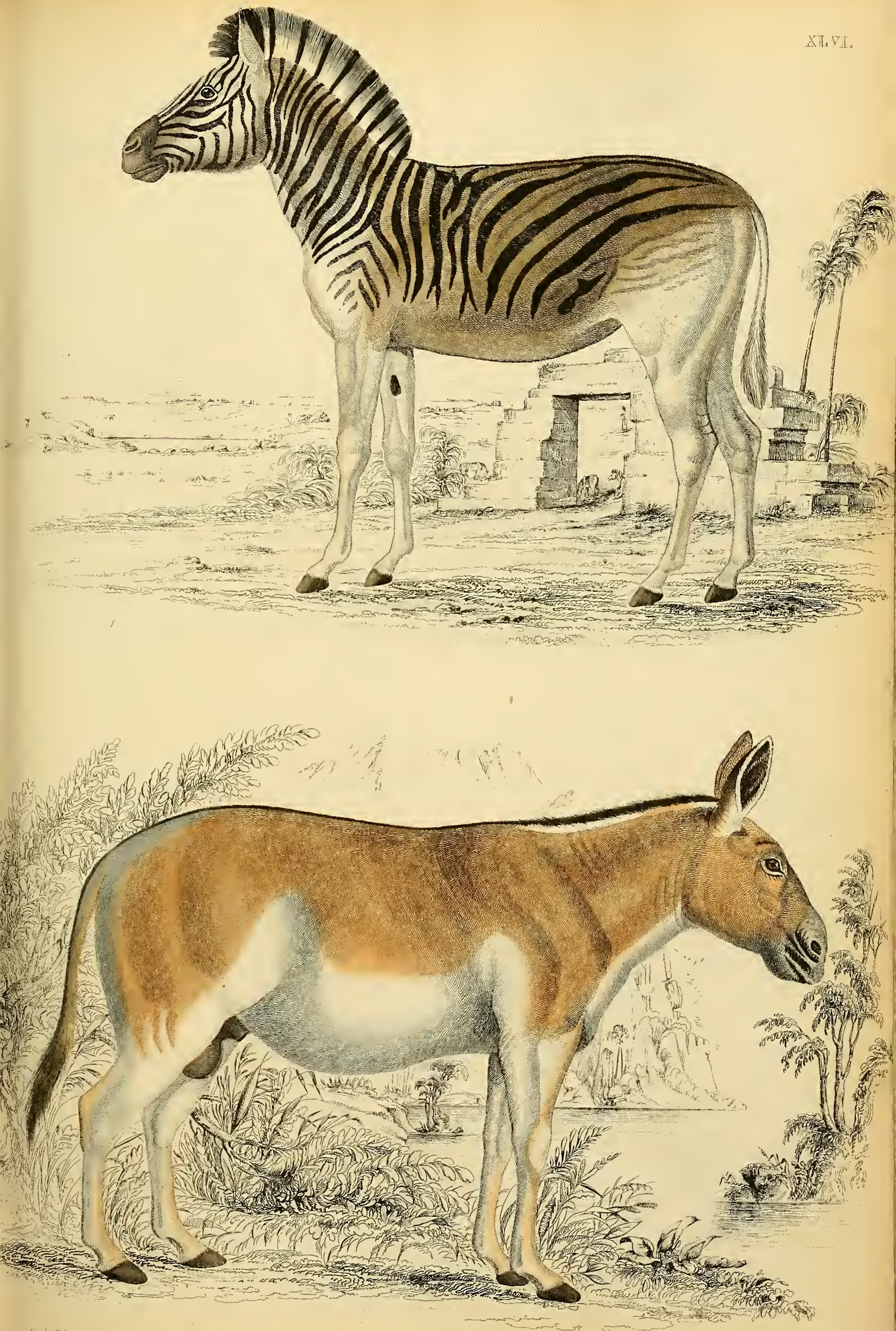
5

6

7

DIPUS, JERBOAS.

1. *D Egyptius*	Egyptian
2. — *hirtipes*	Hairy footed
3. — *Elater*	Ass eared
4. — *Spicilum*	Broad tailed
5. — *platyurus*	Flat tailed
6. — *Sagitta (fem)*	Common
7. — *decumanus*	Great



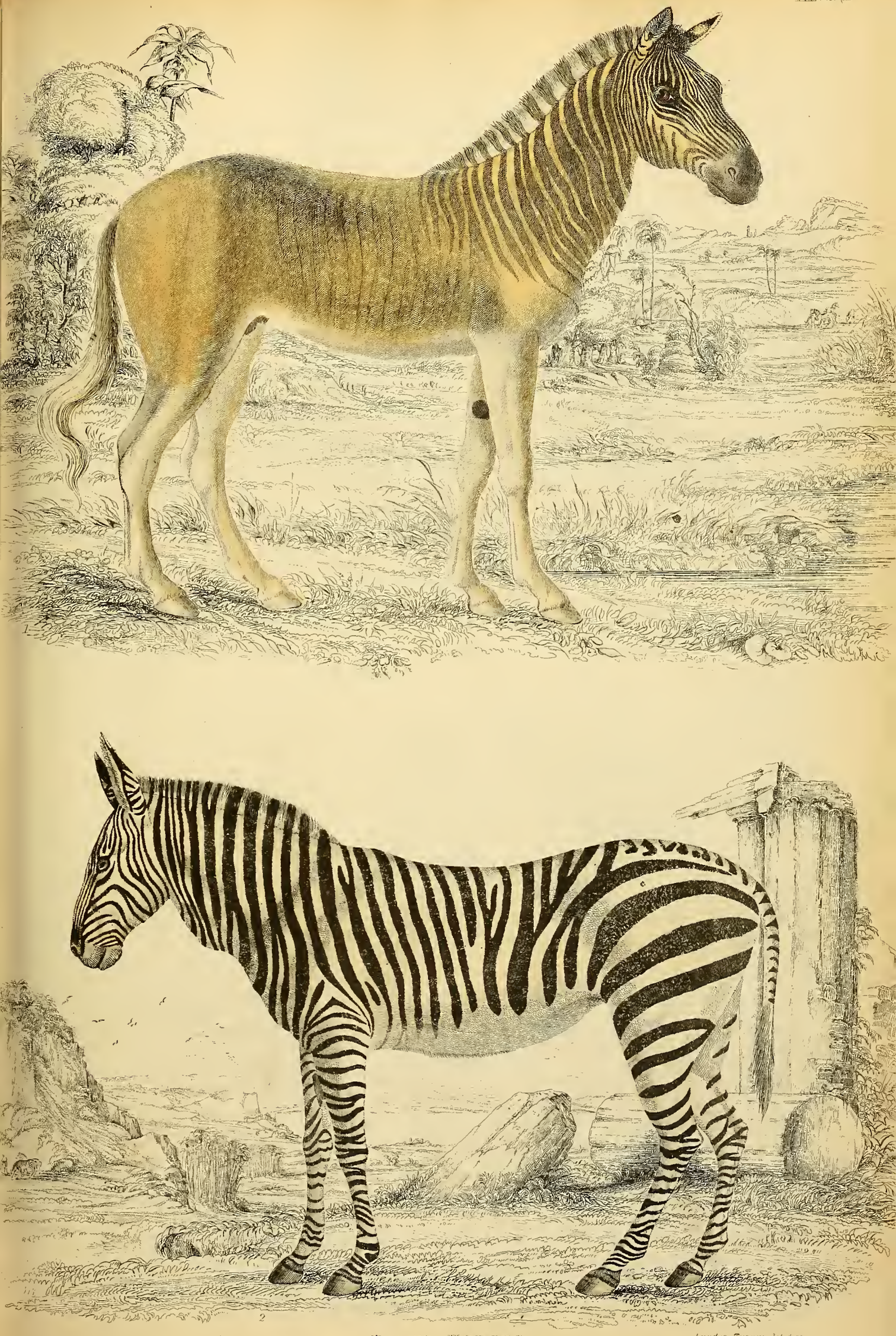
Eq.ª Wolne sc.

EQUUS, HORSES.

1 *E. Burchellii* Dauw. Wem

2 *Hemionus.* Dziggtai

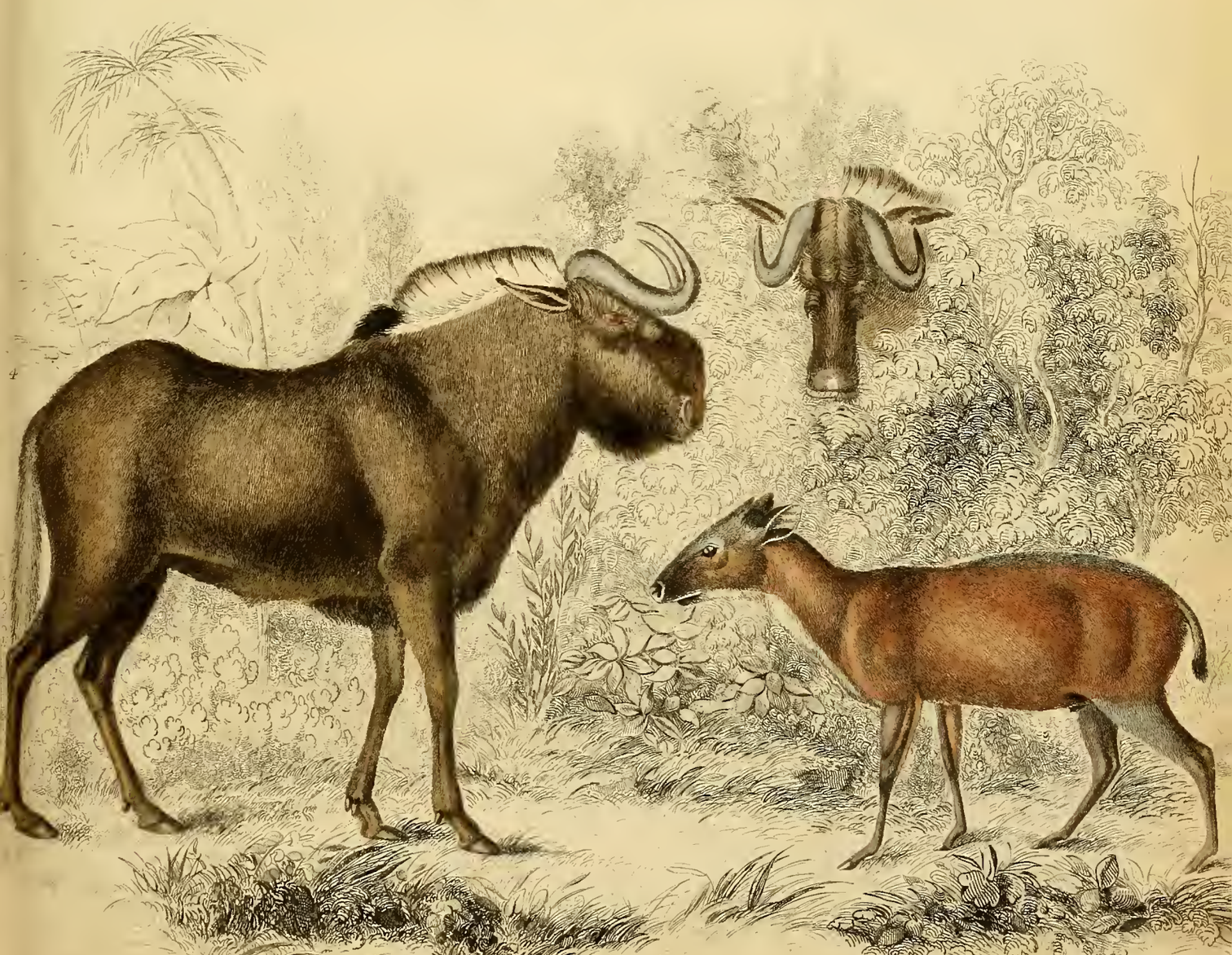
Landsc. Turner del. & sc.



Fig^s. Milne sc. Landsc. Turner del. & sc.

EQUUS. HORSES.

1 E. Quagga Quagga
2 — Zebra Zebra



ANTILOPE, ANTELOPES.

1. A. Gazella. Dama — *Soft Gazelle*
2. Cephalophus Grimmia — *Grimm*
3. Eucephalus, scripta — *Harnessed*

PYTOBLEBAS, ENDOS.

CETACEA. WHALE-TRIBE.

1 *Phocæna communis*	Common Porpoise
2 *Globicephalus Deductor*	Caing Whale
3 *Beluga Arctica*	White Whale
4 *Narwhalus monocephalus*	Narwhal or Sea Unicorn
5 *Balæna Mysticetus*	The true Whale

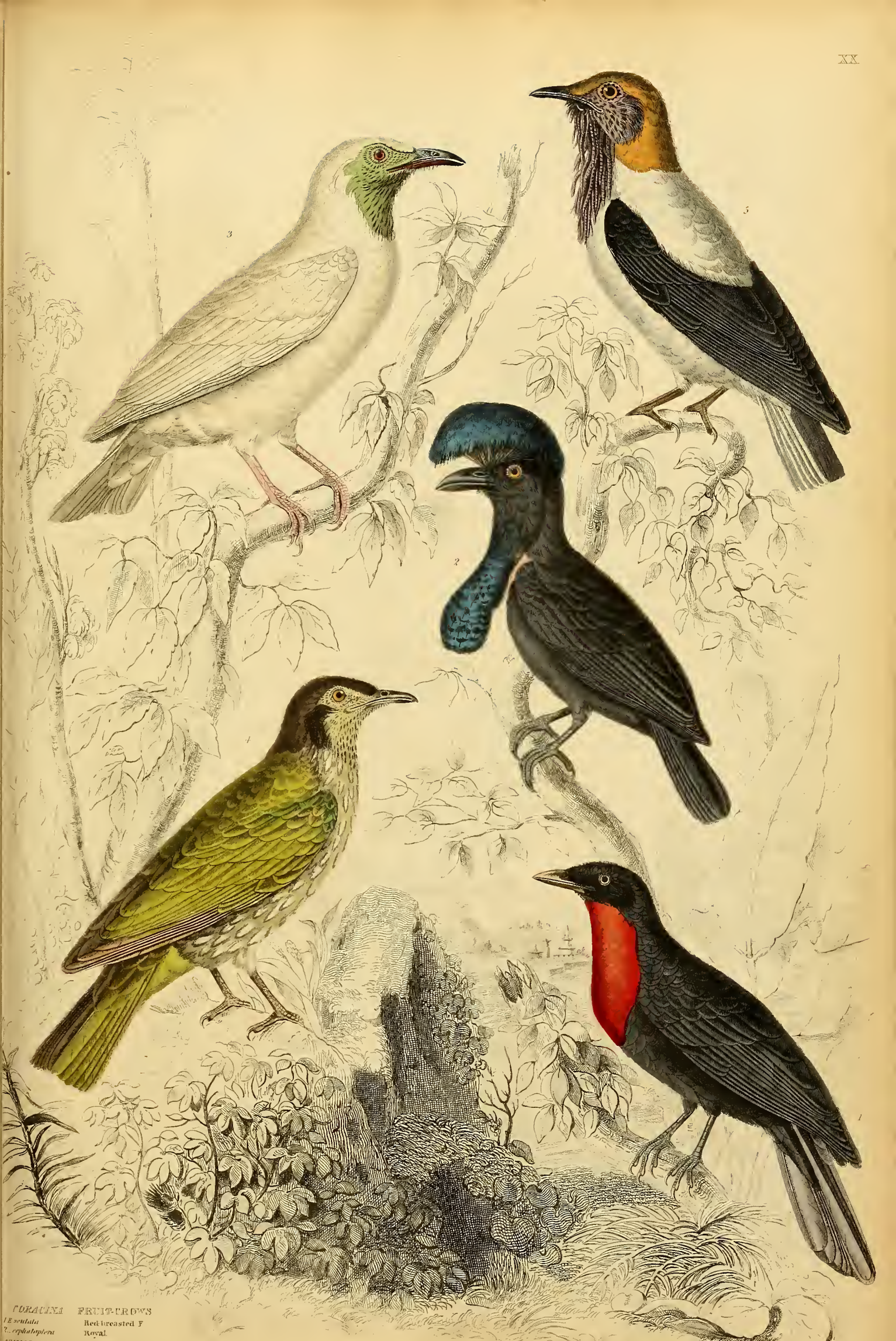
CARACARA, *THE CARACARAS.*

1 *C. aterrimus* The Black Caracara
2 *C.* " of Middle Age
3 *C. Nova Zelandiæ* New Zealand C.
4 *C.* " The Young

MORPHNUS, EAGLE HAWKS.

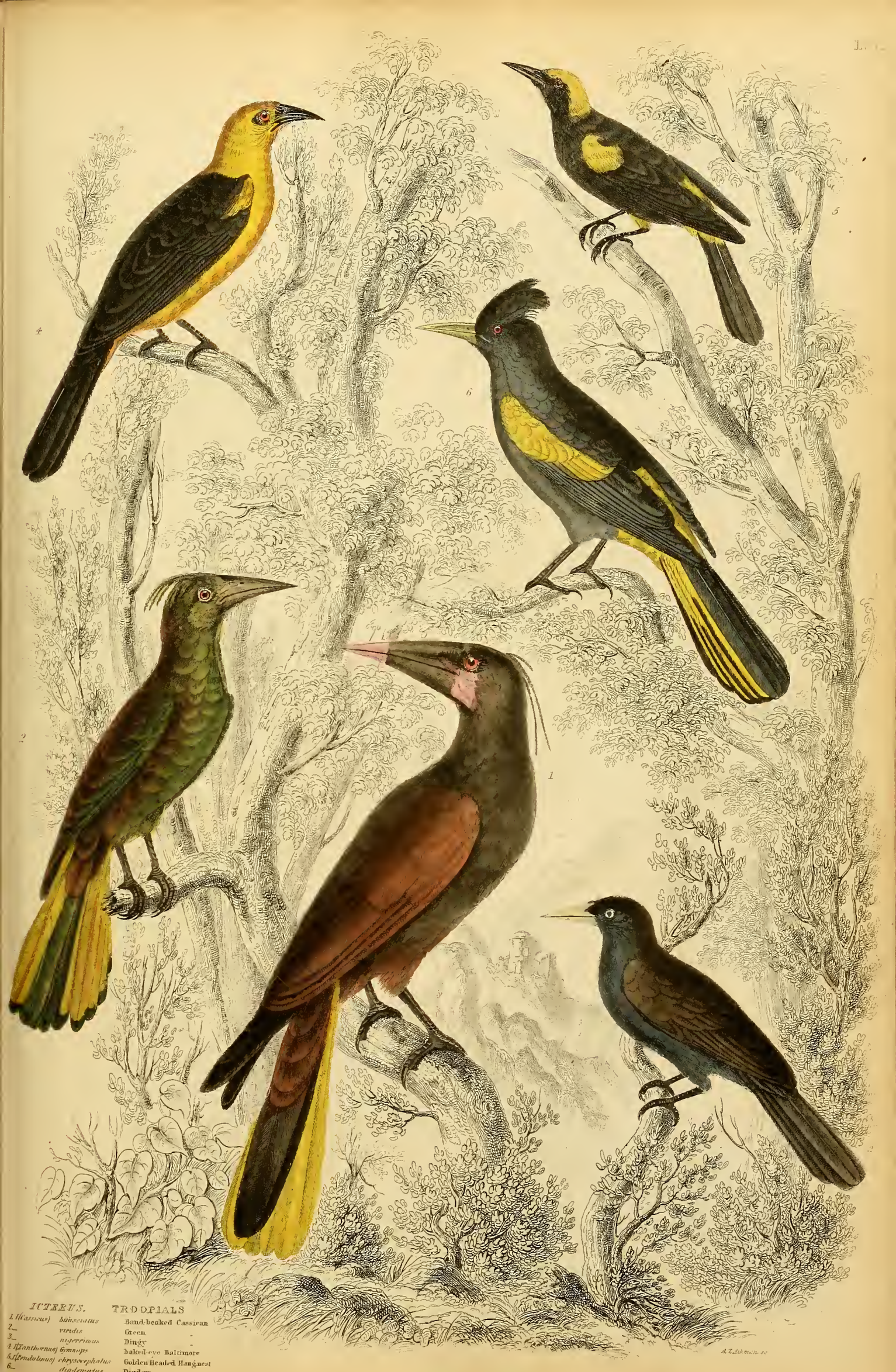
1 *M. Tyrannus*	Tyrant E
2 *— cristatellus*	Singalese — means adult
3 *— ornatus*	Superb
4 *— nivosus*	Snowy

Landsc. Turvey del. & sc.



TORACINÆ FRUIT-CROWS
1 E scutata Red-breasted F
2 ... cephalopiera Royal
ARMARHYNPHUS. SUMMER BIRDS
3 Gouldiæ Araponga ♂
4 Fem
5 variegatus Averano

A T Atkman sc



ICTERUS. TROOPIALS

1. (Cassicus) *bimaculatus* Band-beaked Cassican
2. — *viridis* Green —
3. — *nigerrimus* Dingy —
4. (Xanthornus) *Gymnops* Naked-eye Baltimore
5. (Pendulinus) *chrysocephalus* Golden Headed Hangnest
6. — *diadematus* Diadem —

A. T. Elliott sc.

CORVUS, CROWS.

1 *C. Corax* . . . Raven

2 *C.* . . . Hooded or Royston Crow

PARADISEA, BIRDS OF PARADISE.

1. P. major. Greater B. of P.
1. — fem.
3. — rubra Red
4. — fem.

Figd. Milne sc. Landsc. Turvey del. & sc

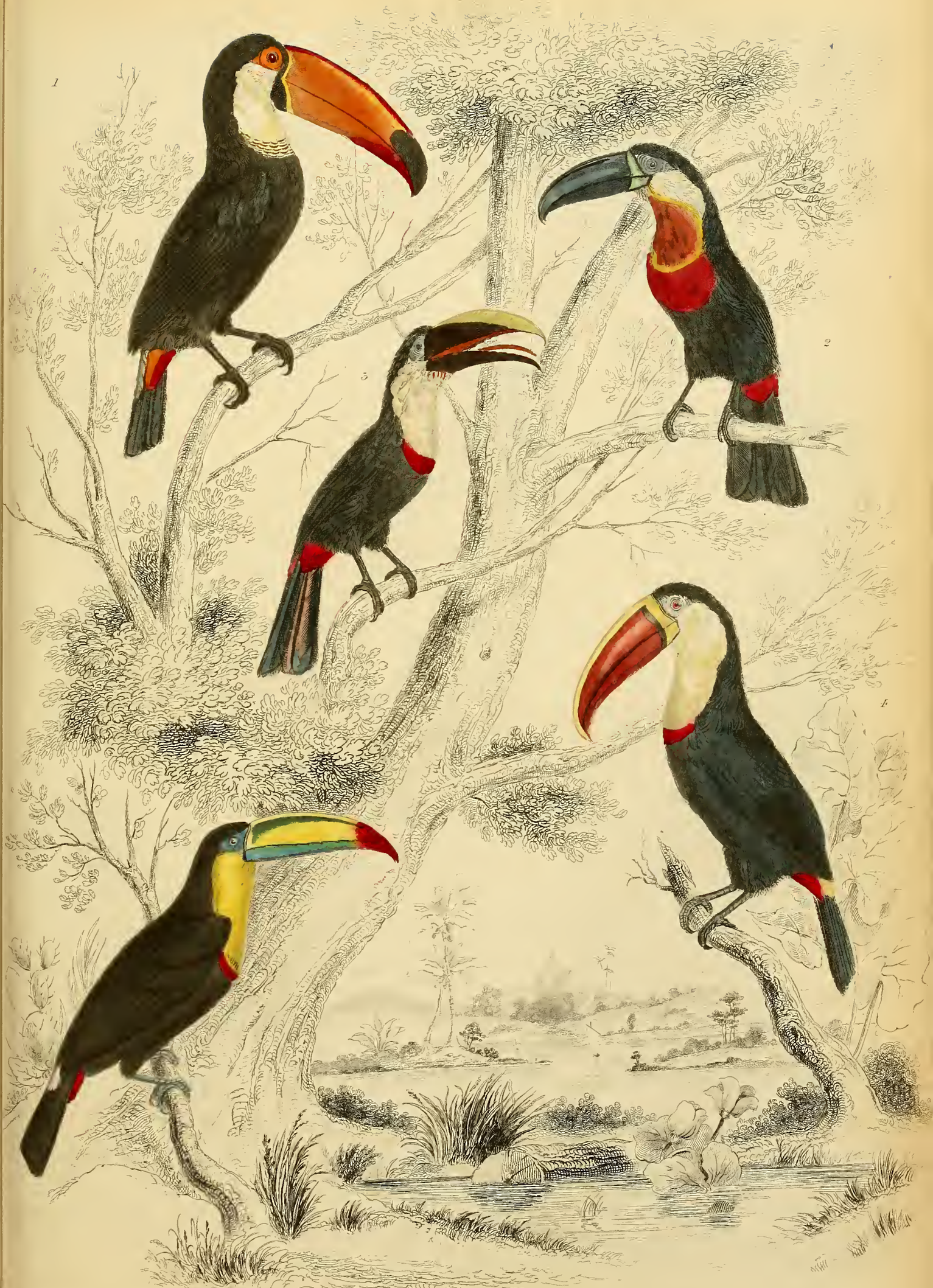
ALCEDO, KINGFISHERS,

1.	*Meninting.*	Indian K.
2.	*fuscobrus.*	Dingy
3.	*melanorhynches*	Fem. Black-billed
4.	*amictor*	Varied
5.	*Diops*	Double-eyed
6.	*Bira*	Bira

Wilson sc. Turner etc.

BUCEROS, HORNBILLS.

1 *B. anthracinus* Mourning H.
2 *— convexus* White-breasted
3 *— gracilis* Yellow-billed
4 *— sulcatus* Red-billed
5 *— galeritus* Largup
6 *— rubricollis* Red-necked



RAMPHASTOS. THE TOUCANS.

1	*R Toco*	Toco Toucan.
2	*„ vitellinus*	Blue billed „
3	*Tocard*	Tocard „
4	*„ erythrorhynchus*	Red billed „
5	*„ carinatus*	Yellow breasted „

Engd by A. Chapman

TROGON, TROGONS.

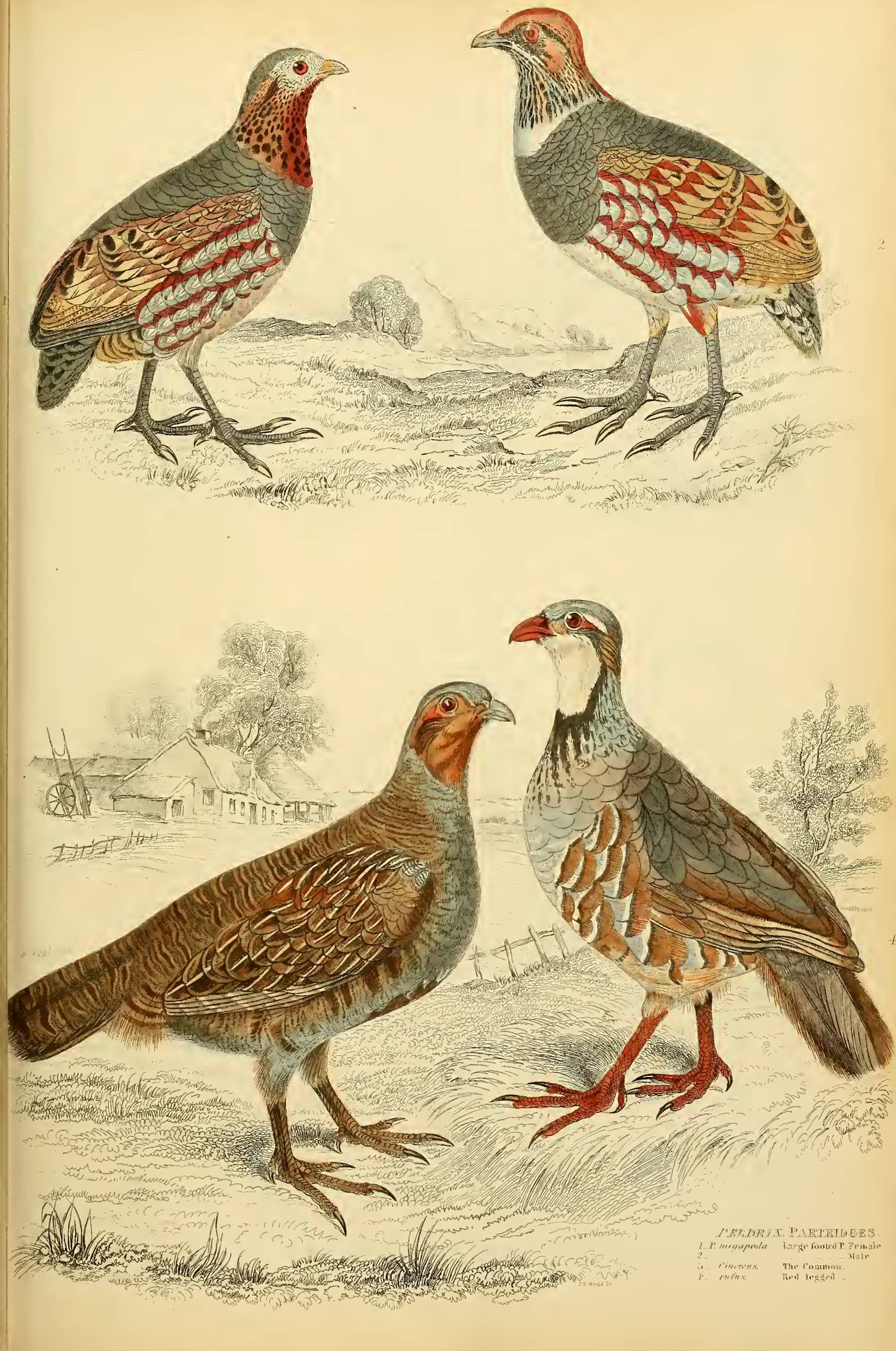
1 T. Duvaucelii	Duvaucel's T.
2 T. Reinwardtii	Reinwardt's T.
3 T. Narina	Narina
4 T. Temnurus	Cuba
5 T. ardens	Rosy breasted Tem.

Fisher Volume sc

Landsc. Parrey del & sc

PSITTACUS. RING PARRAKEETS.

1 P. Alexandri Alexandrine R.
2 — Bengalensis Rose-headed
3 fem.
4 — incarnatus Red-throated
5 — cyanocephalus Yellow-collared
6 — Papuensis Papuan



PERDRIX. PARTRIDGES.

1. *P. megapoda* Large footed P. Female
2. ——— Male
3. *Cinerea.* The Common
4. *rufa.* Red legged

Landsr Turvey sc.

IBIS.

1. I. *religiosa*	*var. leuca*	Sacred I.
2. _ *papillosa*		Papillated
3. _ *plumbea*		Lead-coloure
4. _ *alba*		White
5. _ *chalcoptera*		Metallic

DIOMEDEA ALBATROSSES.

1 *D. exulans*	Common A
2 — *brachyura*	Short tailed
3 — *chlororhyncha*	Yellow billed
4 — *melanophrys*	Black eyed
5 — *fuliginosa*	Sooty

CYGNUS, SWANS.

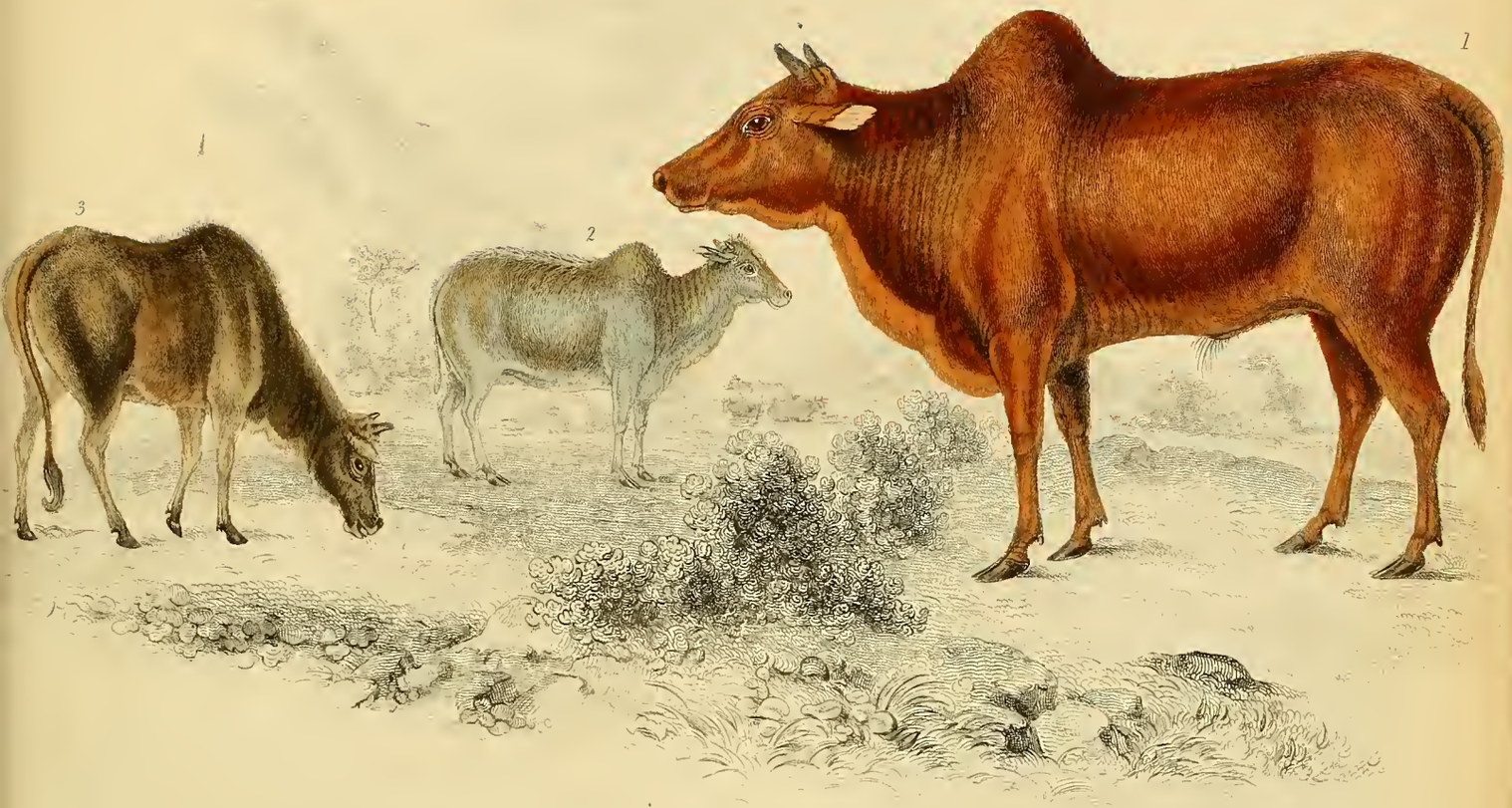
1 C. ferus. *Whistling S*
2 Bewickii *Bewick's*
3 Olor —— *Mute*
4 nigricollis *Black-necked*
5 niratus —— *Black*

MUSTELA. WEASELS.

1.	*M. (Putorius) Furo*	Ferret	
2.			*(Albino)*
3.	*Belella*	Common W.	
4.	*Erminea*	Ermine	*(Summer)*
5.6.			*(Winter)*
7	*nudipes*	Java Ferret	
8.	*Hardwickii*	Hardwicke's	

CANIS. DOGS.

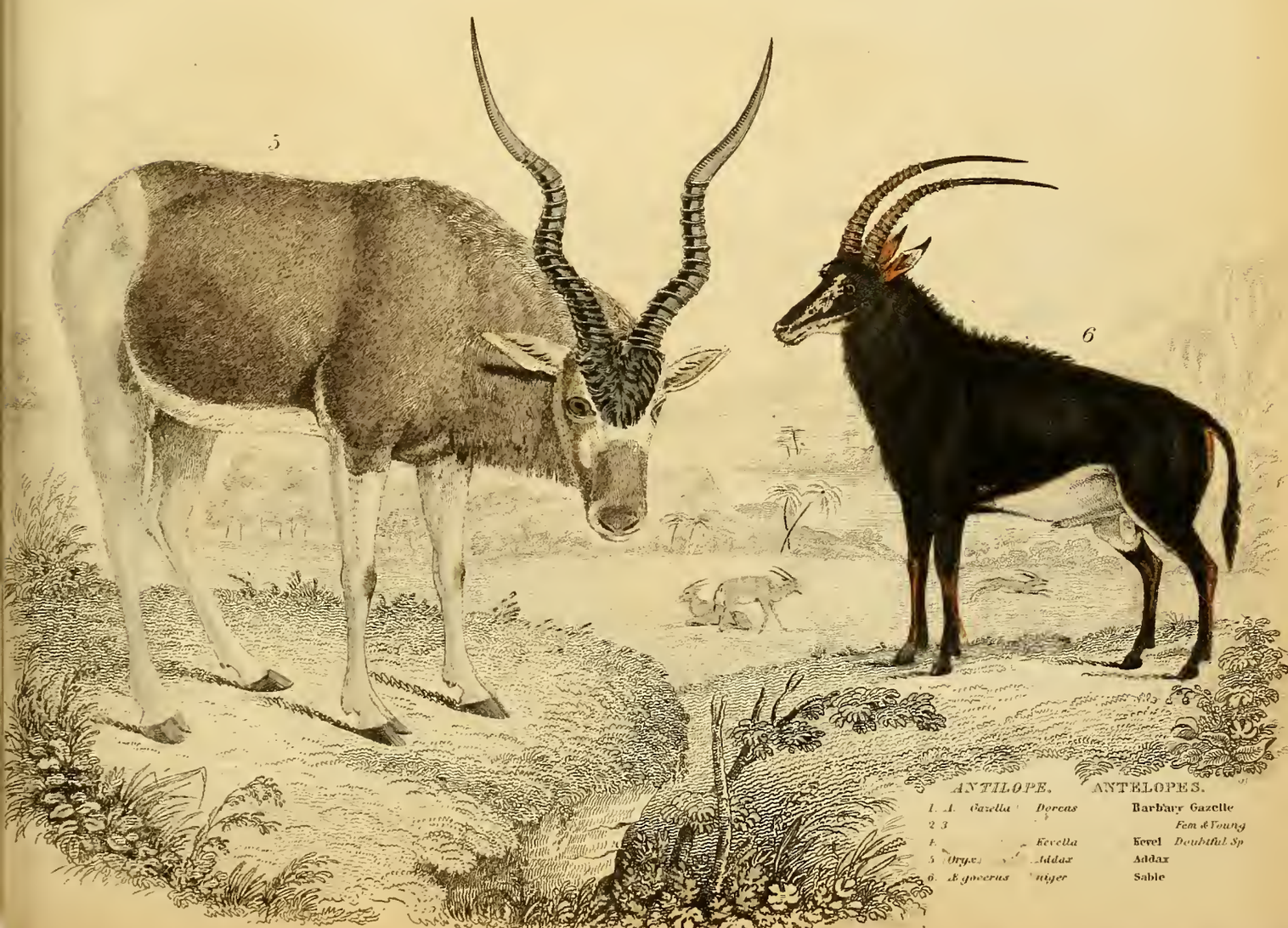
1 C. Lupus occidentalis — *Grey American Wolf*
2 aureus — *Jackal*
3 Mesomelas — *Cape Jackall*
4 pictus — *Hyena Dog*
5 Zerda — *Renard Fennec*
6 Lalandii — *Lalandii Fennec*



B.D.S. BULLS.

1 B Taurus var. Indicus medius *Common Zebu.*
2 — — — *Sem*
3 — — — minor *Small Zebu*
4 Americanus — — — *Bison*

A.T.Ackermann sc



ANTILOPE.		ANTELOPES.	
1. A.	Gazella	Dorcas	Barbary Gazelle
2 3			Fem & Young
4		Kevella	Kevel Doubtful Sp
5	Oryx	Addax	Addax
6.	Acgoceras	niger	Sable

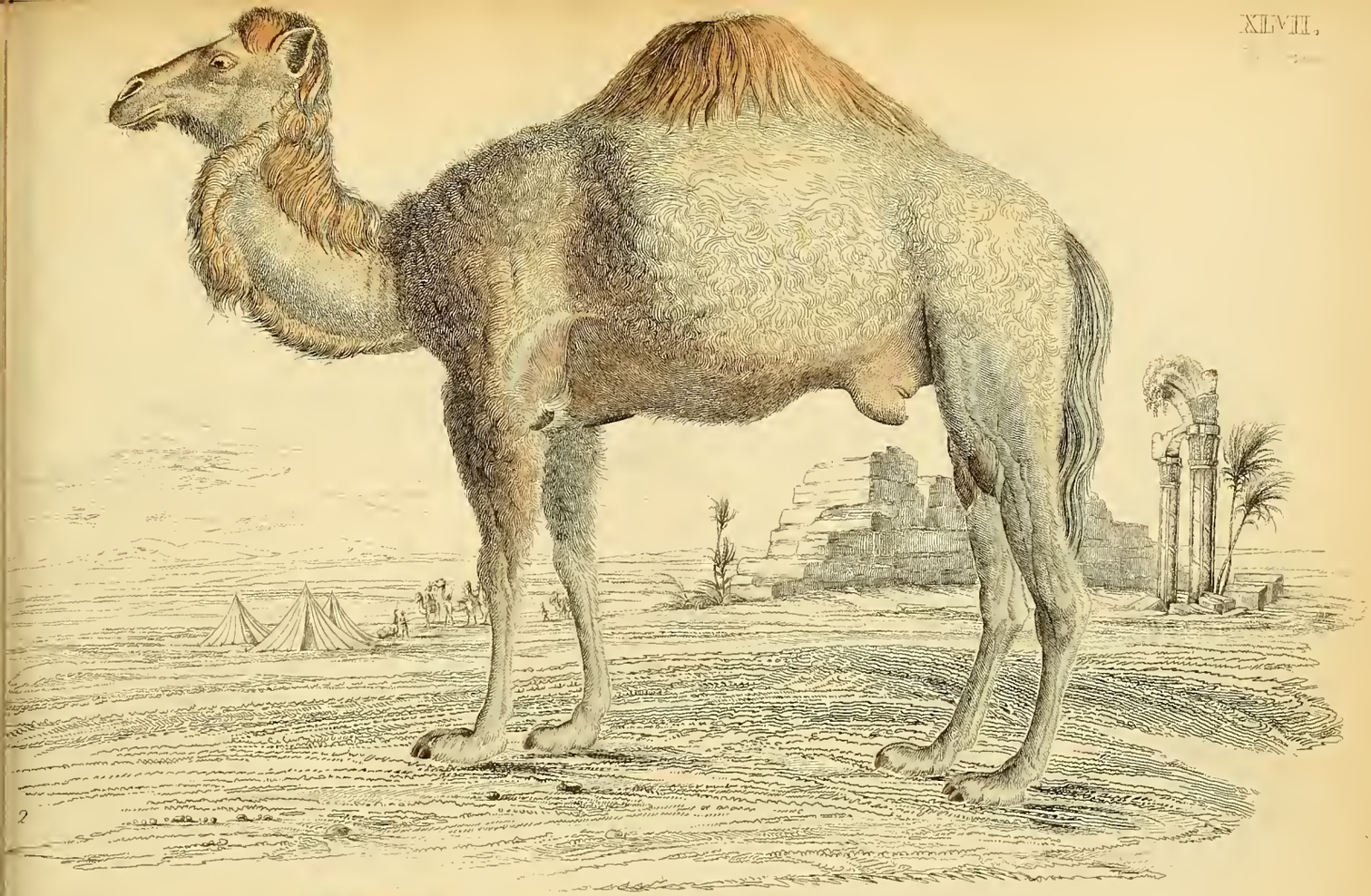
SCIURUS. SQUIRELS.

1	*S cinerei*	Grey S.
2	*— niger*	Black American
3	*— Hudsonius*	Chickaree
4	*— vittatus*	Javanese
5	*— bicolor*	Two Coloured
6	*— Leucotis*	White Eared

FELIS. CATS.

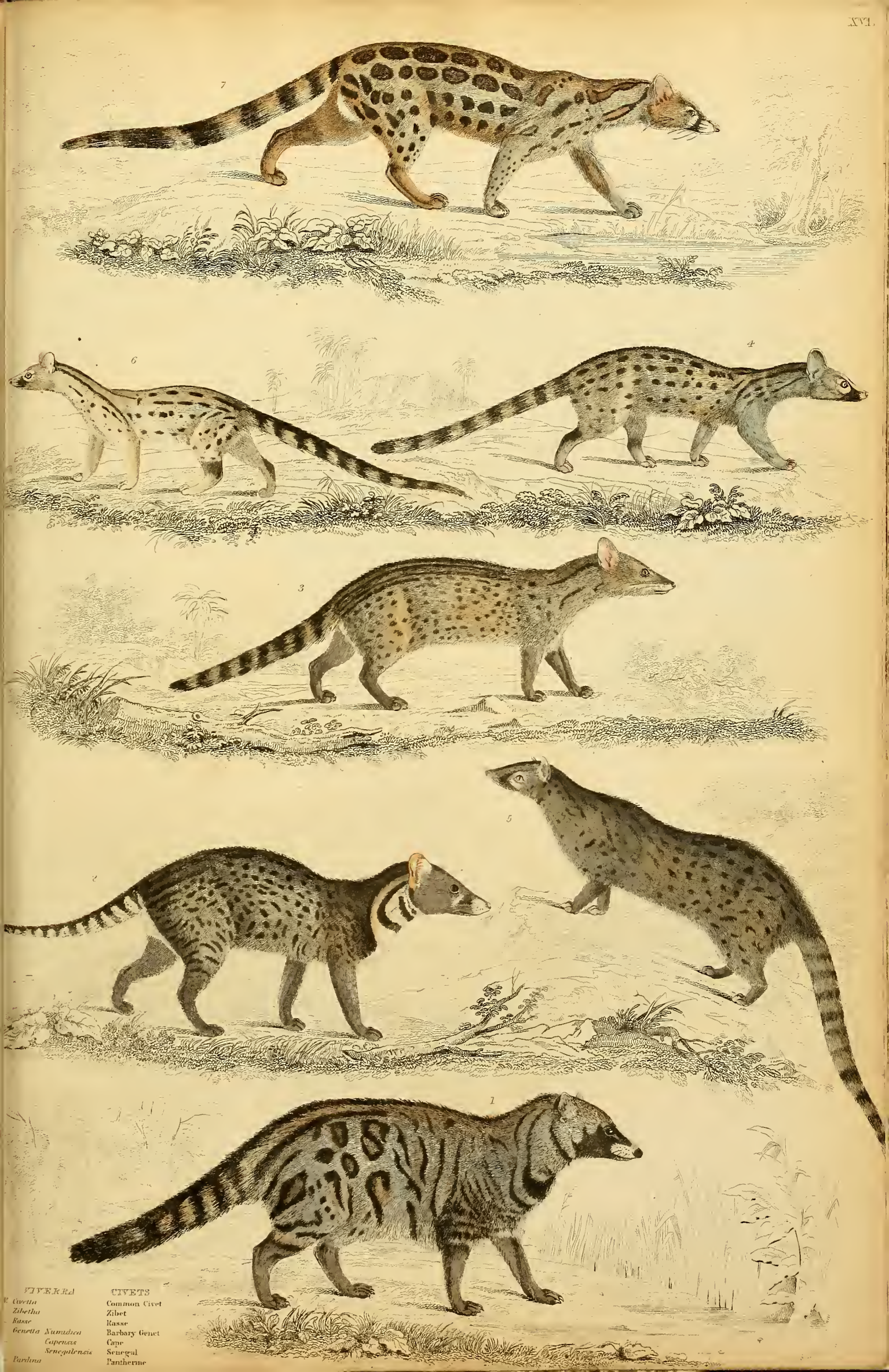
1 *F. Tigris*	Rem.	Tiger
2 *Marina*		Margay
3 *maniculata*	Rupp.	Ruppel's
4 *rufa*		Bay Lynx
5 *minuta varshavanica*		Servaline

Fig.ª Milne sc.—— Landsc. Turvey del. & sc.



CAMELUS. CAMELS.

1 Bactrian Camel *C. Bactrianus.* 2 Dromedary *Dromedarius.*



VIVERRA	CIVETS
Civetta	Common Civet
Zibetha	Zibet
Rasse	Rasse
Genetta Numidica	Barbary Genet
Capensis	Cape
Senegalensis	Senegal
Pardina	Pantherine

Drawn by Cap.tn Brown.

Engraved by W Warwick

RHINOCEROS.

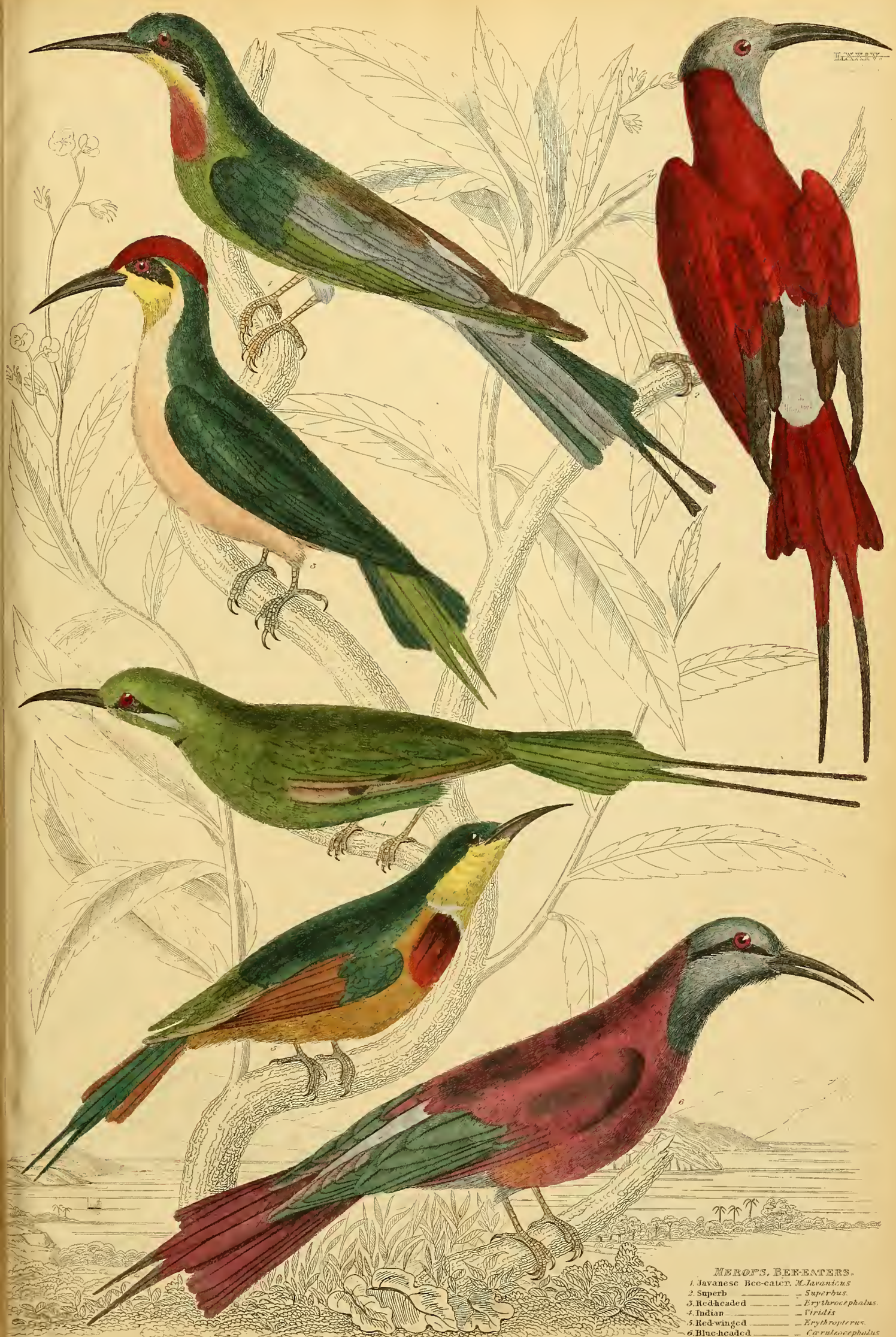
1 Indian Rhinoceros. *R Indicus.*
2 Lesser Two-horned D.o *Africanus.*

CERVUS, DEER.

1 Fallow Deer — *C. Dama*
2 Virginian D^o — *Virginianus*
3 Long tailed Deer — *Macrourus*
4 Axis — *Axis*
5 Malayan Rusa — *Equinus*
6 Guazupucu Deer — *Macrurus*
7 Nepaul Stag — *Wallichii*

Drawn by C. W^m Brown

Engraved by W^m Warnick



MEROP'S, BEE-EATERS.

1. Javanese Bee-eater. *M. Javanicus*
2. Superb _____ *Superbus.*
3. Red-headed _____ *Erythrocephalus.*
4. Indian _____ *Viridis*
5. Red-winged _____ *Erythropterus.*
6. Blue-headed _____ *Cæruleocephalus*

Drawn by Capt.n Brown. *Engraved by S. Milne.*

LEMUR.	MARKS.
1 L. Mongoz	Woolly M.
2 _ ruber	Red
3 _ albifrons	White fronted
4 _ Macaco	Ruffled
5 _	Var.
6 _ nervosus	Gray
7 _ Catta	Ring tailed

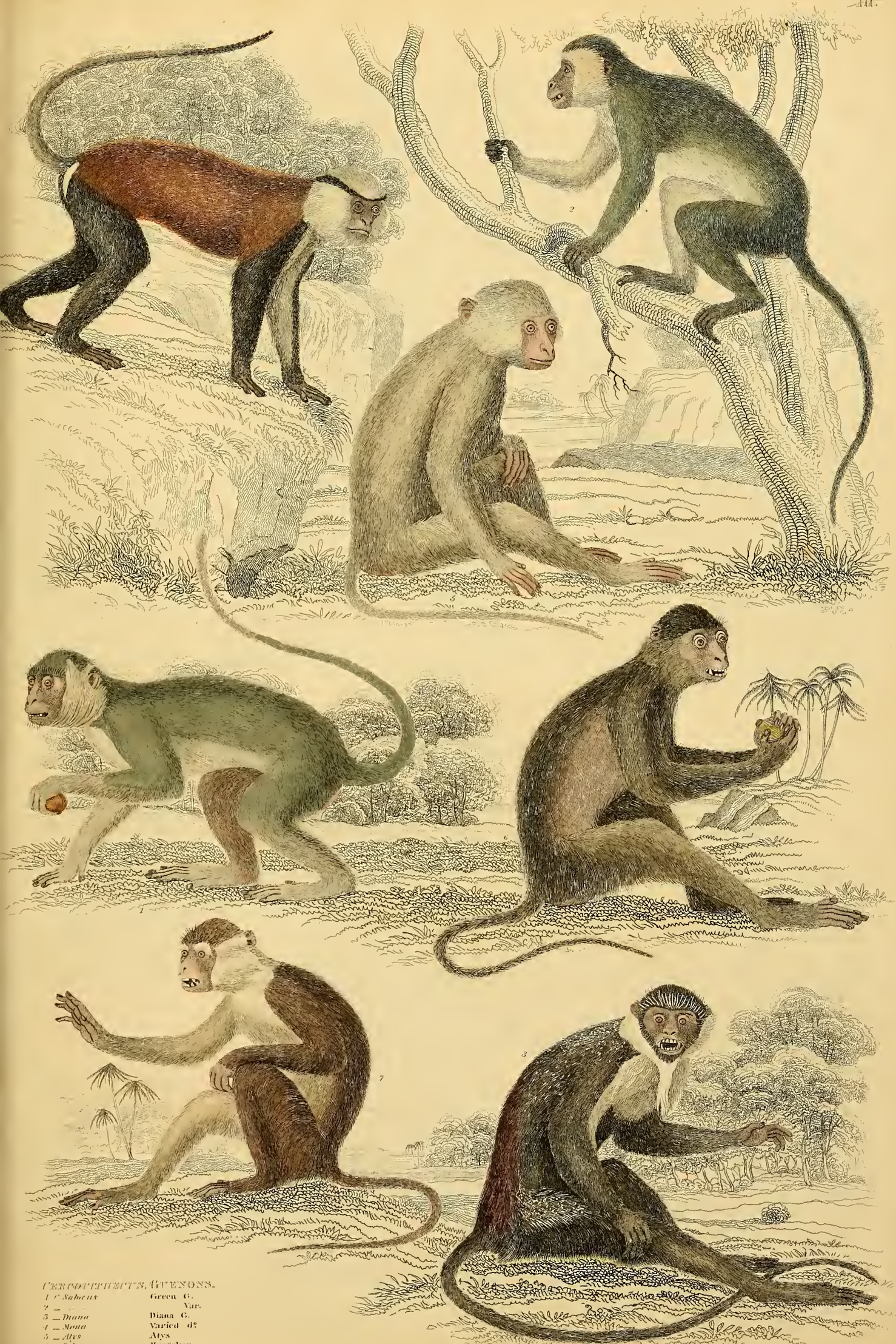
Wilne sc

CERVUS, DEER.

1 Fallow Deer — *C. Dama.*
2 Virginian D° — *C. Virginianus.*
3 Long-tailed Deer — *C. Macrourus*
4 Axis — *C. Axis*
5 Malayan Rusa — *C. Equinus.*
6 Guazupucu Deer — *C. Rufus.*
7 Nepaul Stag — *C. Wallichii.*

Drawn by Wm Barraud

Engraved by Wm Warnick

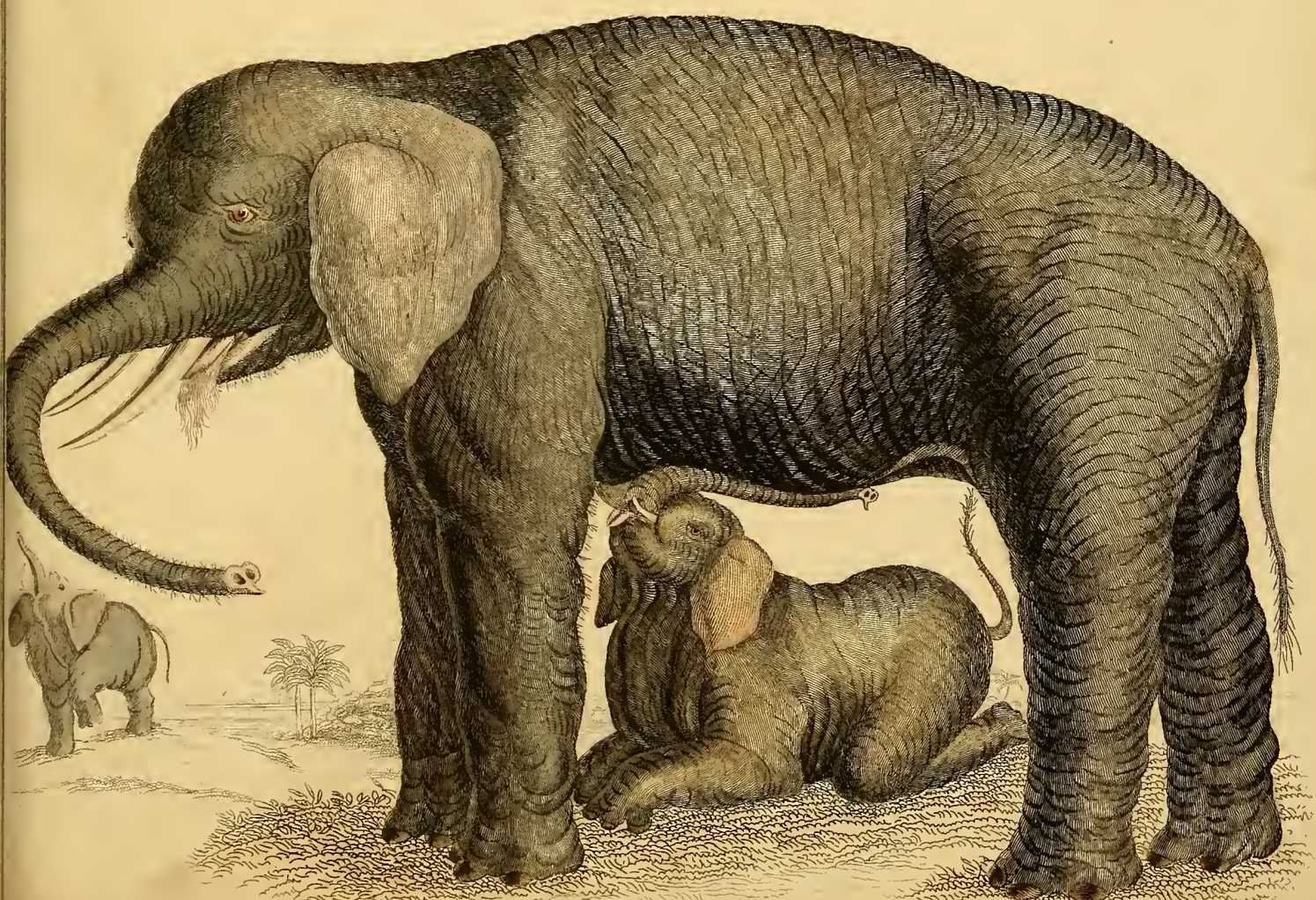


CERCOPITHECUS, GUENONS.

1	*C. Sabæus*	Green G.
2	—	Var.
3	— *Diana*	Diana G.
4	— *Mona*	Varied d?
5	— *Alys*	Alys
6	— *fuliginosus*	Maugabey
7	— *Æthiops*	Collared d?

White sc.

Maréchal Delt



ÆTHIAN ELEPHANTS.
Indian *E. Indicus.*
African *Africanus Fem*

Drawn by Capt.n Brown.

Engraved by S Milne