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BY EDWARD CHARLESWORTH, F.G.S.

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# PREFACE.

Twenty-four monthly numbers of the *second* series of the 'Magazine of Natural History' are now before the public, and from their contents a tolerably fair estimate may be formed of the character which the work is likely to maintain in that portion of our periodical literature devoted to science,—and the degree of confidence it is entitled to from those who contribute to its pages.

The Editor willingly renews the conditional pledge held out in 1837, with regard to its continuation, and in one respect he may do so with greatly increased confidence, since the risk of an inadequate supply of communications, is a crisis which no longer threatens the Magazine, although one which undoubtedly existed about the time the change in the Editorship took place. Altogether indeed the circumstances under which the publication of the present series was determined on were most inauspicious. The Editor was unknown even by report to the subscribers: several of the more valuable Contributors had seceded to establish the 'Magazine of Zoology and Botany,' whilst another portion of them had united to establish a rival periodical, under the fallacious expectation that it would prove a source of pecuniary emolument; and no lack of solicitations and tempting proposals was wanting to win over the few who yet stood by Mr. Loudon. In this position of affairs, to have succeeded in carrying the Magazine forward and procuring for it the favourable opinion of men of undoubted scientific eminence, is a result that cannot be otherwise than gratifying to the Editor. His labor, it is true, might in a pecuniary sense, have been otherwise more profitably employed; for the encouragement bestowed in this country upon scientific periodicals is so slight, that if the question of remuneration were entertained for a moment on the part of those who are engaged in them, it would be fatal to the existence of any English journal, on the pages of which Zoology forms a leading feature. Yet it is this class of works that is turned to for information upon every new discovery in science,—which is so eagerly had recourse to when the result of individual observation or research, requires rapid and universal publicity, and by which a medium of common intercourse and communication is established between the cultivators of science in every quarter of the globe.

With regard to the prospects of the 'Magazine of Natural History,' the Editor indulges a hope that ultimately it may so far form an exception to the general rule, as to enable him to conduct it upon the strength of its own resources, without feeling that its existence is dependent upon fortuitous circumstances. If in the number of those among whom it now circulates there be any who think that its columns might supply a more regular and comprehensive report of what is passing in the scientific world, the Editor can only plead the want of power, and not that of inclination to supply this deficiency. After being carried on without interruption for nine years under the superintendence of Mr. Loudon, the Magazine was threatened with the same fate that has befallen some of its contemporaries, and though this danger has been averted, the hours successfully devoted to that object have only been such as could be snatched from leisure intervals of more definite occupation.

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*Nov.* 25, 1838.

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OF

# NATURAL HISTORY

## JANUARY, 1838.

ART. I. *Reflections on the nature of the Vegetables which have covered the surface of the Earth, at the different periods of its formation.* By M. ADOLPHE BRONGNIART. (Translated from the Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences.) Read at the Sitting of the 11th Sept. 1837.

CURIOSITY is one of the most distinctive faculties of the human mind;—one of those which establish a marked separation between man and the rest of the animal creation: and for this reason we may affirm, that it is one of man's best faculties, when directed towards an end really worthy of him.

It is this principle which is continually stimulating us to extend the fields of our knowledge,—to fathom the most hidden mysteries of nature,—frequently without being able to hope for any other result from our researches, than the pleasure which is experienced by every intelligent being, in proportion as he is enabled to form accurate ideas concerning the nature of the phenomena which surround him. The greater the apparent difficulty attending the study of these phenomena, and the more they are, by their nature or their position, placed out of our immediate reach, the more are we struck with the results, to which profound research has conducted those individuals, who have made them the object of their investigation.

Thus, a strong impression is produced upon our minds, at the perfection to which the telescope has been brought, in placing before us the phenomena of the most distant regions of space; and the microscope, in revealing to us the existence of myriads of beings, whose minuteness, without its aid, would have concealed them from our examination.

In these modern times, science had already made such great progress, that we could scarcely have hoped that a new track would be opened, equally rich in discoveries as stimulating to human curiosity as those which the telescope and microscope had led us through. But nevertheless, the investigation of the soil which we daily tread under foot, has become, during the last half century, in the hands of Werner, Cuvier, and a crowd of other scientific men, who have followed rapidly in their steps, a science most fertile in results, that are not only deeply interesting to those immediately engaged in this study, but calculated to strike the imagination of every one who loves to reflect on the great phenomena of nature.

Geology has, in fact, become capable of revealing to us the history of the earth, during the long periods which preceded its present state. For, by studying the beds of which the crust of the earth is composed, their order of superposition, their nature, and the remains of animals or vegetables which they enclose, we become acquainted with the creatures which have successively inhabited its surface, the revolutions which have occasioned their destruction and given birth to the mineral beds in which they are entombed, and the modifications which this surface itself has undergone, in consequence of these revolutions; and finally, geology proves to us, that all these phenomena, which must necessarily have required many ages to effect them, took place before the creation of man.

Geology thus gives us an insight into the events, and enables us to construct anew the beings, which have preceded, by many millions of years, not only man's earliest historical traditions, but even his very existence.

As in the history of nations, so, during the long history of the formation of the crust of the earth, we find there have been alternate periods of repose and of revolution; the former having been sufficiently tranquil to allow the surface of the earth, and the masses of water which partially covered it, to become peopled with inhabitants of different kinds,—but during the latter, we see the operation of powerful influences breaking up the surface, elevating mountains, submerging parts of the globe previously uncovered by the ocean, and raising above the level of the waters others which had before formed the beds of seas; and, finally, spreading over pre-existing rocks, the materials of new beds, containing the remains of living beings, which had been destroyed by these violent catastrophes; whose preserved relics enable us to ascertain, after so many millions of years, the nature of the ancient populations of our globe, and the order in which they succeeded each other.

The study of the periods of revolution and of those of repose, is equally replete with interest; but the first are entirely under the cognizance of the geologist; the second, on the contrary, necessarily demand the knowledge of the zoologist and the botanist: for they alone, by an exact comparison between the remains of fossilized animals or vegetables, and the corresponding parts of beings now existing, are capable of determining the relations which connect the inhabitants of the globe, at different periods. It is thus that Cuvier, in his admirable *Researches on Fossil Bones*, basing his conclusions on the positive evidences furnished by comparative anatomy, has gone so far as to re-construct skeletons of the greater part of the animals, whose remains had been then discovered, and has been able to determine, and most probably, correctly, their external forms, and their affinities to existing species.

Botany, although for a long time it had furnished fewer documents relating to the ancient state of the globe, must nevertheless be equally called upon to lend its aid to the geologist; and may even throw more light than zoology, upon the state of the earth's surface, during the most distant periods of its formation. Indeed, at the period when life began to shew itself upon our globe, the animals were small in size, and exclusively confined to the ocean; and a luxuriant vegetation, forming immense forests, covered all those portions of the surface, which the sea left unoccupied: and ultimately each period of repose, had its proper vegetation, more or less varied and abundant, according to the circumstances which acted upon the developement of the materials of which it was composed, and perhaps, according to the duration of these periods, but almost always entirely different from that of the subsequent or preceding epoch.

Of these several distinct associations of vegetables which have successively flourished upon our globe, none is so worthy of our attention, as that which appears to have been the first developed, and which, during a long space of time, seems to have covered with thick forests, all those parts of the earth which were above the level of the waters, and the remains of which, piled one upon another, have formed those frequently thick and numerous beds of coal, which are the preserved relics of the primitive forests that preceded, by many ages, the existence of man; and which, furnishing a substitute for the forests of the present æra, that are daily diminishing through the increase of population, are become one of the principal sources of national prosperity.

There can, indeed, be no doubt, that coal owes its origin to accumulated masses of vegetables, altered and modified in the same manner as the peat-beds of our marshes would probably have been, if they had been covered, and pressed beneath the weight of a thick deposit of mineral substances, and then exposed to a high temperature. In order to be convinced of this, it is only necessary to observe the almost ligneous structure which coal sometimes exhibits; and to examine the numerous remains of plants contained in the rocks which accompany it.

But the study of the impressions of stems, leaves, and even fruits, which are generally enclosed in such numbers in these rocks, not only proves the vegetable origin of this substance, but also leads us to determine the nature of the vegetables which enter into its formation, and which, consequently, must have then occupied the surface of the earth. Among these vegetable impressions, the most frequent are occasioned by the leaves of ferns; but these ferns of the primitive world, are not those now growing in our climates, for Europe does not produce, at the present day, more than thirty or forty species, while the same countries then nourished more than two hundred, all much more allied to those which now grow between the tropics, than to those of temperate climates.

Besides these leaves of ferns, the same strata contain stems, whose dimensions might be compared to those of the largest trees of our forests, while, in their form, they are totally unlike them; so that all the older naturalists, struck with this difference, and wishing, nevertheless, to find an analogy between them and the vegetables of the present world, had referred them to the arborescent vegetables, which were but little understood at that time, to the bamboos, and palms, or those large species of *Cactus*, commonly known under the name of *cierge*.

But a more minute comparison between the trees of the equinoctial regions, and these stems of the ancient world, is sufficient to nullify these supposed relations, (founded only upon a resemblance in their general aspect), which some had wished to establish between them; and a more attentive study, either of these stems, or of the leaves which accompany them, very soon shews that the vegetables which formed the primitive forests, cannot be compared with any of the trees which now exist on our globe.

The arborescent ferns, which, by the elegance of their appearance, now form one of the principal ornaments of the equinoctial regions, are the only arborescent plants which we can find among these remains of ancient vegetables; and their number is very small.

As to the other fossil stems, the remains of the primitive forests of the ancient world, it is amongst the most humble vegetables of our epoch that we must look for species analogous to them.

Thus, the *Calamites*, which are from four to five metres in height, and from one to two decimetres in diameter, bear an almost exact resemblance, in every point of their organization, to the *Equiseta*, known commonly by the name of horsetails, which grow so abundantly in the marshy places in our climates, and whose stems, hardly thicker than a finger, seldom exceed a metre in height. The *Calamites*, therefore, must have been arborescent *Equiseta*, a form under which these plants have totally disappeared from the globe.

The *Lepidodendrons*, the numerous species of which must have formed an essential part of the forests of that remote epoch, and which have probably contributed more than all other vegetables, to the formation of coal, differ very litle from our *Lycopodia*. We recognise in their stems the same essential structure, the same mode of ramification, and, finally, we see leaves and fruit, similar to those of these plants, inserted upon their branches. But, whilst the *Lycopodia* of the present day are small plants, frequently creeping, and resembling large mosses, rarely attaining a metre in height, and covered with very small leaves, the *Lepidodendrons*, retaining the same form and appearance, rose to the height of twenty or thirty metres, with a base of a metre and a half in diameter, and bore leaves, which sometimes reached to half a metre in length; they must, consequently, have been arborescent *Lycopodia*, as high as the largest of our fir-trees, whose place they occupied in this primitive world, forming, like them, immense forests, under the shade of which the numerous ferns of that period were developed.

How different must have been this mighty vegetation from that which now clothes the surface of the earth with its varied tints! Size, strength, and rapidity of growth were its essential characteristics; the smallest plants of our epoch were then represented by gigantic forms; but what simplicity of organization, and what uniformity do they display, in the midst of all this developement of vegetative power!

In the present age, even in those spots where man has caused no change in what nature has created, the eye delights to repose in succession upon trees, which are at once distinguished by the diversity of their form, colour, and foliage, and which frequently display flowers and fruits of the most opposite colors. This variation in aspect is still more marked if our glance descend to the different shrubs and plants which skirt our forests or form our fields, with flowers of all the hues of the rainbow. In short it results from this diversity of structure, that among these plants, many serve for the food of men and animals, and are even indispensible to their existence.

The variety of organization and external character displayed in the vegetables which now cover our globe, is indicated by the number of natural groups into which they may be divided. These natural groups, or families, are more than two hundred and fifty in number, about two hundred belonging to the class of Dicotyledonous plants, which consequently present great variety of structure: and thirty to the Monocotyledonous class. Now, the first of these classes, that is to say, the two hundred families which it includes, is altogether absent from the primitive flora; and we find there scarcely any traces of Monocotyledonous plants.

The class which almost entirely constituted the vegetation of the primitive world, is that of the vascular *Cryptogamia*, which, in the present day, comprehends only five families, nearly the whole of which had their representatives in the ancient world; such as the *Filices*, the *Equiseta*, and the *Lycopodia*. These families form what we may term the first step of ligneous vegetation; like the Dicotyledonous or Monocotyledonous trees, they present to our view stems more or less developed, of a solid texture, although of a more simple structure, than that of the trees before mentioned, and are decorated with numerous leaves; but they are destitute of those reproductive organs which constitute flowers, and, instead of fruit, display organs much less complicated.

These simple and slightly diversified plants, which, from their limited number and small size, occupy only an inferior rank in modern vegetation, constituted, in the earliest period of organic life, nearly the whole of the vegetable kingdom, and formed immense forests, which have no parallel in the modern creation. The rigid texture displayed in the leaves of these plants, and the absence of pulpy fruits and farinaceous seeds, must have rendered them ill adapted for animal food; but terrestrial animals did not then exist; the seas alone possessed inhabitants; and the vegetable kingdom then held undivided sway over the visible surface of the earth, upon which it seems to have been placed, to act another part in the general economy of nature.

We cannot indeed doubt, that the immense mass of carbon accumulated in the state of coal, in the bosom of the earth, and arising from the destruction of vegetables which flourished at this distant period, on the surface of the globe, must have been imbibed by them from the carbonic acid present in the atmosphere; the only form under which carbon, not arising from the destruction of pre-existing organic bodies, can be absorbed by a plant. Now, even a small proportion of carbonic acid in the atmosphere, is generally unfavourable to animal life, and especially of the more perfect animals, as the mammifers and birds ; this proportion, on the contrary, is highly favourable to the growth of vegetables, and if we admit that there existed a greater quantity of this gas in the primitive atmosphere of the globe, than there is in our atmosphere, we may consider it as one of the principal causes of the luxuriant vegetation of those distant periods.

This mass of vegetables, which, from their simplicity and uniformity would have been so little fitted to furnish materials for the sustenance of animals, differing in their structure, like those which now exist, may have prepared such a state of things as was necessary for a more varied creation, by purifying the air from the excess of carbonic acid it then contained; and if we would indulge the feeling of pride which sometimes leads man to think that all nature has been created for his benefit, we may suppose that this first vegetable creation, preceding, by so many ages, the appearance of man upon the earth, may have been intended to bring about that state of the atmosphere, which would be necessary for his existence, and the accumulation of those immense beds of fuel, which his industry was afterwards to avail itself of.

But independently of this difference in the constitution of the atmosphere, which the formation of these immense deposits of fossil coal, renders extremely probable, may not the nature of vegetables themselves, furnish us with some data concerning the other physical conditions, to which the surface of the earth was subjected during this period?

What is now going on in different parts of the globe, may throw some light on this question.

The study of the geographical distribution of plants belonging to the same tribes that composed the entire vegetation of the coal period, may, in effect, point out to us the state of climate, and, consequently, the physical causes, which favour the increase of size and number in these vegetables ; and we may, in all probability, conclude from it, that the same causes occasioned their preponderance at the epoch under review.

We see, for example, that the *Filices*, *Equisetaceæ*, and *Lycopodiaceæ*, attain a greater height in proportion as they approach the equatorial regions. So that it is only in the hottest parts of the globe we can find the arborescent ferns, which, uniting with the upright and majestic form of the palm tree, the elegant foliage of the common fern, we have already mentioned as existing in the coal strata. In the same regions, the *Equiseta* and *Lycopodia* attain to a height, double and triple that which is presented by the largest species of the temperate climates. Another circumstance appears to have a still more decided influence on their preponderance, in relation to plants belonging to other families, namely, humidity and uniformity of climate; conditions which are found in the greatest degree of perfection in small islands, at a distance from continents.

In these isles, indeed, the extent of the surrounding seas causes a constant humidity, and a temperature but little exposed to change, which seem, in a remarkable degree, to favour the developement and increase of species among the ferns and other similar vegetables; while phanerogamous plants, on the contrary, are, under the same influence, much fewer in number, and in small variety. The result follows, that while in the great continents, the vascular plants of the class *Cryptogamia*, such as the *Filices*, *Equiseta* and *Lycopodia*, often form scarcely a fiftieth part of the whole number of vegetables, in the small islands of the equinoctial regions, these plants constitute almost half, and sometimes even two thirds, of the whole number of the vegetable tribes which inhabit them.

The Archipelagoes situated between the tropics, such as the Antilles, or the islands of the great Pacific ocean, are then the parts of the globe which display, in the present day, a vegetation most nearly corresponding to that which existed on the earth, when the vegetable kingdom began, for the first time, to be developed.

We are consequently led, by the study of the vegetables which accompany the beds of coal, to infer that at this early period the surface of the earth, in the countries producing the best known of these coal-deposits, namely, Europe and North America, possessed a state of climate similar to that now existing in the Archipelagoes of the equinoctial regions, and, probably, a geographical configuration very little different.

When we consider the number and thickness of the beds which constitute the greater part of the coal strata, and when we examine, from first to last, the changes which have operated on the specific form of the vegetables to which they owe their origin, we are constrained to acknowledge that this luxuriant vegetation of the primitive world, must have covered, with its dense forests, all those portions of the globe which were raised above the level of the sea; for it presents itself, with the same characters, in Europe, and in America; equatorial Asia, as well as New Holland, seem also to have partaken of this general uniformity of vegetable structure.

Nevertheless, this first vegetable creation was shortly to disappear, that it might give place to another, composed of beings, with an organization, less extraordinary than that of their predecessors, but differing from them almost as widely as they did from those of our epoch.

To what causes can we attribute the destruction of all the plants which characterise this remarkable vegetation? Is it to a violent revolution of the globe? Is it to a gradual change in the physical circumstances necessary to their existence,—a change which may, in part, be owing to the very presence of these vegetables? These are questions which we cannot determine in the present state of our knowledge.

Meanwhile we are certain, that the deposition of the latest beds of the coal formation, was followed by the destruction of all the species which constituted the primitive vegetation, particularly of those singularly constructed and gigantic trees the *Lycopodia*, *Filices*, and arborescent *Equiseta*, which were the most prominent feature of this early creation.*

After the destruction of this luxuriant primitive vegetation, the vegetable kingdom appears to have been a long time in reaching an equal degree of developement. Scarcely ever, indeed, in the numerous beds of the secondary formations, which succeed the coal strata, do we find any of those masses of vegetable impressions, a kind of natural herbaria, which, in these ancient deposits of carbon, are evidences of the simultaneous existence of a prodigious number of plants. Scarcely any where do we see in these strata, such immense beds of fossil fuel; and when found, they are never, in number and extent, to be compared with those of the regular coal deposits. In fact, during the formation of the secondary rocks, the vegetable kingdom must either have occupied but very narrow limits on the earth's surface, or its scattered individuals must have barely covered a barren soil, of which the revolutions of the globe did not allow them to become the quiet possessors, or, finally, the state of the surface of the earth at that period, was not favorable to the preservation of its vegetable inhabitants.

However, the long interval of time which divides the coal formations from the tertiary strata, a period which witnessed so many physical revolutions of the globe, and the creation of those gigantic reptiles in the midst of the ocean, types of an organization so extraordinary, that we might often fancy ourselves recognising the monsters to which the imagination of the poets of antiquity gave birth;—this period, I repeat, is

* We still find, in some parts of the secondary strata, a small number of arborescent Ferns and gigantic *Calamites*, but they are much less than those of the coal strata; and we discover no trace of the arborescent *Lycopodiaceæ*, analogous to the *Lepidodendrons*.

remarkable in the history of the vegetable kingdom, for the preponderance of two families, which are lost, as it were, in the midst of the immense variety of vegetable forms, with which the surface of the earth is at this time covered, but which then predominated above all the rest, both in number and size. These are the *Coniferæ,* of which the fir, the pine, the yew, and the cypress, furnish well-known examples; and the *Cycadeæ,* which are plants altogether exotic, less numerous in our present world, than in that remote period, and which join to the foliage and height of the palm, the essential structure of coniferous plants. The existence of these two families during this period, is so much the more worthy of attention, because being connected with each other by their organization, they form the intermediate link between the vascular *Cryptogamia* which almost solely formed the primitive vegetation of the coal period, and the phanerogamous *Dicotyledones,* properly so called, which formed the greater part of the vegetable kingdom, during the tertiary period.

Thus, the vascular *Cryptogamia,* the first step of ligneous organization, are succeeded by the *Coniferæ* and the *Cycadeæ,* which hold a more elevated rank in the scale of vegetation; and these again are succeeded by the dicotyledonous plants, which occupy its summit.

Thus in the vegetable as well as in the animal kingdom, there has been a gradual advance towards perfection, in the organization of the beings, which have successively lived upon our globe;—from those which first appeared upon its surface, to those by which it is now inhabited.

The tertiary period, during which were deposited the strata on which rest the foundations of the greatest capitals of Europe, as London, Paris, and Vienna, witnessed the operaration of greater changes in the organic world, than any that have been effected since the destruction of the primeval vegetation. In the animal kingdom, the creation of *Mammifera,** a class which all naturalists agree in placing at the top of the scale of animated beings, and which seems to have been formed as a prelude to the creation of man. In the vegetable kingdom, the creation of *Dicotyledones,* the great division which the unanimous consent of botanists has always placed at the head of this kingdom; and which, by the variety of its forms, and its organization, by the size of its leaves, and the beauty of its flowers and fruit, must have stamped upon the

*In referring the creation of the Mammiferous class to the tertiary epoch, I omit the hitherto unique occurrence of the fossil Mammifer in the Stonesfield slate: this is quite an exceptionable fact, and would be altogether out of place in a short sketch, like the present.

vegetable world a very different aspect from that, which, till then, it had always presented. This class of Dicotyledonous plants, some traces of which we can, though with difficulty, detect in the latter part of the secondary period, suddenly presents itself during the tertiary period, in great preponderance. As in the present day it surpasses all the other classes of the vegetable kingdom, both in the number and variety of its species, and in the size of individual plants. Thus, the vegetation which flourished in our countries, while the tertiary strata were being deposited, and enveloping its fragments in sedimentary beds, was more nearly allied to that now existing, and more particularly to the botany of the temperate regions of Europe and America. The face of these countries was then covered, as it is now, with pines, firs, poplars, elms, birches, walnuts, maples, and other trees allied to those which ~~which~~ still flourish in our climates.

Thus, not only do we find there no traces of those singular vegetables which characterised the primitive forests of the coal period, but we very rarely meet with fragments of such plants as are analogous to those now existing within the tropics.

We are not, however, to imagine, that the same vegetable forms have been perpetuated from an epoch still very remote, since it preceded the existence of man, until our own day.—No; very marked differences almost always distinguish these inhabitants of our globe, (in a *geological* sense, very recent, though *chronologically*, of great antiquity), from the modern vegetables, by the side of which we might class them. And the existence in these very strata, towards the north of France, of some palms, very different from those which still grow on the shores of the Mediterranean sea, and of a number of other plants which belong to families now confined to warmer regions, seems to indicate that at this epoch, central Europe enjoyed a much more elevated temperature than at present; a result which perfectly agrees with that deduced from the presence, in the same strata, and in the same countries, of elephants, rhinoceroses, and hippopotami, animals which now seldom extend beyond the tropics.

What an astonishing contrast between the aspect of nature, during these later geological periods, and that which it offered when the primitive vegetation covered the surface of this globe!

In fact, in these latter times of the geological history of the world, the earth had assumed, in great part at least, the appearance which it retains at the present day; extensive continents, and mountains, already of considerable height, must have caused a variety of climates, and thus favoured the diversity of organisms. Thus, in a country of small extent, the vegetable kingdom offers to our notice plants as different from each other as they are at the present day.

To the *Coniferæ*, with leaves narrow, hard, and of a dark green colour, are added birches, poplars, walnuts, and maples, whose leaves are large and of a fine green; under the shade of these trees, on the banks of lakes, or on their surface, grew herbaceous plants, analogous to those which still embellish the open country by the diversity of their forms and colours, and whose variety renders them calculated to satisfy the different appetites of an infinite number of animals of all classes.

The forests of the ancient world, like those of our epoch, served, in fact, for the retreat of a great number of animals, more or less analogous to those now existing on our globe. Thus, elephants, rhinoceroses, tigers, bears, lions, stags of all forms, and even of all heights, have successively inhabited them; birds, reptiles, and even numerous insects, complete this picture of nature, as it then presented itself, upon those parts of the earth, whose surface was above the waters;—nature as beautiful and as diversified, as that which we now see upon its surface.

On the contrary, in the *first* ages of the creation of organized beings, the terrestrial surface, divided, without doubt, into an infinity of low islands, and of a very uniform temperature, was, it is true, covered with immense vegetables, but these trees, differing little from each other in their aspect or the colour of their foliage, and deprived of the brilliantly coloured flowers and fruits which array so many of our large trees, must have impressed upon vegetation a monotony which was unbroken, even by those small herbaceous plants, which by the beauty of their flowers form the ornament of our woods.

To this may be added, that neither mammifer, bird, nor any other animal, appeared to animate these thick forests, and we may form to ourselves a tolerably just idea of this primeval state of nature, sombre, melancholy and silent, but at the same time so imposing, by its grandeur, and the part which it has acted in the history of the globe.

Such is, gentlemen, a sketch of the great revolutions of terrestrial vegetation; as far as the researches made upon this subject, during thirty years, will allow us to trace it. Each day adds, undoubtedly, some new point to its details; but recent discoveries, in confirming the results at which we had long since arrived, seem to announce, that no part of this picture will undergo great changes, even when, thanks to the materials collecting from all parts for this end, we may undertake to form this outline into a more perfect picture.

ART. II. *On the influence of Man in modifying the Zoological features of the globe; with statistical accounts respecting a few of the more important species.* By W. WEISSENBORN, D. Ph.

THE history of man does already, in a very appreciable degree, involve the condition of a great many species of the lower animals; and on account of the strict dependence of *all* the species on others, or on the rest of the natural productions, which man likewise modifies, we are perhaps warranted in concluding, that there is no species whose natural relations have not been materially affected by human influence.

The influence which our species exercises in this respect, is either *indirect* or *direct*. The former, which I shall briefly consider first, is a consequence of the change which man brings about in the mineralogical, botanical, or even meteorological features, of every part of the globe's surface subjected to his agency. Wherever he makes his appearance, with the exception of such tracts as are, on account of their low temperature or aridity, utterly irreclaimable from their present barren condition, the surface is gradually modified, as to its constituent principles, state of irrigation, botanical productions, and the proportion, as well as form, of the vapour dissolved in the atmosphere; whereby, of course, the animal productions of such localities are likewise materially affected. Swamps are drained, forests give way to cultivated fields, and the primitive habitats of animals are thus exchanged with new ones, that owe their origin to man. Plants migrate with him, carrying with them their parasitic insects, or drawing after them other species, that depend chiefly on them for their subsistence; and by these, and other means, he will evidently change the zoological features of every country of which he takes possession.

Important as this indirect influence of man must appear, even if considered in its mere outline, it is perhaps less great, and at all events less striking, in its immediate effects, than the *direct* influence which he exercises on the rest of the animals, as to their very existence, or relative numbers in certain localities, or absolute numbers, by destroying or protecting them.

As a direct agent, man affects the condition of the lower animals, either *accidentally* or *methodically*. In the former case, he is but a blind instrument in the hand of the same supreme power, under whose guidance he unconsciously fulfils his own destinies; in the latter, he acts as a self-conscious being, in regulating the condition of the lower animals, as he does his own social existence: in the former, nature takes it upon herself to fill the gaps which man makes in her ranks, according to the laws presiding over the mutual dependence and geographical distribution of the species; in the latter, man undertakes to substitute tame or other species, for those which he thinks proper to exterminate or repress: in the former, everything will spontaneously tend to restore a new equilibrium; in the latter, the self-called wisdom and divine power of man, which too often are but ignorance, and unpunishable arrogance, will often tend to keep up a zoological state, as much at variance with the laws of a natural equilibrium, as with the true interests of his own species.

The former principle has, hitherto, evidently been in operation on the larger scale; but the latter will claim its superiority in the proportion as mankind approaches the standard of civilization, or as its progress towards that standard becomes more self-conscious and universal. As, however, man is often most methodical, when he least intends to be so, as well as most irrational, when acting after a system, it is not possible to say what part of the ultimate effect will belong to the one principle or to the other, or which is destined to act the most prominent part upon the whole. They both, moreover, in many cases, determine each other, and walk abreast with the *indirect* influence of man; so that we may sum up the total effect of man's agency, in saying, that the general zoological features of the globe, greatly depend on the general progress of mankind towards its great temporal end; whereas the zoological condition of each particular country will, in a great measure, be determined by the social institutions and habits of its inhabitants, so that the moral and political state of the latter, may be very fairly tested by the condition of the lower animals.

I shall now try to give a general sketch of the changes which man effects in the animal kingdom, according to the different stages and forms of his own developement.

First, the wandering and savage tribes of *hunters* leave the surface of their habitats nearly in its original state, but cause a considerable destruction with reference to the herbivorous and carnivorous animals, upon which they draw for their subsistence, clothing, and *poor* comforts. However, as the old habitats of animals remain unaltered, the direct destruction will be almost imperceptible, provided the surface of the hunting district bear a large proportion to the population; (and that it almost invariably does, as the hardships and other circumstances of this mode of life, are unfavourable to the multiplication of the human species), as the consumption of game will be almost balanced by the conservation of it, in consequence of the destruction of animals of prey. Thus we find almost all those large tracts, where savage hunters roam in uncontrolled liberty, and kill animals only for their home consumption, well stocked with all the indigenous species of animals. Man, in this stage, is, in fact, little more, as to the point in question, than one of the natural elements of the animal kingdom, which keep each other in equilibrium.

As to the *nomadic* tribes, which wander with their herds or flocks over boundless tracts, they likewise leave the surface, which in itself is mostly of a comparatively little changeable nature, pretty much in its ancient condition. They have, however, substituted for the game, their tame animals, as a regular article of food; and if they indulge in hunting, it will be done, for the greater part, with a view of protecting their cattle from the inroads of the larger animals of prey. Still, they cannot make any great or lasting impression on the wild animals of a given district, particularly as most of the species lead the same vagrant life there, as man himself, and thus the first great step towards civiliatzion, if left uncomplicated, does not affect the animal kingdom in a very striking degree.

As soon, however, as man has made the second great step towards his own improvement, by engaging in *agricultural* pursuits, and becoming a fixed tenant of the ground, the relations of the lower animals to man are essentially changed, and they will be so the more thoroughly, as the developement of man in that stage becomes more perfect. Not only does the indirect influence of man, directly begin to work visible and lasting effects, but it is evident that the large herbivorous species ought to be exterminated, or greatly reduced in numbers, to prevent their depredations on the crops; and that the existence of the fierce carnivorous animals is incompatible with the security of the persons and live stock, in a cultivated district. Against them, therefore, a most determined war will be waged, on the very outset of agricultural pursuits; but the more regular mode of life of the settler will gradually involve the condition, or even the existence, of all the other animals, in the proportion as they are important to man, in every form of this stage of social developement.

If we take a hasty view of the influence which the different and principal forms of the social state of agricultural nations have exercised, or do still exercise, on the animal kingdom, we shall first find the *hierarchical* form of government to have effected a most decided and curious aspect of zoology, in many parts of the globe. The priests did not only set themselves forth as the supreme authority, in regulating the duties of man to God, or to man, but they took it also upon themselves to establish fixed laws about the behaviour of man to the inferior creatures; which, no doubt, operated, in some instances, well, as to the localities for which they were devised, but in others present the most uncalled for and censurable cases, in which the ministers of religion have meddled with human affairs, and substituted their own arbitrary and short-sighted views, for those which flow from an unprejudiced and enlightened consideration of the part which man is to act, with reference to the lower animals. The religion of the Hindoo nation, according to which it is sinful to kill any animal, from man down to the microscopic animalcule, produces, wherever it is in force, a most ridiculous encroachment of the animals on the rights of man; and, but for the indirect influence of the latter, and the order which nature keeps up, in spite of man, such countries must be almost uninhabitable by him. The peaceful co-existence of man with all the living creatures, has indeed something in it, that will please us at first sight; and many may admire the tame peacocks or fish in India, which latter are fed by the Hindoo watermen; but if we cast a look upon the hospitals for vermin, or consider that such a state of things can only be kept up by enslaving the human mind by pious fraud, and by rendering it unfit for the attainment of much higher ends, we cannot help condemning it, both in principle and practice. The ancient Egyptian priesthood thought proper to take a great many animals under their special protection, by casting round them the odour of sanctity; they did so in such a whimsical manner, that they promoted the multiplication as well of the most useful as the most injurious wild species; for instance, the ibis and the crocodile. Even the Mosaic law, by declaring many animals to be unclean, must have had a decided influence upon their numbers; and though we cannot see why eating the flesh of hares, rabbits, or ostriches, was deemed to be particularly unwholesome, even to the unclean people which the Jews appear to have been, about the time of Moses, yet we can even less conceive why the red Caffres, (Bichuanas), should have added to most of the animals unclean to the Jews, every species of fish, unless they were made to believe it was the law of the creator. The Roman hierarchy has not tried to enslave the human mind in that respect; though by eating, almost exclusively, fish, on many days, which is called fasting, the followers of that confession have vastly contributed to diminish the numbers, not only of many species of *Piscis*, (Linn.) but of other animals, as water fowl, the otter, beaver, which are classed with the fish by the infallible church.

In adverting to the worldly forms of government, as not complicated by the hierarchy, the pure *democratic*, where every wild animal is considered as *res nullius*, and merely awaiting the *primus occupans*, works as destructively with reference to the animals, as it does in every other respect.—Where a democratic population becomes at all numerous, every useful or interesting wild animal will be wantonly persecuted, by any individual, without any consideration to the season, or to the detriment which its extermination would cause, as to the more important interests, as well as the comforts or pleasure of all the other inhabitants; so that those species which hold out great temptations to him who takes possession of them, and to which the localities afford little natural protection, soon become extirpated; whereas others can only with difficulty stand their ground, in consequence of their own cunning, or faculties of adaptation, or the favourable chances which the locality in itself gives them.

The *aristocratic* form of government, on the other hand, if taking any great developement, will react against that general persecution of animals, in favor of such species as it may be the interest or pleasure of the privileged class to conserve, without taking notice of the rest; and thus create and perpetuate one of those public nuisances, which the aristocracy of every country have been guilty of starting and fostering.

The *monarchical* form, in its many modifications, from the most absolute despotism, up to that where the monarch sanctions and determines only what is considered to be the general will, or benefit of the nation, may act, in regulating the condition of the lower animals in a country, either as a perfect curse or blessing. Not but that any proportion of the merit or blame attaches to any particular modification of that form; a wise despot may do, within a few years, more to bring the condition of the animals in his dominions, into more perfect harmony with the interests of his subjects, than a constitutional king, crossed in his good intentions by a domineering party of his nation; but, on the other hand, a prince, more or less absolute in that respect, when it pleases him to favor certain species of animals, more than his subjects, may, within a very short time cause the latter to be hurt in their most vital interests by the former; whereas this is impossible if the power of the prince be duly limited. It is, therefore, not a quality inherent to any particular shade of monarchical government, to make the quickest strides towards a perfect equilibrium of the respective conditions of man and the lower animals; only what is quickly gained in the one, may be as quickly lost; and what is gradually gained in the other, may be gained for all times to come. A properly centralized state has also, in this particular, great advantages over one, where the local authorities are too independent, and may stand in the way of general improvement; whereas what is merely locally important, may be safely regulated by the local magistrates; and a large kingdom that is well *arrondi*, has a better chance of succeeding in regulating the condition of many species, than a small or scattered state. I might quote examples to prove all this, from times and countries quite at hand; but I should, by so doing, only anticipate what I shall have a better opportunity to say and to prove, in the paragraph at the end of this article, where I intend to consider the condition of a few particular species, in their different relations to man, in different countries.

*To be continued.*

Art. III. *Notes upon the Natural History of a portion of the South West of Scotland.* By William Thompson, Esq. F.L.S. &c.— Vice-President of the Natural History Society, of Belfast.

As, by the kindness of friends and correspondents, I have occasional opportunities of learning something of the Natural History of a portion of the South West of Scotland, I here bring together notices of a few of the most rare and interesting species that have thus come under my observation.

Bee-Eater. *Merops Apiaster*, Linn. Of this species, which has so rarely occurred in the British islands, I saw an individual in a recent state, that was shot on the 6th of Oct. 1832, by Capt. James McDowall, 2nd Life Guards, at his seat near the Mull of Galloway. It was sent to Belfast by my friend, Capt. Fayrer, R.N. to be preserved and set up for that gentleman.

Iceland Gull. *Larus Islandicus*, Edmonston. Being lately informed that a few rare gulls had appeared about Ballantrae, in Ayrshire, and which, after displaying for a season some interesting peculiarities of manner, had been shot, and one of them preserved; I embraced my informant's kind offer of bringing it from Scotland for my inspection, on his recent return to this country. It proved to be the Iceland Gull, (*L. Islandicus*, Linn.) in the stage of plumage, apparently, which immediately precedes maturity. A professional gentleman at Ballantrae, into whose possession this bird came, and by whom it was preserved, favoured me with the following particulars respecting it, in a letter dated October 26, 1837.— "At the end of last year, three gulls, of the same kind, made their appearance on the shore where the fishermen reside.— Two of them were shot in the spring, and the one you have, in June. As they frequented the fishing boats, the men used to supply them with fish; and in a short time they became quite familiar; took whatever was thrown to them, but would not allow themselves to be caught. They were never observed to go far from the place where they were first seen. The person who gave me this information, shot the two in the spring; and says that every winter one or more are seen on the coast. He cannot say where they breed, but is sure there are none on the Craig [of Ailsa]." This indifference to the near presence of man, on the part of these northern strangers, reminded me of that of the first *Larus Sabini*,—also a native of the arctic regions,—obtained on the British shores. (Mag. Zool. and Bot. v. i. p. 460). The month of June seems a late period for the Iceland Gull to remain in such a comparatively southern latitude; and there can hardly be a doubt that it is the same species which is seen about Ballantrae every winter, as the authority for the statement must evidently know it well from its congeners, when he correctly states that it breeds not on Ailsa Craig.

GANNET. *Sula Bassana*, Briss. Having heard from two friends, who had been grouse-shooting in the neighbourhood of Ballantrae, that they had seen great numbers of gannets lying in a state of decay, in holes on the beach, and which had been taken at extraordinary depths in the fishermen's nets; I made particular enquiry on the subject, from a worthy resident of my acquaintance, (who is postmaster, &c. in the village); and on the 15th November, 1836, received the following reply. "Gannets are very commonly caught about Ballantrae, (chiefly in the month of March), in the fishermen's nets, which are generally sunk from 9 to 20, but sometimes to the depth of 30 fathoms,* just as the fish, herrings &c. are lying. They are taken at all these depths, when the water is rough as well as smooth, and in both the cod and turbot nets, (respectively 5 and 7 inches wide in the mesh). Of the greatest quantity taken at one time, "John, son of old Alex. Coulter can make oath, that he took 94 gannets from one net, at a single haul, a few years ago. The net was about 60 fathoms long, a cod-net, wrought in a 5-inch scale. The birds brought up the net, with its sinkers and fish, to the top, where such as were not drowned, made a sad struggle to escape. There were four nets in this train; but the above 94 were in one of the nets, and there were 34 additional birds in the other part of the train, being 128 gannets in all." It is added that "there are found also in the nets, what are here called holland

* One hundred and eighty feet; there being 6 feet in a fathom.

hawks,† and burrians;‡—a holland hawk weighs 14lb—the bird called burrian, weighs 7 or 8 lb. and is speckled on the back like a starling, belly and breast pure white. Some others of the Ailsa birds are also got in the nets at all depths;—one is about the size of a pigeon,§ moves in the water with extended wings, always pushing his way forward, and thus gets drowned. Herrings are occasionally taken in the wide cod net, and also mackerel." Were these facts not amply attested, I must confess that I would be incredulous about the depths which the gannet sounds; but the information furnished in writing, the truth of which, it is stated, may be implicitly relied on, is precisely what was related to my friends, and the singularity of which prompted my enquiry. The vicinity of Ailsa Craig, the great breeding haunt of the gannet in this quarter, must be recollected, in connection with what is here related.

ANGLESEA MORRIS. *Leptocephalus Morrisii.* Early in the summer of 1837, Capt. Fayrer captured a specimen of this singular fish, in the harbour at Portpatrick. He remarks that "it appeared in an active state of health and vigour, sporting now and then on the surface, and as quickly descending." On account of its delicate organization, it was judiciously put in very weak preservative liquor, about one part only of common spirits, to four of water; and was thus kept by me for four months, without being injured as a specimen. It was almost equally transparent as it had been in its native element. When put in stronger liquid, for permanent preservation, it of course became discoloured, and more opaque. It is so buoyant as to float on the surface like a cork, and on the phial being reversed, as quickly attains this position. The specimen is 5½ inches in length; and in the spotting, differs from others described and figured. Distant 1¼ inch from the anterior extremity, small black dots appear on the lateral line, and continue to the tail; ¾ inch from the same part, a row of black dots, larger than those on the lateral line, commences, and extends, on each side, to within ¾ inch of the end of the tail; from where these terminate, the black is taken up by the base of the anal fin; every ray,—and they are here close together,—being spotted at the base. Not a spot appears on the dorsal ridge, nor anywhere but as here mentioned. The

† Great Northern Diver. *Colymbus glacialis*, Linn. "Allan-hawk" is applied to Divers, (*Colymbi*) generally, in Belfast Bay.

‡ Red-throated Diver. *Colymbus septentrionalis*, Linn.

§ Puffin. *Mormon Fratercula*, Temm. probably, judging from the size. The description of the manner of moving under water, would, perhaps, apply generally to diving birds.

*irides* are bright silver. I have elsewhere recorded a *Leptocephalus*, which was taken on the opposite coast of Downshire. (Zool. Proc. 1835, p. 82).

PURPLE OCEAN SHELL. *Ianthina communis*. A specimen of this shell, kindly forwarded for my inspection, by Captain Fayrer, in March, 1837, was one of about a dozen collected some time before, on the shore of Wigtonshire, by Lady Agnew, of Lochnaw Castle. About the 1st of August, 1836, this species was abundant in the vicinity of the Giant's Causeway; and on the 11th of this month, a few individuals were found by Dr. J. L. Drummond and myself, on the beach near Bangor, on the Down coast. I had never before known the *Ianthina* to be washed ashore in this county, but on the northern parts of Antrim, it was long since observed. Those obtained in Scotland were, in all probability, a portion of the same fleet that had thus touched at certain parts of the coast of Ireland.

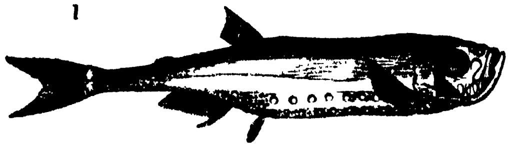
SEA LONG-WORM, (Borlase). *Nemertes Borlasii*, Cuv.—About the same time that the *Leptocephalus* was obtained, Capt. Fayrer got an individual of this species, holding on to a bait, (the "buckie," *Buccinum undatum*, Linn.) on his long line, when he was fishing for cod, off Portpatrick. Having put it in spirits, diluted with an equal portion of water, Capt. F. observes, "that the contortions of the poor animal were really horrible." Montagu mentions, that one about 8 feet long, which he "put alive into spirits, instantly contracted to about 1 foot, at the same time increasing to double the bulk, which originally was about the diameter of a crow-quill."—Linn. Trans. vol. vii. p. 73. Judging from this, the present specimen must have been very much larger, as in its present contracted state, it is about 3 feet in length, and from 1½ to 3½ lines in diameter. Its colour is as described by the author just quoted, "dusky brown, with a tinge of green, with five [several] faint longitudinal lines, of a paler colour." A few years ago, a specimen of the *Nemertes* about 12 feet in length, was taken on the opposite coast of Ireland, near the entrance of Strangford Lough, by my friend Mr. Hyndman, (Member Nat. Hist. Soc. of Belfast): in this instance it was found sheltered beneath a stone, at low water. This remarkable worm, the only species of the genus, I believe, yet discovered, has three generic appellations attached to it; being the *Lineus* of Sowerby, the *Borlasia* of Oken, and the *Nemertes* of Cuvier.

*Belfast, Nov. 2nd*, 1837.

ART. IV. *Notice of the fourth occurrence of the Argentine,* (? Scopelus Humboldtii, *Yarr.*) *upon the British Shores.* By DR. W. B. CLARKE. *With additional Remarks,* by W. YARRELL, Esq.

I BEG leave to transmit, for insertion in the Magazine of Natural History, a sketch and description of a species of Argentine, which I obtained upon the shore of the Firth of Forth, at Portobello, in April, 1833.

1



I discovered this highly elegant little fish, whilst looking amongst the various bodies cast up by the water, and observed it lying entangled in some sea-weed, which had been accumulated in masses, and left by the retiring tide. The fish was dead, but from its freshness could not long have been so.

In the Animal Kingdom of Cuvier, translated by Griffith, we have the following description of the genus.

*Scopelus*, Cuv. *Serpes* of Risso.

"Mouth and gills extremely cleft; the two jaws furnished with very small teeth: the edge of the upper entirely formed by the intermaxillaries: the tongue and palate smooth.— Their muzzle is very short and obtuse: there are nine or ten rays to the gills; and besides the usual dorsal, which corresponds to the interval of the ventrals, and the anal, there is another very small one behind, in which the vestiges of rays are perceptible."

"These fishes are caught in the Mediterranean, intermingled with the anchovies, and they are there called Melettes, as are other small fishes. One of them, the *Serpes Humboldtii*, Risso, pl. x. fig. 38, is remarkable for the brilliancy of the silvery points which are distributed along the body and tail."

Then in a note we have, "I believe this fish to be the pretended *Argentina Sphyræna* of Pennant's Brit. Zool. No. 156; therefore it should be found in our part of the Atlantic."

Besides the *Scopelus Humboldtii*, which probably is identical with the species under description, there are two other species, viz. *Serpes (Scopelus) crocodile*, Risso, p. 357; and *Serpes (Scopelus) balbo*, Id. Ac. des Sc. de Turin, tome xxv. pl. x. fig. 3.

Mr. Yarrell, in his invaluable work upon the British Fishes, states, "Pennant, and the Rev. Mr. Low, of Orkney, appear to be the only British observers who have met with, on our shores, examples of this brilliant little fish, which Cuvier considers as belonging to the genus *Scopelus*." "Pennant's specimen was taken in the sea near Downing, in Flintshire. Mr. Low's fish was brought to him by a boy, who said he found it by the edge of the water, amongst sea-weed. The receipt of an additional portion of M.S. recently confided to me by William Walcott, Esq. furnishes a notice, written by his father, of a third instance of the occurrence of the Argentine, which was found stranded on the shore, near Exmouth."

Pennant's description agrees, in many respects, with my fish; but as the *figure* contained in Mr. Yarrell's work, (which was taken from Pennant's), differs very materially about the head and tail, although it resembles it in the form of the body, I have sent an exact figure of my own specimen, to shew the precise form of the bones of the *opercula* and sides of the head; together with a full description: which may assist future observers in determining whether more than one species visits our shores. If Pennant's *figure* be an exact representation, the fish it was taken from was certainly a different species to the one under description.

Pennant describes his as follows; viz. "Length, two inches and a quarter: the eyes large, *irides* silvery; the lower jaw sloped much: the teeth small: body compressed, and of an equal depth almost to the anal fin: tail forked: back was of a dusky green: the sides and covers of the gills as if plaited with silver: the lateral line was in the middle, and quite straight: on each side of the belly was a row of circular punctures, above them another, which ceased near the vent."

My specimen would correspond with the above, except the following; viz. Length, 1 inch $\frac{5}{16}$: the back of a dense blue-black, presenting, in certain lights, a brownish tinge: lateral line central and straight, but inclining upwards, at about its anterior sixth, towards the upper angle of the *operculum*.

The number and arrangement of the *guttæ* in the specimen under consideration, are as follows; viz. On each side, upper series between *os hyoïdes* and origin of pectoral fin, five; upper abdominal series between base of pectoral and a spot perdendicularly over the ventral, nine; lower abdominal series, from a spot perpendicularly beneath the posterior margin of orbit, to base of ventral, twelve; between base of ventral and commencement of anal, six; the *two anterior* directed downwards and backwards; the *four posterior* forming an arch from a little above the second *gutta* to the commencement of the anal fin: one large *gutta*, in a line with the upper abdominal series, is placed slightly anterior, but above the commencement of the anal fin: between the anterior commencement of anal and base of caudal twenty-four; but between the eighth and ninth from the caudal fin, there is a space where a spot appears to have been obliterated.

About midway between the anterior commencement of the dorsal and base of caudal, but rather nearer the latter, there is a slight elevation, where, apparently, the fleshy fin has its origin; but in the specimen under description, it is scarcely perceptible, being, even with the aid of a lens, only like a slight membranous ridge.

The formula of the fin rays appears to be D. 9. P. 17. V. 8. A. 20. C. 18'
Mr. Yarrell's formula is......................D. 9. P. 17. V. 8. A. 15. C. 19'

Mr. Yarrell remarks, "the figure of this fish, referred to in Risso's work, represents the anal fin as containing many more rays than are represented in the figure by Pennant." The fish obtained by me possesses more anal rays than Pennant's would appear to have had, judging from the figure which he has published.

Length of head compared with whole length of fish, as one to four: diameter of eye to length of head, as one to three: first dorsal fin commences midway between end of nose and tail: depth of body to whole length of fish, as one to five and a half: nostrils double, situated in a depression midway between the eye and centre of intermaxillary bone. The *operculum* is extremely large, and appears to be developed at the expense of the *pre-operculum*, which is very small, and joins the former by a straight moveable suture, running in a line perpendicularly downwards, from the posterior margin of the orbit; it forms an obtuse-angled triangle, with the obtuse angle pointing downwards and backwards: the sub-orbital bone occupies nearly the anterior inferior half of the orbit, and is of a beautiful argenteous lustre, like the *operculum*. There are five oval spots, forming a fan-shaped figure, occupying the space between the anterior edge of the superior maxillary bone, and the anterior inferior angle of the *pre-operculum*, beneath the sub-orbital bone, and distinctly seen through the transparent intermaxillary bone, which is very large. There is one *gutta* upon the *pre-operculum*, at its anterior inferior angle, and the appearance of another at the anterior inferior angle of the *sub-operculum*: there is no appearance of branchiostegous rays whilst the *opercula* are closed.

The sides of this elegant little fish are of the most resplendent argenteous lustre; the *guttæ* are of a dense opaque white, and round their margin, especially along the sub-caudal series, there is a steel-blue tinge, giving that part of the body a very beautiful appearance. The upper abdominal series have an arched appearance, from this tinge not being continued round the inferior margin of the *guttæ*. The back of the specimen under description, which has been in spirits ever since its capture, is of a dense blue-black, presenting, in certain lights, a brownish tinge.

From specimens of this fish having been found in the above localities, viz.—in the sea near Flintshire, on the shore in Orkney, in Devonshire, and, lastly, in Edinburghshire, we may infer that it is generally, although sparingly, diffused through the British seas. Probably, ere long, we may hear of other examples of its occurrence upon our shores, or in our seas; for I am convinced, that from the admirable character of Mr. Yarrell's work, it will have the effect of exciting such an interest in the inhabitants of the boundless deep, that many interesting facts respecting the Ichthyology of our seas will soon be brought to light, which, but for such a publication, would have remained unrecorded, perhaps unnoticed.

*Ipswich, Nov. 2nd,* 1837.

[Upon the receipt of the above interesting notice from Dr. Clarke, we forwarded the MS. to Mr. Yarrell, who obligingly returned it with the following Letter. Ed.]

Dear Sir,

The various communications recently received by you and others, as well as by myself, on the subject of British Fishes, are to me so many gratifying testimonials of the increasing number of observers, whose attention is being directed to the Fauna of our seas; and I feel a sincere pleasure in the prospect of the many additions, and more correct illustrations, which our Ichthyology is likely to derive from the great interest now taken in this branch of Natural History.

The minute size of the fish renders it, I think, extremely probable, that the example obtained by Dr. Clarke at Portobello, the one noticed by the Rev. Mr. Low, as found in Orkney, and a third specimen taken still farther north, now preserved in the museum at Bergen, and described by Professor Nilsson, in his Prodromus, will eventually prove to be distinct as a species, from the examples found by Dr. Walcott, and Pennant, on our south coast, and in the west; the more so, because I learn from the Prince of Musignano, who is now in London, that the species of the genus *Scopelus*, or of genera very closely allied, are much more numerous than have hitherto been supposed. In a new History of the Fishes of the Mediterranean, written by the Prince of Musignano, which it is hoped will soon be put to press, no less than thirteen species are described, as inhabiting that sea. The extensive resources of this gentleman, and his great acquirements as a naturalist, cannot fail to render this intended publication equally interesting and valuable.

I am, Dear Sir,
Yours very truly,
Ryder St. Dec. 20, 1837. Wm. Yarrell.
*Editor of Mag. Nat. Hist.*

Art. V. *On Coptosoma, an anomalous genus of Heteropterous Insects.* By J. O. Westwood, Esq. F.L.S. &c.

The illustrious Swammerdam, long ago, remarked upon the great advantages to be derived from thoroughly investigating a single species, belonging to each of the great types of the insect tribes; whereby the student would be enabled to obtain a knowledge of the general structure of the entire class. No advice could be more philosophical, for no method could be devised, by which we can so completely master the difficulties attending the investigation of such an immense series of minute creatures. To know, for instance, that having made ourselves well acquainted with the cockchaffer, in all its peculiarities of organization, we have learned the general formation, in all probability of nearly 100,000 distinct species of Coleopterous insects, is in itself a sufficient ground for adopting Swammerdam's advice; but there is still another reason, which scarcely yields to the former, namely, that by instituting a comparative examination of the structure of any particular organ, throughout each of these chosen types, in conjunction with its varied uses, we are enabled to obtain more perfect physiological views of these tribes, than could possibly be obtained by studying any single species, in the utmost detail. We are in this manner more completely able to trace those modifications and apparent anomalies of structure, which so constantly meet us in our researches, to their true source, and to ascertain wherefore they have been given to the species. For example, having carefully studied a common white garden butterfly, and ascertained that its spiral tongue is composed of two distinct pieces, representing, in their situation, the *maxillæ* of beetles, and applicable for collecting the nectar of flowers, we at once, and in the most satisfactory manner, come to the conclusion, that the very elongated filaments which proceed from the mouth of the Coleopterous genus *Nemognatha*, are the real *maxillæ* of the beetle, notwithstanding their very attenuated form, and that their use must be analogous to that of the spiral tongue of the butterfly.

The anomaly in the genus which I propose to notice in this communication, consists in the peculiar structure of the upper wings, (or *hemelytra* as they have been termed by Messrs. Kirby and Spence, in the Heteropterous insects), of the species of which it is composed. A few general remarks upon the structure and functions of these organs will not be out of place.

In the order Coleoptera, the upper pair of wings is transformed into a pair of corneous cases, generally extending to the extremity of the body, and when unemployed, shutting closely together by a straight suture down the back. Thus united, they become a shield of great strength, defending the posterior pair of wings, which, when at rest, are *transversely* folded up beneath them, and which, when the insect is on the wing, are its only effective organs of flight. This lower pair of wings is membranous, and distended by corneous air-tubes. In the order Orthoptera, the anterior wings, when at rest, form a shield to the posterior wings, although much less effective than that of the beetles, since they are of a much more coriaceous texture; the posterior wings themselves are membranous, of a large size, and when at rest, they are *longitudinally* folded. During flight, both pairs of wings assist in locomotion. In the Neuropterous, and some other groups, the posterior pair of wings are not defended, when at rest, by the anterior, and they are consequently not folded up, as in the foregoing; whilst, in the Hymenoptera and Lepidoptera, the anterior wings are larger than the posterior, which are likewise never folded up. In these last tribes, all the wings are membranaceous. We thus see, that where the posterior wings take a large share in the act of flight, it is necessary that, being of a larger size, they should be folded up, and defended by more or less powerful wing-cases, while unemployed; when, on the other hand, the anterior wings take the largest share of active force during flight, the posterior are so much reduced, as to require no defence: in other words, where we find large and strong wing-cases or shields, the active organs of flight are membranous, large, and folded up.

On applying these principles to the Heteropterous insects, (Genera *Cimex*, *Nepa*, and *Notonecta* of Linnæus), we find that the organization of the wings differs from any of the groups mentioned above, yet their general functions may be most assimilated to those of the Orthoptera. The anterior wings are coriaceous throughout their basal half, and membranous throughout their apical portion; the posterior wings are of a moderate size, and when at rest folded longitudinally, and defended by the *hemelytra*, which are horizontally shut when at rest: the membranous portion of the one, folding upon the same part in the other, and extending only as far as the extremity of the body.

In the genus of Heteropterous insects now under consideration, the anomaly consists in having the *anterior* wings very much elongated, and, when at rest, *transversely* folded; a peculiarity hitherto unnoticed, and which exists, as far as I am aware, in no other group of insects. The posterior wings are also present, and of small size. The only *transverse* folding of the wings of any insects, occurs, as above stated, in the posterior wings of Coleopterous and in Forficuloideous insects; we will therefore enquire whether there be any circumstances shewing an analogy, as regards their functions, between them and the anterior wings of this Cimicoideous genus. The posterior wings of the Coleoptera are large and transversely folded, and it is consequently requisite for them to have a strong shield, which exists in the united horny wing-cases. In this genus, the anterior wings evidently perform the greatest share during flight, being so much enlarged as to require a transverse fold; they are, moreover, entirely membranous, thus rendering the existence of a shield doubly requisite, and for which purpose the *scutellum* is so much enlarged, as entirely to cover the abdomen, thus becoming, as to its functions, the analogue of the united corneous *elytra* of the beetle. As to the reason why these anterior wings should be so much enlarged in size, we have only to look at the peculiar shape of the body, which is short and almost triangular, instead of being oblong or oval, so that if these wings had retained their proportionate size, they would have been so short as to have been unable to support the massy body of the insect during flight.

The genus in question was first separated as a section of *Scutellera*, by Latreille, that genus being divided into three groups; the names of *Thyreocoris* and *Tetyra* having been previously respectively proposed by Schrank and Fabricius, for the genus *Scutellera*, in its undivided state. Dr. Leach subsequently gave Latreille's three divisions as genera, and applied to them, according to his usual irregular plan, the synonymical names of *Scutellera*, *Tetyra*, and *Thyreocoris*; the last of which is the subject of this memoir, having for its type the *Cimex globus* of Wolff, a small species, which, according to Stephens' Catalogue, has been found in this country.—Laporte subsequently, without adopting Leach's nomenclature, gave the *Cimex globus* as the type of a new genus, which he named *Coptosoma*, and characterized it by the *scutellum* being entire at the extremity, &c. &c. adding a second subgenus, under the name of *Platycephala*, which he particularly characterized from the very broad head, and the *scutellum* emarginate behind, in the middle. In the appendix to his treatise, however, he substituted the name of *Canopus* for that of *Platycephala*, on the authority of Griffith's Animal Kingdom, Insects, (pl. 92, fig. 2) where a species of this sub-genus is figured under the name of *Canopus punctatus*, of Leach; but as M. Lefebvre has more recently proved the incorrectness of this nomenclature, it would be proper to return to M. Laporte's previous name, had it not been long previously employed by Mergen, for a genus of Dipterous insects. Under these circumstances I beg leave to propose for this broad-headed division, the sub-generic name of *Plataspis*, a name which I had long ago given to the entire genus, in a memoir prepared upon it, for the Zoological Journal.

Hahn subsequently published the *Cimex globus* in his work on the *Cimicidæ*, under the generic name of *Globocoris*, accompanied by a very inaccurate series of outline dissections. Boisduval also figured another broad-headed species, in the Voyage de l'Astrolabe, under the generic name of *Brachyplatys*. Burmeister, on the other hand, in the second volume of his Handbuch, restored Schrank's name, *Thyreocoris*, to the genus, as improperly applied by Leach; for which reason I consider it will be most just to adopt Laporte's name, *Coptosoma*.

The last-named author has, however, erred, in giving the entire or notched extremity of the *scutellum*, as the character of the two sub-genera of which the genus is composed; since it is another unnoticed peculiarity in both sub-genera, that in the males, the *scutellum* is deeply notched, whilst it is entire in the females. In addition to the other characters given by Laporte, it may be mentioned, that *Plataspis* differs from *Coptosoma* in the form of the terminal ventral segment, which is of a triangular form in both sexes; and in the posterior

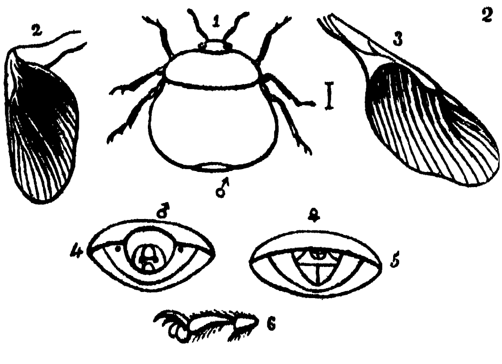



Fig. 2 No. 1 represents *Coptosoma globus*, male, magnified. 2. Anterior wing folded. 3. Ditto unfolded. 4. Extremity of scutellum and abdomen of the male. 5. Ditto of female. 6. Posterior tarsi of male.

terior *tarsi* of the males, having the basal joint as long as the terminal. Moreover, although the genus certainly belongs to the *Scutelleridæ*, I have not been able to discover more than two joints in the *tarsi*.

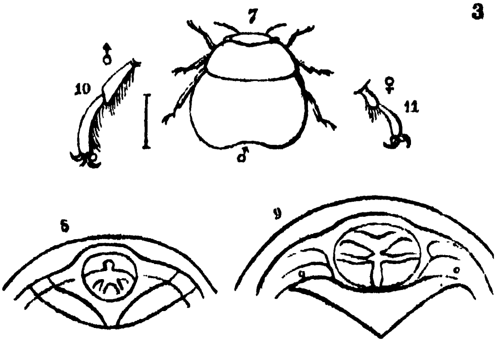



Fig. 3. No. 7. *Plataspis nigriventris*, magnified, (Java). 8. Extremity of the scutellum and abdomen of male. 9. Ditto of female. 10. Posterior tarsi of male. 11. Do. of female.

ART. VI. *Contributions to South African Zoology.* By ANDREW SMITH, M.D. Surgeon to the Forces.

No. I.

WHILST lately engaged in examining the saurian reptiles of South Africa, I found amongst them nine species referrible to the genus *Cordylus*, of Gronovius; and as only one of them appears to be distinctly described, I here propose to characterise the remaining eight species; not, however, without a suspicion, that some of them, at least, may have already been indicated by Schlegel, in his Monograph of the genus *Cordylus*, which I have not been able to consult. All the species belong decidedly to the same genus; at least, their general configuration and anatomical characters, place them together: yet there are modifications presented by some, which may render it desirable to arrange them for the present, in sections, or sub-genera. The characters common to all, may be indicated as those of the genus; and the peculiarities common to certain of the species, as those of the sections, or subgenera.

Genus *CORDYLUS*, Gronov.

*Head* broader than the neck, somewhat triangular, square behind, the temples bulging, above it is covered with thin plates, five of which form a distinct square upon the *occiput*. *Teeth* small, cylindrical, closely set, and disposed in a groove, around the inner surface of both jaws; those about half way between the nose and angle of the mouth, generally the largest.—*Tongue* short, its apex emarginate. *Ears* partially concealed by the hinder edges of the temples. *Scales* of the back and belly disposed in transverse rows; those of the tail, in spinous rings. *Femoral pores* distinct, and arranged in one or two rows.

A. *Scales forming the transverse rows contiguous or over-lapping, of a squarish form, and smooth or carinated; sides of the neck armed with projecting spinous scales; most of the scales of the tail carinated, and many of them, particularly those on the sides, terminated by strong sharp spines; femoral pores in one row, and in the male only.* CORDYLUS.

C. *griseus*, Seba. Back with about 26 transverse rows of quadrangular scales, the latter smooth towards the dorsal line, but, on the sides, carinated. Anterior edge of ear concealed by two or three slightly projecting semicircular horny scales. Above, colour brown, or brownish black, below, light brown. The back, in many individuals, is variegated with irregular black or light reddish brown spots, and in some there is a reddish brown line, following the course of the spine. Femoral pores generally 7 on each side. Length from 6 to 8 inches.

C. *polyzonus*. Back crossed by about 40 bands of quadrangular scales, the latter smooth, except on the sides, where they are slightly carinated.—Anterior margin of ear covered by several thick, projecting, pointed scales, the lowermost of which is largest. Temporal scales slightly carinated, and each with a faint aculeus. Above, brown or black, sometimes brown variegated with spots of a darker or lighter tint; below, livid brown; on each side of the neck, immediately behind the ear, an oblong black blotch. Femoral pores 12 on each side. Length, from 8 to 10 inches.

C. *nebulosus*. Back with about 16 transverse rows of quadrangular scales, the latter smooth on the middle of the back, but strongly carinated and spinous on the sides. Ears defended by four large projecting scales. Sides of neck armed with strong spinous scales, directed outwards. Temples very prominent, thereby giving a great breadth to the hinder part of the head. Scales of the tail terminating in very strong spines. Colour above, brown, below, yellowish brown, clouded with black spots and stripes. Length, from 6 to 8 inches.

The diagnostic characters of the foregoing species are numerous. They may all be readily distinguished, simply by reckoning the rows of scales, which are nearly uniform in the individuals of each species; but should this not be considered sufficient, other discrepancies will easily be discovered. On comparing specimens of *Cordylus griseus* and *C. polyzonus*, it will be found that the rows of scales are much narrower in the latter than in the former, and that the scales of the tail in *polyzonus* are never so strongly armed as in *griseus;* besides, the latter never attains to the same size as the former, nor does it ever exhibit the oblong black blotch, which occurs on the side of the neck of *polyzonus*. *C. nebulosus* is again easily to be distinguished from both the last, by the breadth of its hind head, the great size of its scales, their superior strength, and the very strong and lengthened spines, with which the greater portion of the tail is armed. The black variegations upon the chin, throat, and belly, are also peculiar to it.

B. *Back covered by transverse rows of contiguous or over-lapping scales; sides by small tubercular or granular scales; sides of the neck with a fold of loose skin, which, as well as the parts surrounding it, is covered with granular scales.* HEMICORDYLUS.

H. *Capensis.* Scales of the back quadrangular and carinated; the number of transverse rows considerable, but from their being indistinct on the back of the neck, where the granular scales abound, it is not possible to reckon them with any certainty. About the middle of each side, a longitudinal row of large scales amongst the granular ones. Scales of tail with moderate spines. Belly with 8 longitudinal rows of square plates. Femoral pores, 18. Colour above, dirty black, beneath, livid blue black. Length 7½ inches.

This is the only species I have yet seen, which well belongs to this section; and the only specimen of the species which I have had an opportunity of examining, is contained in the Museum of the Army Medical Department, whither it was sent, from the Cape of Good Hope, by Assistant Surgeon Forde, of the 72nd Regiment. By its peculiar scales, it is at once to be distinguished from the species of the foregoing section. The mixed character of the scales on the sides, points out its close connection with the species of the next section.

C. *Scales of the back and sides disposed in transverse rows, somewhat circular in form, and those of each row more or less separated by the intervention of small granular scales. Neck with two folds of loose skin, and by the mode in which they are disposed generally give rise to triangular depressions behind the ears. Femoral pores in two rows, most distinct in the male.*—PSEUDOCORDYLUS.

P. *montanus.* Scales forming the transverse rows small, somewhat ovate and faintly carinated; those on the sides largest; scales of tail with moderate sized spines. Colour above, brown or blackish brown, and transversely divided at nearly equal distances by 7 or 8 interrupted yellowish bands; below, yellow or orange, with tints of red; legs variegated by transverse yellow bands; tail irregularly marked, black and yellow. Femoral pores 8 in the last, and 4 or 5 in the first row. Length, from 10 to 13 inches.

P. *fasciatus.* Scales forming the transverse rows rather closely set, somewhat circular, and with elevated discs. Anterior margin of ear concealed by three projecting horny scales, the lowest being largest. Colour above, brown-black, variegated by 7 or 8 transverse rows of dirty white spots, 2 of which rows cross the back of the neck; beneath, light livid brown. Seven femoral pores in the last row, and 4 or 5 in the first. Length, from 8 to 10 inches.

P. *melanotus.* Scales circular and small along the middle of the back, on the sides larger and somewhat ovate, each with a faint carina, ending in a rudimentary spine. Colour above, black, sides and belly orange yellow, tinted with vermilion red. On each side of the neck two large black spots. Ten femoral pores in the last row, and 8 in the first. Length, from 12 to 14 inches. The female has the back freely variegated with short yellowish stripes.

P. *Algoensis.* Scales forming the transverse rows, sub-ovate, each with an elevated disc, and a faint carina; those towards the dorsal line smallest. Colour above, reddish brown, crossed by some imperfect yellow bands in the male, and by 6 or 7 rows of yellow spots in the female; sides and belly orange yellow, tinted with vermilion red; two large black spots on each side of the neck. From 7 to 9 femoral pores in the last row, and 4 in the first. Length, from 14 to 16 inches.

P. *sub-viridis*. Scales of transverse rows smallest towards the dorsal line, where they are of a somewhat circular form; on the sides they are larger, and inclined to a triangular shape, with elevated discs, and each faintly carinated. Colour above, blue green, the back freely variegated with faint longitudinal short whitish streaks, beneath greenish brown. Length 10 inches.

There is a considerable resemblance between the two first species of this section, but they will easily be distinguished by a regard to the character of the scales. In *montanus* they are carinated; whilst in *fasciatus* they have elevated discs, without any appearance of carinæ.

## Art. VII. *On the generic characters of Cartilaginous Fishes, with Descriptions of new genera.* By Professor J. Muller and Dr. Henle.

The confusion which still exists in the natural history of cartilaginous fishes, may be attributed to the generally imperfect descriptions which have been given of the species, and also to the circumstance of the most important generic characters having been, in many instances, either overlooked or not sufficiently appreciated. In searching for characters by which the genera and species might be distinguished with more accuracy than had been previously done, we found ourselves compelled to enlarge the number of genera and subgenera hitherto established; but, at the same time, we most carefully avoided making these additions, unless very essential differences rendered their establishment necessary. Such are, in the order of *Sharks*, the system of dentition, the form of the nose, of the mouth, and lips, and of the caudal fin; the existence or want of the eyelid, (*membrana nictitans*) spiracles, and of the small depression or dimple on the root of the tail; the situation of the branchial openings, and of the dorsal fins; and in the order of *Skates*, the form of the nasal valve, and of the membranaceous curtain behind the teeth, (*velum maxillare*) the number and si-

* We regard this communication as an extremely valuable one, from the very extensive materials to which the authors have had access, in drawing up the arrangement of so highly interesting an order of vertebrate animals as the Cartilaginous Fishes. Prof. Müller and Dr. Henle have just returned to Berlin, after spending some months in this country; during which they visited the different Museums of Natural History, besides having the use of Dr. Andrew Smith's extensive collection of Sharks from the Cape; the result of their investigations, up to the present time, is embodied in this paper. The Article is in Dr. Henle's own English, with a few revisions. Ed.

tuation of the fins, and the shape of the teeth; only in the genus *Raia* this last character is uncertain, the teeth changing here with the age and sex, so as to be a character which cannot be depended upon, even in the distinction of species. The same may be said, to a certain extent, of the scales of the skin, and the shape of the snout. Fortunately, in a collection of Sicilian fishes, presented by Dr. Schultz to our anatomical museum, and in the admirable manner in which they are arranged, we possess the means of comparing a great number of individuals of the same species, whereby we are enabled to determine the limits of individual differences.

The most important character by which the great order of Skates, (*Raiæ*) differs from that of the Sharks, (*Squali*), is the existence of a peculiar cartilage arising from the nasal part of the skull, and extending toward, or even meeting, the anterior part of the crest of the pectoral fin. This cartilage is found in all the Skates, and also in *Rhinobatus* and *Pristis;* whereas there is no trace of it in any Shark.

At the head of the order of Sharks we place the family of the *Scyllia*, of which the following characters may be given.

Fam. *SCYLLIUM.*

An anal and two dorsal fins; the first dorsal placed behind or opposite, but never before the abdominal fins. The spiracles are distinct in all, and pretty large in most of them. The eye-lid, (*membrana nictitans*) is wanting.

The distinction of Cuvier, which is taken from the distance between the mouth and nostrils, is not sufficient, as it is a difference only of degree. We confine the name *Scyllium* to such Sharks of this family as have the anal fin placed nearer to the head than the second dorsal fin. (11 species.)

Gen. *Pristiurus*, Bonap.

Differs from *Scyllium* only by its long snout, and by a series of larger scales, arranged like a saw, on the upper edge of the tail. (1 sp.)

*Chiloscyllium*, Nobis.

Anal fin placed farther back than the second dorsal, and the last branchial opening approximating to the fourth. The characteristic mark of this genus is the broad, membranaceous under lip, separated from the skin of the throat by a kind of furrow. The upper nasal valve bears a *cirrhus*. (4 sp.)

*Hemiscyllium*, Nob.

Situation of the fins is as in the preceding genus; the nose and mouth as in *Scyllium*. (1 sp.)

*Crossorhinus*, Nob.

Remarkable for a great number of small membranaceous lobules, situated between the nostrils, and the first branchial opening. The mouth is nearly at the top of the head. The two dorsal fins are placed towards the posterior end of the animal; the first of them being situated above, and a little behind, the abdominal fins. (1 sp. the *Squalus lobatus*, *Bl. Schn.*)

*Ginglymostoma*, Nob.

Has small spiracles, the two last branchial openings approximating to each other. The first dorsal fin above the abdominal ones; the second dorsal fin opposite to the anal. In adult specimens, the inferior part of the fold bordering the corners of the mouth, is distinctly separated from the skin of the lower jaw, by a perpendicular furrow. (1 sp.)

*Stegostoma*, Nob.

The first dorsal fin begins a little before the abdominal ones, standing, for the greater part, opposite to this. The branchial openings are as in *Chiloscyllium*. A large and thick wreath or rim conceals the upper jaw and the opening of the mouth, which is placed transversely: the nasal valves are reduced to lateral edges of this wreath. (1 sp. *Squalus fasciatus*, *Bl. Schn.* 3 var.)

All the *Scyllia* have the teeth small, pointed, with one or two, or more, lateral denticles en each side. In *Stegostoma* they are like trifid leaves; in *Ginglymostoma* the number of the lateral denticles increases to four on each side. To this group belong, as it seems, all the oviparous Sharks. All of them, whose anatomy we are acquainted with, have the valve of the intestine in the form of a spiral.

The Sharks of the second division possess, like the *Scyllia*, an anal and two dorsal fins, and five branchial openings; but their first dorsal fin is always placed between the pectoral and abdominal fins. They may be divided in the following manner.

A large group is distinguished by a *membrana nictitans*, by the situation of the second dorsal fin, which is opposite to the anal one, and by the situation of the branchial openings, the last, or two last of them being always placed above the base of the pectoral fins. We distribute them in two divisions, characterized by the presence or absence of spiracles; and we make subdivisions according to the form of the teeth.

A. *Without spiracles.*

*a* *Teeth flat, sharp, the edges serrated or smooth*

1. *Carcharias.* Their flat and sharp teeth are serrated on each side, either in the upper jaw only, or in both. Spiracles are never met with in the adult specimens, though the rudiments of these organs may be observed in the fœtus of a few species. (20 sp.)
2. *Scoliodon*, Nob. differs only by the teeth being of the same shape in the upper and lower jaw; viz. the points directed towards the corner of the mouth, with a smooth edge, and a truncated protuberance, either smooth or indented, on the exterior side of the base.—(5 sp.)
3. *Zygæna;* the generic characters of which we need not repeat. Teeth as in *Scoliodon*, but in the adult specimens distinctly serrated.—(3 sp.)

These three genera have the valve of the intestine longitudinal and rolled; an incision near the extremity of the elongated upper lobe of the caudal fin, and a small dimple at the root of this fin. It seems that there exist Sharks, very nearly related to *Carcharias*, but wanting this dimple, a character which would of itself constitute a genus.

*b. Teeth pointed, with lateral denticles, like the teeth of Scyllium.*

1. *Triaenodon*, Nob. On each side of the teeth there is a denticle, which on the exterior side of most of those in the lower jaw is double.—Caudal fin as in *Carcharias*, with a dimple at the root. (1 sp.)
2. *Leptocharias*, Andr. Smith. Teeth numerous, one or two lateral denticles on each side. The dimple near the caudal fin wanting, and the inferior lobe of the fin scarcely indicated. The nasal valve elongated into a *cirrhus*. (1 sp.)

We are as yet unacquainted with the valves of the intestine in these two genera.

B. *Possessing spiracles.*

*a. Teeth flat, sharp, serrated or not serrated.*

1. *Galeocerdo*, Nob. Teeth strongly serrated on the exterior edge, finely on the interior. Spiracles small. A dimple on the root of the tail: the upper lobe of the caudal fin elongated, with two incisions.—Valve of the intestine as in *Carcharias*. (2 sp.)
2. *Loxodon*, Nob. Teeth without serrature, as in *Scoliodon* Spiracles very small. Valve of intestine, dimple of the tail, and caudal fin as in the preceding genus, but the upper lobe of that fin with only one incision. (1 sp.)
3. *Galeus*. Teeth, in both jaws, serrated on the exterior edge, inclined outwardly. Tail as in *Carcharias*, but wanting the dimple. Valve of intestine in a spiral. (1 sp.)

*b. Teeth pointed, as in Scyllium.*

*Triakis*, Nob. Teeth as in *Triaenodon*. Dimple of the tail wanting; the inferior lobe of the caudal fin not distinct. (1 sp.)

*c. Teeth pavement-like, or presenting a general continuity of surface, as in the Skates.*

*Mustelus*. Spiracles large. Inferior lobe of the caudal fin very short. *Membrana nictitans* only rudimental. Valve of intestine in a spiral. (1 sp. 3 var.)

In none of the following genera is there any trace of a *membrana nictitans*.

The *Lamnoidea* form the second group, of which the following characters may be given.

## Fam. *LAMNOIDEA*.

Branchial openings large, all situated before the pectoral fins. Spiracles small. Caudal fin in the form of a crescent, with a lateral keel and a distinct dimple, and the small anal and second dorsal fins opposite each other.

1. *Lamna*. Head pointed, conic; spiracles extremely small, discovered by Dr. Smith; teeth long, pointed, with two lateral denticles, indistinct or wanting in young individuals. The third, sometimes also the fourth or fifth tooth of the upper jaw is smaller than the rest. (2 sp.)
2. *Oxyrrhina*, Agass. Teeth long and thick, like nails, without lateral denticles, the anterior ones introverted; the third tooth of the upper jaw is small and short. (2 sp.)

* This Shark is the *Lamia* of Rondelet, and seems to be the *Carcharias verus* of Agassiz.

3. *Carcharodon*, Smith. Teeth as in *Carcharis*, serrated on both edges The third tooth of the upper jaw smaller. (1 sp.)*
4. *Selache*. Teeth very small, narrow, conic, numerous. Snout short. (1 sp.)
5. *Rineodon*, Smith. Teeth exceedingly small, pointed. Mouth on the top of the snout.

The valve of the intestine seems to form a spiral in all the *Lamnoidea*; there is only *Carcharodon* and *Oxyrrhina* in which we cannot be sure of this point, because we have had no opportunity of dissecting them.

*Berlin, Dec.* 12. *To be continued.*

ART. VIII. *Remarks on the species of the genus Mustela.* By CHARLES L. BONAPARTE, Prince of Musignano.* Communicated by the Author.

IN all English zoological publications, we find two American species noticed, with more or less certainty, under the names of *Mustela vulgaris* and *M. erminea*.

During my stay in the United States, I only saw a small species of *Mustela*, very common throughout the Union, which all the naturalists at that time considered as the *M. vulgaris*. I at once perceived that it was not that European animal, and that it approached more to the *M. erminea*. From that remark of mine the name was changed, as, for example, in Dr. Godman's Natural History.

I have since, in my Iconography of the Italian Fauna, speaking of the new *M. boccamela*, taken an opportunity of revising the group *Mustela*, and of distinguishing the American under the name of *M. Cigognanii;* as it is intermediate between the two European species. I believed, (not to speak of the American authors, who have only studied nature in European books), that the American *M. vulgaris* and *M. erminea*, had both been founded on this species; I have now found two American species the true representatives of *erminea*. For these I shall now propose a name; and as my observations on the genus may not be known in England, I shall give a short compendium of my labours.

The genus *Mustela*, as may be seen at length in the work quoted, is by me divided into four genera; *Zorilla*, *Martes*, (the *Mustela* of Cuv.) *Putorius*, (*Putorii* pars, Cuv.) and *Mustela*, (*Putorii* pars, Cuv.) Of the necessity of retaining the classical name of *Mustela* to these small slender-tailed species, every one acquainted with Latinity cannot have a doubt.

The following are the species of the genus, as I have restricted it.

* Read at the Zoological Society.

1. *Mustela erminea*, Linn. Europe.
2. *Mustela Cicognanii*, Nob. North America.
3. *Mustela boccamela*, Nob. Sardinia.
4. *Mustela vulgaris*, Linn. Europe.
5. *Mustela Richardsonii*, Nob. (*M. erminea*, Rich. F. Bor. Amer.) North America.
6. *Mustela longicauda*, Nob. (*M. erminea*, Rich. F. Bor. Amer.) North America.
7. *Mustela frenata*, Licht. A beautiful species from Mexico.

One of the new species is named after Dr. Richardson, the author of the truly excellent Fauna Boreali Americana, who has done so much for American Zoology. As to the shorter tailed American species, it was a source of great gratification to me to be able, in a book published in Rome, to pay, by naming after him an American animal, a compliment to an accomplished and most esteemed friend; who, for upwards of fourteen years had served, in diplomatic and commercial concerns, with mutual satisfaction, two countries, separated by such an immense distance, and so different in their institutions, as the Roman and United States of America. My object was, I must confess, that the good Americans, (alien I am sure from proverbial republican ingratitude), should have constantly under their eye, this very common little animal, as the perpetual memorial of the worthy individual after whom I have named it.

ART. XI. *Catalogue of the rarer indigenous Plants growing in the neighbourhood of Tring.* By RICHARD CHAMBERS, Esq. F.L.S. &c.

THE town of Tring is situated on the western extremity of the county of Herts, on the borders of Buckinghamshire; which, lying on the great chalk formation, that extends, with but little interruption, from Cromer, in Norfolk, to the Isle of Purbeck, in Dorsetshire, renders the neighbourhood highly favourable for our rarer plants, particularly the *Orchideæ*.— Thinking that every addition to our botanical localities would be acceptable to those who read

"Sermons in *flowers*, and good in every thing,"

I have given a list of the rarer phænogamous plants, which I have met with in my various rambles through this interesting district.

*Dipsacus pilosus*. Beech woods near Buckland Common. From five to six feet high.

*Asperula cynanchica*. Chalky meadows around Tring.

*Alchemilla vulgaris*. Abundant in the beech woods south west of Tring. Extremely luxuriant, being frequently more than two feet high.

*Atropa Belladonna*. Copse on the road from London, within a mile of Tring.

*Vinca major.* Hedge-banks; Barley End, near Ashridge.
*Gentiana verna.* Chalky meadows between Tring and Aston Clinton.
*Convallaria multiflora.* Beech woods above Aston Hill.
*Chlora perfoliata.* Chalk banks; road-side between Tring and Aston Clinton.
*Paris quadrifolia.* Abundant in the woods near Albury, on the borders of Northchurch Common.
*Monotropa Hypopitys.* Beech woods above Aston Hill.
*Pyrola minor.* Woods south west of Tring, in abundance.
*Rubus idæus.* Beech woods around Tring.
*Fragaria elatior.* Woods near Wigginton Common.
*Aquilegia vulgaris.* Hedges and woods near the Aylesbury road.
*Anemone Pulsatilla.* Most abundant on the chalky downs between Tring and Aldbury
*Melampyrum cristatum.* Wood near Northchurch Common.
*Antirrhinum minus.* Hilly meadows under the beech woods.
*Turritis hirsuta.* Woody glen at the bottom of Aston Hill.
*Vicia sylvatica.* Beech woods above Aston Hill, festooning the trees in the utmost luxuriance.
*Hippocrepis comosa.* Road-sides; most abundant.
*Prenanthes muralis.* Beech woods west of Tring.
*Cineraria integrifolia.* Abundant on the downs to the north of Tring.
*Epipactis grandiflora.* ——— *latifolia.* ——— *Nidus avis.* } Beech woods around Tring.
*Habenaria viridis.* *Herminium monorchis.* } Chalky meadows at Barley End, near Ashridge.
*Ophrys muscifera.* Borders of meadows and woods near Tring Park.
——— *apifera.* Meadows between Wigginton and the London road.
*Orchis conopsea.* ———*pyramidalis.* } Very luxuriant and abundant on all the chalk banks by Tring, Aston Clinton, and Ivinghoe.
———*ustulata.* Chalk banks at the bottom of Aston Hill, and on the downs between Tring and Ivinghoe Hill.
———*militaris.* Chalk banks bordering on the beech woods to the west of Tring. As this splendid *Orchis* has been frequently confounded with the *Orchis fusca*, and the *O. tephrosanthos*, I have given a figure of each, by which I think it will be readily distinguished from its congeners.

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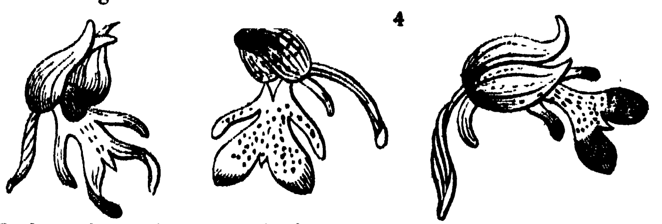


*Orchis tephrosanthos.* *O. fusca.* *O. militaris.*

A few years since the *Orchis militaris* was found in great abundance in many places around Tring, particularly in the hilly meadows which intersect the beech woods to the south west of the town; but now it is as rare as it was formerly abundant. And it is to be regretted that the avidity of collectors has nearly extirpated some of our rarest plants. The *Cypripedium Calceolus*, once common near Ingleborough, in Yorkshire, is now hardly ever met with; and such is the fate of the *Orchis militaris*. How desirable is it, that botanists should bear in mind the christian advice of the late Mr. James Dickson, that "if they found but four or five specimens of a plant, only to take one; ever recollecting, that there are other botanists, equally eager as themselves, to collect a specimen." Instead of following this golden rule, many seem to consider quantity as the only criterion of botanical knowledge; and sorry am I to say, that the students of some of our public institutions have adopted this erroneous and selfish opinion.—It gives me great pain to be compelled to make these remarks, but when I see these wholesale collectors, after a day's herbarising, laden with bundles and baskets, full of our rarer plants, like a regiment of botanical pedlars, I cannot help, for the sake of the present as well as future botanists, urging them to bear in mind the beautiful precept of doing as they would be done by; and also reminding them, that true liberty does not consist in doing what we please,—but, *in doing what we please without injuring another.*

*London, Dec. 10th*, 1837.

ART. X. *A Notice of the Remains of Vertebrated Animals occurring in the Tertiary Beds of Norfolk and Suffolk.* By EDWARD CHARLESWORTH, F.G.S. &c.

(From the Sixth Report of the British Association for the Advancement of Science.)*

THE author brings forward this paper, principally with a view to substantiate the fact, that some of the marine fossiliferous deposits on the eastern coast of England, belonging to the *tertiary* epoch, contain the remains of extinct and existing species of terrestrial Mammalia, clearly contemporaneous with the shells and other organic bodies in association with them.

In 1835 the author described a newly-discovered bed of fossils,† separating the crag from the London clay, at various localities in Suffolk, which he proposed to call "Coralline Crag," suggesting, at the same time, the term "*Red Crag*," as an appropriate designation for the overlying ferruginous

* The geological relations of the crag fossils described in the New Series of the Mag. Nat. Hist. will be readily understood by a reference to the present article. ED.

† See London and Edinburgh Philosophical Magazine, August, 1835.

shelly strata with which geologists were already familiar.—Never having detected the remains of mammalia in either of the above-named deposits, and believing that the crag of Norfolk was merely an extension of the upper or red crag of Suffolk, the author, in common with Professor Phillips, and some other geological writers, had thrown doubts upon the existence of the bones of elephants and other land animals, in the tertiary beds of the former county, believing that their supposed occurrence probably originated in the erroneous identification of diluvium with crag; the extremely superficial character of the latter, and the abrasion to which it has, in some places, been exposed, rendering a precise separation of the two a matter, sometimes, of considerable difficulty.

A recent examination, however, of Norfolk, has produced a total change in the opinions previously entertained by the author upon this subject; for he finds that not only are the bones of land animals constantly found in the so-called "*crag*" of that county, but that they are of most frequent occurrence in those particular beds which furnish the strongest evidence of tranquil deposition; and further, the bones strictly belonging to these beds of marine origin, can be at once distinguished from those of the overlying diluvial or lacustrine deposits, by the peculiar chemical change which the former have undergone. The list of mammalia enumerated by the author, as belonging to the tertiary period, include six or eight species of *Rodentia* and *Ruminantia*, one of the genus *Lutra*, besides teeth of the elephant, hippopotamus, and mastodon. Dr. William Smith was the first who announced the discovery of the mastodon in our own country; and though geologists have generally refused to place it on the list of British fossil *Pachydermata*, the existence of this genus has recently been most completely established by the researches of Mr. Robert Fitch and Mr. Samuel Woodward, of Norwich, and Captain Alexander, of Yarmouth.

The author, in the next place, proceeds to discuss the relation which this mammiferous stratum bears to the two tertiary deposits of the adjoining county, and shews that is not, as he had anticipated, an extension of the red crag of Suffolk, but a deposit altogether distinct from it and the coralline, differing essentially from both, in the number and nature of its organic contents. Its geographical limits are not confined to Norfolk, since it may be traced from Norwich, to Aldeburgh in Suffolk, overlying some part of the coral reefs in that most interesting locality. It may be most advantageously examined in the immediate neighbourhood of Norwich, at Southwold, and on Thorp Common, near Aldeburgh. This stratum, as regards relative age, may be looked upon as holding a station intermediate to the red crag, and those deposits in which the testaceous remains appear to belong, almost exclusively, to existing species of *mollusca*.

The beds above the chalk in Norfolk, Suffolk, and Essex, may be grouped into two sections, determined by the presence of terrestrial mammalia throughout a part of the series, which in descending order will be as follows.—

A. *Beds furnishing remains of Terrestrial Mammalia*

1. Superficial gravel, containing bones of land animals, probably washed out of stratified deposits.
2. Superficial marine deposits of clay, sand, &c. in which the shells, very few in number, (10 or 15 species), may all be identified with such as are now existing.

*Examples.*—Brick earth of the Nar, Norfolk.

3. Fluviatile and lacustrine deposits, containing a considerable number of land and fresh-water shells, with a small proportion of extinct species. (Mammalian remains in great abundance.)

*Localities.*—Ilford, Copford, and Grays, in Essex; Stutton in Suffolk.

4. Mammiferous crag of Norfolk and Suffolk, hitherto confounded with red crag, containing about eighty species of shells; proportion of extinct species undecided.

*Localities.*—Bramerton, near Norwich; Southwold, and Thorp, in Suffolk.

B. *Beds in which no traces of Terrestrial Mammalia have yet been observed.*

1. Red crag, containing 150 to 200 species of shells; proportion of extinct species undetermined.

*Localities.*—Walton and Dovercourt, Essex; Felixstow, Newbourne, and Bawdesey, Suffolk.

2. Coralline crag, containing 300 to 400 species of shells; proportion of extinct species undetermined.

*Localities.*—Ramsholt, Sutton, Tattingstone, (beneath red crag), Aldeburgh, Orford.

3. London clay.
4. Plastic clay.

The author next adverts to the remains of birds, which he has recently obtained, on several occasions, in the mammiferous stratum of crag. The bones, principally belonging to the *phalanges*, have not yet been minutely compared with the corresponding portions of skeletons of existing species. These remains occur at Southwold, and have undergone the same chemical change as the bones of mammalia.

No remains which can be satisfactorily referred to the *Reptilia*, have been discovered in the crag.

The remains of fish are very abundantly dispersed throughout the red and mammiferous crag, but are far less numerous in the coralline. Occurring only as detached bones, it is not very easy to arrive at any very satisfactory results in their examination. Their distribution throughout the three deposits is as follows.—

*Mammiferous Crag.*—Bones of the genus *Platax*, in immense numbers; several species of the genus *Raia; vertebræ* of genera totally new to Agassiz.

*Red Crag.*—Teeth of *Carcharias*, several species, including *C. Megalodon* of Agassiz; palates of *Myliobatis;* teeth of *Lamna, Notidanis, Galeus.*

*Coralline Crag.* Genera undetermined.

## ART. XI. *Remarks on the production of Crystals.* By JOHN MORRIS, Esq.

THE origin of the various combinations of the metallic and earthy bodies familiar to the geologist, in the primary and secondary rocks, will become more elucidated in proportion as the chemist investigates their composition. Nature, though silent has not been inactive, during the long succession of ages intervening since their deposition. Mechanical action is evident in the consolidation of shales and clays by pressure —in the conversion of sand into sandstone—in the hardening of calcareous marls—the deposition of chert, &c. There is also extensive evidence of chemical action; from an attentive examination of the contents of our secondary strata, I have been led to the opinion of the animal origin of some of the sulphur; we find it combined in the state of sulphuret and sulphate, through all the argillaceous deposits—in the clay slate—lias marls and clays—the Oxford and Kimmeridge clays—in the gault and London clay, and sparingly in the oolites and chalk;—the two latter contain a smaller proportion of iron scattered through their substance, whilst in the former, it not only exists in great quantities, but in a finely divided state. The abundance of fossil remains in these formations, especially of the testaceous tribes, is well known, and it is probable that many of the animals were entombed with their shelly covering; the decomposition of all this animal matter has produced quantities of sulphuretted hydrogen, which, in a nascent state, may have united with the particles of iron, and converted them into a sulphuret, or at certain depths, this gas may have become liquid, and combined with the iron in that state;* the sulphuret may have become acidified, the acid uniting with the lime, and forming sulphate, the iron being set free, and entering into other combinations, such as those ochreous concretions so common in these deposits; or sulphate of iron† may be formed, and this again decomposed by contact with calcareous or earthy substances. In this way I have been able to produce, artificially, crystals of sulphate of lime, by placing pieces of compact limestone in solutions of the sulphates of the various metals, and leaving them for a considerable time, the sulphates have become decomposed, one portion is precipitated on the limestone, in the state of sub-sulphate, the other portion of the acid uniting with the lime, and forming transparent acicular crystals of the sulphate, which shoot out from the mass itself. When sub-sulphate of copper is formed in this way, and allowed to continue for some time, it is again partially decomposed, and converted into a carbonate. By the same slow process, continued for two or three years, I have formed ochre and other substances. Now, it would appear that some native mineral compounds have been so formed, having frequently observed in specimens of carbonate of copper, the crystals arranged in bundles or masses round a nucleus of the sulphuret, the surface of the limestone itself presenting rhomboidal facets, as if it had been acted upon by an acid: also specimens of sulphuret and carbonate of barytes. and other native mineral substances.

*Kensington, Nov.* 1837.

ART. XII. *Notice of the Discovery of Cucubalus baccifer, in the Isle of Dogs.* By MR. GEORGE LUXFORD, A.L.S.

THE following passages in Sir J. E. Smith's admirable Discourse read at the opening of the Linnean Society, appear so apposite to the singular history of the plant which forms the subject of the present communication, that I make no apology for using them as a preface to this article.

* "Sulphuretted hydrogen becomes liquid at 50° F. under a pressure of 17 atmospheres, or beneath 578 feet of water, or 250 feet of rock."

*Geol. Researches, by De Labeche.*

"Sulphuret of iron has been formed by mice and rats falling accidentally into a solution of sulphate of iron the vessel not being disturbed for some time." *Pepys,—Geol. Trans.*

† Some of the pyritous fossils of the Isle of Sheppy, exude sulphur, or sulphate of iron, according as they have been exposed to a damp state.

"Besides an attention to Natural History in general, a peculiar regard to the productions of our own country may be expected from us. *We have yet much to learn concerning many plants, which authors copy from one another as the produce of Great Britain, but which few have seen.*" "Of the productions of our own country we ought to make ourselves perfectly masters, as no natural object can anywhere be studied half so well as in its native soil."

This Discourse was written about fifty years ago; and although since that time so much has been done in the different branches of Natural History, and Botany in particular, in consequence of the discoveries which have recently been made in it, has become comparatively a new science, it must be granted that much still remains to be done—that "we have yet much to learn concerning many plants;" not only those of distant lands, or even the more rare productions of our own country, but also concerning those with whose forms we are most familiar. These "gems of the earth," which, from their being so common, we too much neglect, will, if read aright, be found to display more beauties, and to possess a greater number of interesting peculiarities, than we had 'dreamt of in our philosophy.'

But to the subject.—Whilst botanizing in the Isle of Dogs in June last, in company with my highly respected friend, Mr. Cameron, Curator of the Birmingham Botanic Garden, I observed growing among nettles and brambles on the southern bank of one of the ditches, a considerable quantity of what I thought was *Cerastium aquaticum*, not in flower; and I felt so persuaded of its being merely that common plant, that I, for a time, totally forgot the circumstance, and made one botanical visit to the island, without examining, or even thinking of the locality. In the early part of the following August, however, being again botanizing there with another esteemed Birmingham friend, Frederic Westcott, Esq. one of the Hon. Secs. to the Botanical and Horticultural Society, I quite by accident came again to the place where I had before seen what I thought was *Cerastium aquaticum*. The plant was now in full flower; and I at once, to my equal surprise and delight, perceived it to be the highly interesting *Cucubalus baccifer;* a plant which, although it had occupied a place in every British Flora, and every list of British plants, for a period of one hundred years, appears never before to have been found wild, or even apparently wild, in any part of the British islands.

This plant is a native of the south of Europe, and was inserted by Dillenius, as a British plant, under the name of *Cucubalus Plinii*, in the 3rd edition of Ray's Synopsis, 267, published in 1724. He there speaks of it as having been "gathered in hedges in Anglesea, (*Mona*), by Mr. Foulkes, of Llanbeder, and sent to Dr. Richardson." The following letter from Mr. Foulkes to the latter gentleman shews, however, that his information was erroneous.

"Sir, Llanbeder, near Ruthin, Nov. 7, 1727.

I am to beg your pardon, which I do heartily, for informing you that *Alsine baccifera* grew in Anglesea, which I did from the account of it from one who pretended to know plants very well, and had attended Mr. Edward Lloyd."

In a note to *Alsine baccifera* in the above letter, Sir J. E. Smith says;—

*Cucubalus baccifer*. The only authority for this plant being reckoned a native of Britain, is the above Mr. Foulkes. Nobody, as far as I can learn, has met with the plant since, except in curious botanic gardens, in any part of the British isles; and I was accordingly obliged to be content with a garden specimen, for the figure in *English Botany*, *t.* 1577. I am therefore under the necessity, however unwillingly, of excluding the *Cucubalus baccifer* from our British Flora. The Rev. Hugh Davies, who is so intimately acquainted with the Botany of Anglesea, could never meet with this plant." *Linnean Correspondence*, *Vol.* ii. *p.* 171.

And subsequently, in his *Eng. Fl.* published in 1828, he remarks;—

"*Cucubalus baccifer*, which has hitherto found a place in every British Flora, and which, in *Fl. Brit.* 464, stands as the only representative of its genus. must here be omitted." *Vol.* ii. *p.* 290.

Dr. Macreight, in his *Manual of Botany*, published in 1837, inserts the plant on the authority of Mr. G. Don, as growing in "shady woods near Edinburgh;" but Professor Don says he believes this is a mistake; and that his brother only thinks the plant he saw, might have been the *Cucubalus*.

My chief object in making this communication is to call the attention of botanists to this singular plant. For although it would perhaps be too much to claim its restoration to the British Flora, on the ground of its occurrence in this single locality, yet I cannot but believe that I have before met with it, in similar situations, in other parts of England; where, not having been in flower at the time, I have always passed it by, as I did on my first sight of it in the Isle of Dogs, thinking it to be its natural ally, *Cerastium aquaticum*, to which, when not in flower, it bears a very strong resemblance. Moreover, from the very luxuriant state of the *Cucubalus* in the above locality, I should conclude that it had been, for a long time, in undisturbed possession of the place where it was growing: and the ditch having been cleaned out, and the banks cleared of their rank herbage, on each side of this place, it is not improbable that the plant had been destroyed in the cleared parts. Under the circumstances there can, I think, be no harm done in considering it a *naturalized* plant, at least until further investigation shall have thrown more light on the subject.

The frequent occurrence of *Polygonum dumetorum* since its first discovery, may be instanced as the effect of the attention of botanists being directed to any particular plant; and induces me to hope that this notice may lead to the detection of the plant which is the subject of it, in other localities, and its consequent restoration to its long-occupied place in the British Flora. Whether this be the case or not, it is a curious coincidence, that three plants, *Bupleurum falcatum*, *Polygonum dumetorum*, and *Cucubalus baccifer*, which the older botanists seem to have considered as belonging to our Flora, but apparently on insufficient grounds, should yet, in our modern days, be found growing within so short a distance of the metropolis. Truly, it goes far to prove that these honest old *simplers* knew what they were about, and that they were not quite such noodles as some of their descendants are too apt to take them for.

*London*, *Dec.* 25, 1837.

## SCIENTIFIC NOTICES, INTELLIGENCE, &c.

*Zoological Society's Gardens.*—In our last number we noticed the interesting addition which the Zoological Society had then then just made to their Menagerie, in the purchase of a female *Orang;* and, up to the present date, (Dec. 25th), we are enabled to give the most favourable report of the creature's health. She has become excessively attached to her keeper, and is daily improving in strength and spirits, and promises to be, for a long time, one of the most attractive objects at the gardens. At the evening meeting of the Society, Dec. 12th, Mr. Owen made some remarks upon one or two particulars, in which this animal differs very materially from the Chimpanzee, whose death was so much regretted about two years since. He observed, that one very marked difference consisted in the inferiority of the Orang, as regards the functions of the organs of voice; for, while the Chimpanzee expressed its anger by loud cries, or a succession of short quick sounds, resembling a bark, the Orang, when vexed or thwarted of its favorite object, displayed its wrath by uttering a feeble and almost inaudible continuous whine. The Orang is also far less active in its habits, rarely moving, unless to follow its keeper, or when strongly tempted, and then its motion is slower, and more awkward than in the Chimpanzee;

the awkwardness arising from the extreme disparity in the length of the anterior and posterior extremities. The hair on the head is all directed forwards; in the Chimpanzee it radiated from a centre.

Mr. Owen also remarked that the thumbs of the lower extremities were devoid of nails, and that the animal had the deciduous series of teeth in use; viz. 2 canines and 4 grinders in each jaw.

Another object at this time alive in the Society's collection is a tame seal; which, from the grotesque singularity of its movements when on land, and the general intelligence and docility the creature evinces, proves a source of considerable amusement and interest to the visitors. This animal was captured somewhere on the eastern coast, and brought up the river Orwell; where it fell into the hands of a small innkeeper at Ipswich, who contrived, for the first few weeks, to keep it alive by forcing flour down its throat, as it obstinately refused to take any food of its own accord. In a short time however it became reconciled to its new condition, and devoured fish most voraciously, eating 30 or 40 small flounders in a day.—Its favourite mode of taking them was in a tub of salt water, in which it was allowed to bathe. A small straw sty was erected for it in the inn-yard; but when first seen by us, the creature was lying outside the house door, a place which it always occupied when left to follow its own inclination. Although it followed persons with whom it was familiar, like a dog, it was not safe to play with it, since it was apt to snap at the hands, even of its owner, but apparently more from a natural propensity than from a vicious disposition. When seized by the tail, and raised from the ground, it was utterly helpless, having apparently not even the power to struggle, in that position. A spacious yard, with a pond in the centre, which is replenished every two or three days, with salt water, has been appropriated to its use, in the gardens, and it is supplied with fresh fish every day. Several Seals have, at various times been in the Society's possession, but three or four weeks have been the average duration of the time they have been kept alive. The present one has been a prisoner five months, and appears as brisk as if just taken from its native element.

*Question of the parasitic nature of the Animal found in the Argonaut.*—Within the last few weeks we have had the pleasure of receiving a visit from Madame Jeannette Power, the lady to whom M. M. Dumeril and de Blainville refer in their Report of a Notice by M. Rang, respecting the Animal of the Argonaut. (*Mag. Nat. Hist.* v. i. N. s. pp. 393 &

It is probable that we may shortly have an opportunity of publishing a translation of Mme. Power's original memoir, read to the Genoese Academy; and we shall suspend, until then, any observations upon the nature of the conclusions which this lady has deduced from her experiments.

*Scientific Expeditions.*—We have received some details respecting the more dangerous of the two expeditions, which have been undertaken this year, at the expense of the Imperial Academy of St. Petersburgh; viz. that of M. de Baer, to Nova Sembla; and that of M. Parrot to the North Cape.—In the night of July 14th, M. de Baer arrived at the coast of Lapland, and set sail from thence on the 24th. Within five days the expedition reached the entrance of the Matotschkin-Schar, or the great straits separating the two islands of Nova Sembla. The north wind had cleared the sea of ice, and excursions were made from that point to every quarter, as well as communications established with the walrus-hunters. The district toward the Carian sea was still covered with ice, which afterwards broke up, so that a boat could enter it; here stormy weather exposed the expedition to great danger. On the 13th of August they met with immense numbers of *Beroë*, in icy cold water, whose swimming-bladders presented a most beautiful variety of colours. On their return, they found on an island near Beluga Bay, Rossmyslow's hut, (who had wintered there in 1767), where they recruited. On August 16th they sailed through the straits of Matotschkin, which in the mean time had become quite free from ice; and then to the south, as the wind was from the north. After landing in a bay, still without a name, and surveying Kostin-Schar, as well as the mouth of the Nachwatowa, where part of the crew was almost lost in hunting the rein-deer, the season being already much advanced, (end of August), they repaired to the peninsula of Kola, (Lapland).

The expedition was, upon the whole, very successful; and the collections obtained are comparatively rich. They consist of 99 Phanerogamous, and about 30 Cryptogamous plants, and more than 70 invertebrated marine animals.

M. Solomon Müller has at length returned to Heidelberg, after an absence of fourteen years, of which three were spent in Sumatra, and most of the rest in other parts of the East Indies. He has penetrated very far into the interior of Borneo, and has brought from thence a specimen of the Orang-Utang, between 6 and 7 feet in height.

Dr. Gaimard, the well-known traveller, is making preparations for a scientific tour through Scandinavia, up to the

North Cape. The expense will be defrayed by the French government.

The Prussian traveller, M. Moritz, having been prevented by a revolution, which broke out on the Upper Oronoko, from continuing his journey down that river, to Rio Nigro and Varinas, after waiting several months in the missionary stations on the river Carani, has returned to Europe, by Angostura and St. Thomas. He has brought with him an extensive zoological and botanical collection, which has been added to the Museum and Botanic garden at Berlin.

M. Hedenborg, a Swede, who has travelled seven years in Africa, and is said to have penetrated farther into that continent, by Egypt, than any of his many predecessors, has arrived in Alexandria; where he intends remaining some time, to recruit his health, before returning to his own country.—His collections in the different branches of Natural History, are said to be extremely rich and important.

The collections of Baron Hügel, the result of his long and distant travels through Asia and Australasia, are now exhibiting in Vienna.

The collection of the late Prof. Afzelius, consisting of natural and other curiosities from Africa, has been bought by H.R.H. the Prince hereditary of Sweden, for the University of Upsala.

*Death of Professor Nitzsch, of Halle.*—On the 16th of August, the University of Halle lost one of its most distinguished members, Mr. C. L. Nitzsch, Professor of Natural History, and Director of the Zoological Department. He was a very successful cultivator of several branches of the science, espe- Entomology and Ornithology.

## SHORT COMMUNICATIONS.

*Transmission of experience in birds, in the form of instinctive Knowledge.*—I have seen lately a brief notice of Sir Thomas Andrew Knight's paper on the transmission of hereditary propensities in animals, read before the Royal Society in August last. I hope the following instance may be thought sufficiently interesting, as proving, that the collective experience of many generations of animals has a much more powerful influence on their behaviour, than their individual experience. The *Bustard* is one of the wariest birds; like the wild geese, it always is guarded by one or more sentinels, according to the number of the flock, whilst the latter is feeding, and through uncommon caution the flocks of this bird continue undiminished in the *open* districts of Germany, although it hatches but two or three young ones a year, and although it is much persecuted, not so much for the value of its flesh (only that of the young being esteemed), as for the sake of destroying a creature so injurious to the crops, especially those of colza, or rape seed, and on account of the sport. I have often admired the sagacity, which enables this large and heavy creature to exist and thrive amid so many dangers, in a thickly peopled country; but in adverting more particularly to the means through which it effects this purpose, we shall find that every generation learns instinctively from the former, what objects the experience of the latter has taught them to shun. From these the bird recedes at very great distances; but it takes not to the wing, nor does it run away, at the sight of every object of certain kinds, but it makes the nicest distinctions between the different varieties or modifications of the same kind of object. It evinces no great fear of man in general, but it shuns men dressed like gamekeepers or sportsmen, and if the latter put on peasants' frocks, they have a much better chance of getting near the bustards. In neighbourhoods where this stratagem has been often tried, the disguise is not sufficient, but the sportsman must *behave* like a peasant for many hours, within sight of the flock, and draw near and retreat among rural occupations, before he has an opportunity of uncovering his rifle to shoot at one of the bustards. The stratagem of disguising oneself as a peasant woman with a high basket on one's back, in which the rifle is, and of feigning to be weeding, succeeds the best now, because few hunters have been original or eager enough to resort to it. I know a shepherd, who invariably succeeds in *driving* the bustards near a pit made for the purpose at a convenient place, in which the hunter lies concealed. But this man, who has almost as quick an eye as the bustards themselves, sometimes works from morning till late in the afternoon, before he brings the birds fairly in. He takes a wheelbarrow, fills it with earth, which he carries to some distant spot, but in all his movements he is directed by a plan of operation, through which he gains his point, sooner or later, according to the degree of caution which the bustards show that day; and they cannot find him out, as the dreaded report of the gun comes from a different quarter. With reference to other moving objects, as different sorts of carriages, they are now most distrustful of droskes, because these are the favourite conveyance of sporting characters, and the bustards have often been shot at from them. In a close carriage one may pass comparatively near the bustards, when they happen to feed near the road, and in rainy weather I remember having seen thirty-four together, which allowed the coach to pass within ten or twenty yards. A dung-cart may leave the road, and approach them, without exciting their suspicion, which is not the case with other carts or waggons employed by the farmers. But though the individual bird becomes more and more wary, in the proportion as it grows older, yet it profits very little, comparatively, by its own *immediate* experience; and as the smell of iron must be neutralized, by carefully rubbing all the parts of a trap with pine-twigs, for catching wolves or foxes, which have never seen one, so, for the bustard, which relies chiefly on its eye for its safety, every suspicious appearance, which the *instinctive* knowledge of the bird would denounce as dangerous, must be removed from the objects intended for its destruction; and thus the same instruments may be repeatedly and successfully employed against the same individuals. Among different examples, which I could communicate in support of this, I shall mention the following as the most striking. In 1817, I had a long ox-cart stuck round with straw wisps, so as to resemble a dung-cart and to allow a man to sit concealed in it. It was mounted with a duck-gun, on a swivel-joint; the back part of the cart, from which the muzzle of the gun projected a little, presenting a considerable opening between the wisps, to allow the marksman a certain range of sight sideways. The gun was loaded with two handfuls of swan-shot and a proportionate quantity of powder, and with this cart I, with two other sportsmen, all dressed in peasants' frocks, under which we had rifles, repaired to a district where bustards may always be found. We soon discovered a flock of seven, and with proper management approached them so near as to kill two, by discharging the gun and rifles. The rest flew in a direction, where we did not lose sight of them with our telescopes, until they alighted, at the distance of about four English miles. We followed them, and, by the same manœuvres, got a second shot at them, which, however brought only one bird down. This time the survivors flew very high, and passed a ridge, beyond which we were not able to discover them again. To elucidate this principle by another example, I may refer to the *Ampelis garrulus*, which is bred in northern wildernesses, where, unmolested by man, it cannot become possessed of transmitted instinctive caution as to him. When a flock of these birds, which visit Germany every seventh or eighth year, alight on a mountain ash to feed on its fruit, one may approach them without any caution, and shoot a number of them. The rest fly to a neighbouring tree, and return to the mountain ash, as soon as the hunter has retired to some distance. Thus the whole flock may be destroyed, by repeating the same operation.—*W. Weissenborn.—Weimar, Oct.* 20, 1837.

*Singular effect supposed to have been caused by change of temperature on small birds.*—A singular occurrence took place the night of Wednesday, Nov. 8th, ult., which, as you may perhaps remember, was the coldest we have experienced this season. Four small birds, (*Haberdevats*), were exposed at a window in an apartment, during the night, and were discovered, the following morning, to be dead in the cage. Upon examination it was found that the skin of each was ruptured on both sides the median line extending from the head to the tail. This is an extraordinary fact. Has cold the power of contracting the skins of animals to such a degree as to rupture them? I have shewn one of the birds to my friends, Messrs, Bell and Walker, and mentioned the circumstance to Mr. J. E. Gray, who, like myself, cannot account for this extraordinary occurrence. Should a similar effect have come under the observation of any of your readers, I should feel obliged by their recording it, as I think it may perhaps account for the death of many of the smaller birds during the winter months, whose skins are extremely fine. By inserting this in your Magazine, you will much oblige &c.—*Daniel Cooper.* 82, *Blackfriars Road.*

On Monday last a fine specimen of the *Mergulus melanoleucos*, or little Auk, was found in the garden of Wm. W. Luard, Esq. of Witham Lodge. It was so much exhausted that it suffered itself to be taken by the hand; and on being opened, no trace of food was found in it.

It is here considered a very rare bird, though I do not know whether it is sufficiently so to merit a corner in your "Short communications." On that point you must exercise your own discretion.—*Edward H. Burnell. Witham, Nov.* 17, 1837.

*Substitution of a new generic name, Thetis, for the second genus of Proteus, in the class, Infusoria.*—

———"Majus in aequorâ *Proteus*,
"Jus habet" *anguinus.*

Having given a short memoir of the *Proteus anguinus*, Laur. in the last No. of the Magazine of Natural History, I think it worth while to correct the following error.

On reference to the order "*Les Infusoires Homogènes,*" in Cuvier's Règne Animal, (Edit. 1817), it will be seen that there is mentioned *another* genus of *Proteus*; now as this is a violation of the well-known rule in Natural History,—that not more than *one* genus in Zoology, or *one* in Botany, or *one* in any other of the like sciences, should receive the *same* name, —it is fit that *one* of these two genera of *Proteus* be changed. Laurenti, when he gave that name to his new amphibious animal, seems not to have been aware that it had already been bestowed upon a minute animal, belonging to the last order of the lowest class of the Animal Kingdom. Another rule also prevails in Natural History; which is this,—that the name of a *second* animal, or plant, &c. to which the *same* generic appellation shall have been given, shall yield the preference to the one which was *first* so designated;—hence, we must ascertain which of the two animals is able to claim the priority of that term. Roesel, I find, discovered the infusorian animalcule which he has described under the title of '*der kleine Proteus*,' i. e.—*P. minutus*, at p. 621, vol. 3, of his 'Insecten,' which was published in the year 1755. Now Laurenti did not give to the world his account and name of the *P. anguinus* until the year 1768, in his work entitled—'Specimen Medicum exhibens Synopsin Reptilium;' and this was the first notice of it that had ever appeared. Wherefore it is evident that the least of these animals is the most worthy of, and ought strictly to retain, that generic term. But, since the amphibious creature is now so well known by that appellation, and since, in all probability, he is wont, (amongst other tiny food), to devour some myriads of his aquatic namesake, it would, in this case, be manifestly injudicious to change it: I therefore propose to call the infusorian genus, *Thetis*,* instead of *Proteus*, in order to bear in mind the tale of Proteus and Thetis, in Ovid's elegant verses.—(Vide Met. XI. fab. 7).—And the name of *Thetis* is especially appropriate to this animalcule, because as she "centum mentita figuras,"—so this diminutive creature, in the words of Lamark, "jamais ne se présente une minute de suite, sous la même forme,"—several of whose different forms are well represented in the 101st plate of Roesel's Insects. There appear to be only two species, viz. *Thetis diffluens*, and *T. tenax*, which are described by Bosc in his Histoire des Vers, tom. 3, p. 258, and by Lamarck, in tom. 1, p. 416, Hist. Nat. des Animaux sans Vertèbres.—*Viator*. *London, Dec. 22nd*, 1837.

* I have had some trouble in ascertaining whether any genus in Zoology is already dedicated to *Thetis*, but, as far as I can find, there is none. If there be, of course, I have fallen into the very same mistake, which I have here wished to remedy; and then the infusorian *Proteus* must be re-named. An alphabetical List of all the names of the families, genera, species, and their synonymes, in every branch of Natural History, with references to the authors, is much wanted, and would prove of great assistance to Naturalists.

## ERRATA IN VOL. 1.

Page 96 line 1, for Branchiopodous read Brachiopodous

214 line 5 from the bottom, for possess no operculum read possess an operculum

384 18 lines from the bottom, two lines are transposed

442 19 lines from the bottom, for scaly read male

479 18 lines from the top, for green hawks read greenshanks

484 3 lines from the top, for objects read digits

# THE MAGAZINE

OF

# NATURAL HISTORY.

## FEBRUARY, 1838.


Art. I. *Notes by* M. Turpin, *on a species of Acarus, presented to the Academy at the Sitting of the 30th of October, by* Mr. Roberton,(1) *to whom it had been forwarded by* Mr. Cross.*

In bringing forward the present communication, the dignity of the Academy renders it necessary for us to state, that these notes are not to be regarded in the light of a regular *Report*, since the subject is one very far beneath the important and definite labours in which it is usually occupied; indeed, had it not been for the too great publicity given to a little animal which is not worth the trouble it has occasioned, and for its having been sent by the President for our examination, we should have allowed it to sink into oblivion, together with the ideas promulgated concerning its mysterious origin.

Upon reflection we also thought it would be as well, if only for our own satisfaction, to bestow some study upon the animal, as we entertained a hope of being able to recognize its identity with some species already described, and of referring it to its proper source. We thought, too, that by furnishing a description and figure of it, we might be rendering some service to the science of Entomology. Having effected this, and completed our investigation of the subject, we have been led on to declare our personal opinion as to the pretended origin of this microscopic spider.

A solitary specimen of the *Acarus* of Mr. Cross, preserved in spirits of wine, and enclosed in a small phial, presented, on examination, the following characters.

(1) Immediately upon reading of this note, we received a letter from Mr. Roberton, stating that the *Acarus* presented by him to the Academy, had not come directly from Mr. Cross, but through Dr. Buckland, to whom Mr. Cross had presented numerous specimens, offering, as we suppose, a larger proportion of females than males, as is usual with the other species of this genus, and which explains the circumstance of the individual presented to the Academy being a female, ready to deposit the egg which it contains.

* From the Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences. (Nov. 13th, 1837).

Viewed with the naked eye, while still in the phial, it appeared merely as a whitish speck; its specific gravity causing it to remain at the bottom of the vessel.

The magnifying glass rendered visible a small oval body, bristled with long diverging hairs.

Having taken it out of the alcohol, dried it as much as possible, and then placed it between two plates of glass, with a thin layer of varnish, in order to render all its parts more transparent, and consequently easier to study, we placed it under the microscope, applying a power which magnified the diameter 280 times. Examined under these circumstances, we saw that the body was of an oval form, and that the stomach was slightly flattened, and the back very much arched, particularly towards the posterior part of the body. The dorsal surface was studded with a profusion of small *papillæ*, a certain number of which, larger than the rest, and distributed here and there among them, served as bases or bulbs to some long hairs or bristles, which pointed in every direction, and the greater number of which were at least as long as the body of the animal.

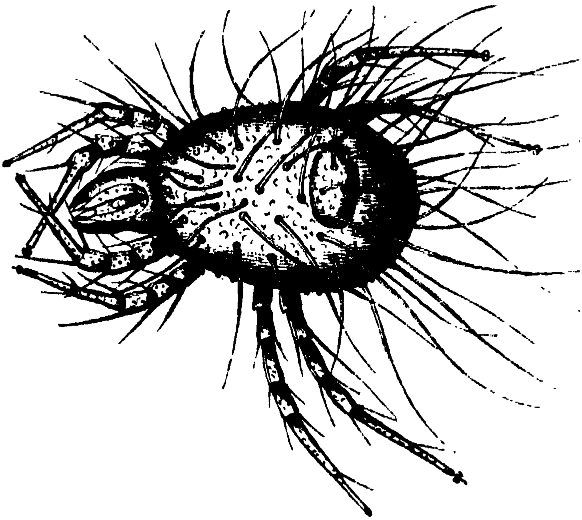
These hairs, standing erect on the arched back of the *Acarus*, gave it very much the appearance of a microscopic porcupine; its resemblance to that animal being still farther heightened by the lengthened snout.

Viewing it as a transparent object, we have not been able to discover any traces of a stomach, ovary, or lateral pulmonary lobes.

The situation of the *anus* is faintly indicated by a slight indentation situated in the direction of the median line, and at the posterior part of the abdomen.

We however saw very clearly a large oval egg, like those which are perceived, often to the number of two, three, or even four, in the transparent body of the female domestic *Acarus*, both of cheese and flour, and in those of the same sex in the *Acarus* of the human body, as represented in the drawing which we have had the honor to submit to the Academy.— This egg, which is similar in shape at both ends, and $\frac{1}{7}$ of a millemeter in length, happens, rather singularly, to occur in the solitary individual sent by Mr. Cross, as if chance were willing to furnish us with a material proof of the well-known mode of re-production of the *Acari*, in the very species which had been supposed to be producible at will, merely by the aid of elementary molecules floating in space.

From the anterior part of the body projects a sort of head, terminating in a lengthened snout; the separate parts of which it was very difficult to examine, but we could, however, distinctly perceive in it an upper lip, notched at its extremity, beneath which a dagger-shaped *rostrum* projected, and under this, but situated laterally, we found two large moveable mandibles, which were pointed, and slightly bent inwards. Within these, and pointing in the same direction, were two *palpi*, shorter than the mandibles, and nearly hidden by them, and the lip which protected them.



*Acarus horridus*, Turpin.

Having had but one individual at our disposal, it has not been possible for us to establish the existence of a lower lip, which is so large and so evident in the *Acarus* infesting the human body. Neither have we been more fortunate with regard to the two small smooth eyes, situated on the neck of the other species of this genus.

On the circumference of a kind of *sternum* are placed eight limbs, all locomotive and articulated; the four anterior directed towards the front, and the four posterior towards the hinder part. They are all composed of the same number of pieces; but as may be remarked in many insects, and in the *Arachnida* and *Crustacea*, the two anterior pairs of limbs are shorter, thicker, and more robust than the hinder ones. This difference, though hardly observable in the *Acari* of cheese and flour, is very great in the *Acarus* of the human body; in which, without an attentive examination, we might be almost led to suppose that the two pair of posterior limbs, which indeed are only rudiments, were organs of a different kind.

Each of the eight legs of the *Acarus* sent by Mr. Cross, is formed of seven joints, without including the *tarsus*. The first is triangular, and may be considered as the hip; the second and third are longer than the hip; the fourth is longer than the two preceding; the fifth is shorter than the fourth; the sixth and seventh are longer and thinner than the others, and the seventh is terminated by a little transparent *tarsus*, which appeared to us to be bi-lobate, and provided with a single claw, bent inwards. Upon the upper edge of each of these joints, except the one which forms the hip, are one or two straight and stiff hairs.

The actual length of the body and head, is half a millemetre.

The *Acarus* of Mr. Cross appears to constitute a new species of that genus. The species to which it most nearly approaches, of such as are already described and figured, are those found in cheese and in flour, or, perhaps more nearly, Hermann's *Acarus dimidiatus*. It differs from the two first in the absence of a false corselet, in the two longer and more slender articulations which precede the *tarsus*, in the form of the body, which is shorter, more ovoid, and more tumid, and finally, by the long and numerous hairs with which the back is covered.

It is distinguished from the *Acarus dimidiatus*, (which has a spherical body, with a false corselet, more coloured than the rest of the abdomen), by the want of the little short hairs which cover the surface of the eight limbs of the latter; but resembles it in the numerous diverging hairs which cover the back.

We propose to give to this species, supposing that it ultimately appears not to have been previously described, and retains its novel mode of originating, the name of the Rough Acarus, *(Acarus horridus)*.

Thus far we have limited our remarks to the facts connected with zoological details; we have examined, described, and figured, counted and measured, all the constituent parts of this little animal. We have by these means really proved that the phial presented to the Academy by Mr. Roberton, does certainly contain the animalcule or the *Acarus* announced to us; and which, indeed, may be seen by the naked eye, as a whitish speck.

We now request permission to say a few words on the singular origin, or rather the singular creation, of an animal, which, although microscopic, is so complicated in its structure, and holds so elevated a rank in the scale of organization. Its parts, as we have seen, consist of, First, a body; secondly, a head, formed of two lips, two mandibles, two feelers, a *rostrum*, a mouth, and two eyes; thirdly, a stomach and *anus;* fourthly, two lateral pulmonary lobes;* fifthly, an ovary, containing eggs in the female specimens; sixthly, eight limbs, each composed of eight joints, including the *tarsus;* seventhly, a skin, bristled with numerous long hairs.

As we have seen, it would be hardly possible for the organization of this animal to have been more complex; since in addition to what we have just stated, there are distinct sexes, in which intercourse and fecundation are necessary to the reproduction of individuals of the species, and in which, consequently, we must admit the existence of reproductive organs; and finally, that the females form and deposit eggs, whence proceed young individuals, at first provided with only six legs, until the period when, shedding their skins, two more appear, which were in progress of developement under this cutaneous slough.

If Mr. Cross believes that he has really formed an animal of such elevated organization as the *Acarus* in question, merely by employing simple material elements, such as might separate themselves from the surface of a piece of lava, kept in a humid state by silicate of potash spread over it, saturated with an excess of muriatic acid, and incessantly electrified; a belief, in which we know, on good authority, that the new creator is daily fortifying himself, we will venture to remark, that Mr. Cross does not appear to have sufficiently studied the organization and comparative physiology of living creatures; without which knowledge, a naturalist, even though very skilful, may strangely deceive himself, by imagining himself to be more powerful than he really is.

It may readily be conceived, that by the aid of the elementary materials diffused through space, we may obtain either amorphous conglomerations, or conglomerations which are regular and crystalline; but from these inorganic formations to the creation of the simplest organized being, there appears to us to be an immense distance.

Before we dream of creating animals so complex as the *Acarus*, let us only try to fabricate or to obtain the globules of the *Protosphæriæ*, and the filaments of the *Protonemæ*,†

* The contraction of the animal, so long steeped in alcohol, prevented us from seeing the eyes and pulmonary lobes distinctly.

† *Protosphæria simplex*, Turp. *Protonema simplex*, Turp. Dict. des Sciences Naturelles; Atlas Botanique, tome ii. pp. 1 and 2. We have, at the present moment, in a living state, a considerable number of filamentous *Protonemæ*, which vegetate indiscriminately with *Hæmatococcus*, and *Heterocarpella geminata*.

We should have great pleasure in shewing them, under the microscope, to any one desirous of seeing one of the simplest creations of the organic two productions which appear to us the simplest of the organic kingdom—the very commencement of organization—and which point out the moment when matter assumes a globular form, and is drawn out, in order to serve, the next moment, for the formation of the various structures of all other beings, whether animal or vegetable.

In these very simple globules and filaments, we can perceive no internal granulation, which might serve for their reproduction. From this we might, perhaps, be led to think that these two kinds of organisms, are undoubted elements of those of a higher order,—that they are organized productions formed immediately of matter. But who can say positively that these *Protosphæriæ* and *Protonemæ* do not contain reproductive globules, which escape the action of our most powerful microscopes? Or at all events, and which amounts to nearly the same thing, who can say that these simple and diminutive vegetables do not separate into particles, at the moment when the life of association abandons them, in such a manner that each particle, animated with a new and independent life, becomes a sort of scion, reproducing the species? If these are but conjectures, they have, at least, the merit of being in perfect accordance with what takes place every where else, except in these two solitary productions.

All our microscopic researches, with regard to organized beings, whether animal or vegetable, and those the smallest in their dimensions and the simplest in their structure, have always shewn us, that their reproduction was entirely dependent on an individual of the same kind which preceded them, and which alone, drawing its materials of nourishment from space, could expand itself into a germ, destined, by means of separation, to reproduce its species.

It is thus, that in proportion as we have more closely pursued the comparative study of organized beings, and by means of the microscope, have reached even the smallest gradations, we have successively witnessed the disappearance of those numerous generations presumed to be spontaneous, a race of phantoms, which could not stand against the light of true and constant observation.

From our own knowledge, then, acquired by a long succession of labours in organization and physiology, we will take upon ourselves to assert, that Mr. Cross has not created the

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kingdom, as compared with its most complex production—man. The *Protonemæ* are beings, complete of their kind; they are not a *thallus*, or a stem preceding or preparing a terminal fructification, such as, for example, the stalk of the mushroom.

*Acarus horridus*, by the mere aid of the materials which he points out. These means, even supposing them to have been, under the circumstances, indispensible to the appearance of the animal, have acted but as simple stimulants, which, like those exciting organic germination in a grain of corn, have hastened the developement of eggs, similar to that contained in the female individual sent by Mr. Cross himself,—eggs which happened to be laid or deposited upon the surface of the lava made the subject of experiment.

Being unacquainted with the works written by Mr. Cross, upon the artificial and voluntary production of his *Acarus*, we are ignorant whether the animal comes fresh from the experiment in its perfect state, or if, as would be more consonant with the laws which regulate the developement of organized beings, it passes through the different stages and metamorphoses which are so familiar to us, in all the other species of this genus; whether, in the experiments, it commences by being only a point, then a globule, then an egg, next a young *Acarus*, having only six legs, and finally, a perfect *Acarus*, with eight legs, male, or female without eggs, or containing eggs, like that manufactured by Mr. Cross, a figure of which, taken with the aid of the microscope, we have had the honour of submitting to the Academy.

But in viewing the production of Mr. Cross's *Acarus* in this light, there still remains one great difficulty,—that of knowing how and where these animals, naturally so voracious, could find the nourishment necessary for their developement; since organized beings can increase in weight and size, only by taking in the nutritive matter found around them, and assimilating it by means of a mysterious power peculiar to themselves.

Physiology, in the present day, being more enlightened, and consequently but little credulous in the matter of spontaneous organizations, and above all of organizations formed by the hand and at the will of man; convinced, moreover, by observation, that all organized beings result, by tissular extension, from a parent similar to themselves, and which alone has received from nature the power of reproduction;—this physiology, exacting but little, does not demand from physics and synthetical chemistry, unaided by the living laboratories of which we have just spoken, the construction of an *Acarus*, which is an animal almost as complicated as one of the *Mammifera*,—but only that of a single muscous globule of *Protosphæria*, endowed, let it be understood, with the properties or attributes of organic life, viz. absorption, assimilation, and the reproduction of its species.

This simple globule, though, in the scale of organization, infinitely below the *Acarus* of Mr. Cross, would be more than sufficient to excite, in the highest degree, the admiration of physiologists and philosophers, or probably might still give rise to fresh doubts.

In producing his animal, Mr. Cross is far from having had the merit of priority of invention, but he has at least that of fixing most accurately, the object of his creation, in designating it by the name of *Acarus*, and in shewing us its nature. It is to be regretted, that the first production of a source so new and unlooked for, should have been one of the ugliest forms of the animal creation. But let us wait, since this is but a beginning.

The author of a well-written work on a similar subject,* has also told us of a crowd of animals and vegetables manufactured by himself, and by simple chemical means. It is true that he has not displayed his productions, (we mean to men capable of appreciating them as naturalists), and that he has confined himself in speaking of them, to such vague terms as hazard little, but which, consequently, inspire no confidence. There were some beings among them which resembled lobsters, spiders, leeches, gnats flying with two spreading wings, and others which were but rough-hewn attempts at insects, some of them wanting a head, and others, legs.

When any one has the rare good fortune to make, or to enjoy the exclusive privilege of making, such astonishing discoveries, he should first make sure that he is wide awake, and then have resolution to be silent on the subject, until select and competent persons have verified and established the facts by their own observations. By such a course, in the pursuit of the positive knowledge attainable by man, how many absurdities might be avoided, which, when once introduced into science, cling to it in such a manner as renders ages necessary to effect their removal.

[We do not think that M. Turpin has handled his subject, at least so much of it as relates to the "pretended origin of the microscopic spider," in the most philosophical manner; and we dislike exceedingly the spirit in which his critical observations are written. By his own admission it appears that he has not perused Mr. Cross's history of the matter, and he has therefore, in a most unwarrantable manner, identified that gentleman with the ideas promulgated concerning the mysterious origin of the *Acarus*.—We believe Mr. Cross to have acted in the most open and straightforward manner, in this business; having simply stated the conditions under which these *Acari* made their appearance, without in the least pretending to say, that he could at any time produce them by the agency of electricity. Ed.]

*I. B. Fray; "Essai sur l'origine des corps organises et inorganises." 1817.

ART. II. *Experiments made with a view of ascertaining how far certain marine testaceous animals, possess the power of renewing parts which may have been removed.** By MADAME JEANNETTE POWER, Member of the Gioenian Academy of Catania, and other Scientific Societies.†

IN imitation of other observers of animated beings, as Signor Abbate Spallanzani, and Charles Bonnet, who investigated the reproductive powers of the *Limaces*, *Polypi*, and land testaceous animals, I turned my attention to the marine species, with a view of determining whether they possess, in an equal degree, the power of reproducing such parts as may have been cut off.

These molluscs are generally very difficult to study in a house; for when taken from their proper element, the series of their phenomena cannot be correctly observed. I therefore constructed a kind of cage,‡ which was made entirely on a plan of my own, leaving between the bars a convenient interval for the free passage of the water, without allowing the animal to escape, when placed in the sea. I had several of these cages made of different sizes, to correspond with the bulk of the animals I meant to study, and placed them in a sheltered part of the port of Messina, near the citadel. I introduced some *Murices*, *Tritones*, and other testaceous animals, as well as my favourite "*Polpo dell' Argonauta*;" furnishing them with proper aliment, although I frequently found that they procured their own nourishment.

I hope that this method will be not only approved, but adopted by naturalists generally, when studying the habits of marine molluscs; they would by this means be rendered less liable to form incorrect notions, and prevent their recurrence to hypothesis.

These cages should be placed according to the nature of the animals to be studied; some species, for instance, liking a rather muddy bottom; and others requiring that marine plants should be introduced along with them.

The Illustrious Professor Charles Gemettaro having favored me with a visit, in the month of August, I communicated my method to him, and he greatly approved of it, as well as to Dr. Cocco, who frequently accompanied me during my observations.

* From the 13th Vol. of the Transactions of the Gioenian Academy of Catania.

† Translated by JAMES POWER, Esq. and communicated by the Authoress.

‡ These cages were afterwards named, by the Academy, "Gabbiole alla Power."

Spring and autumn are the most proper seasons for these observations. It is requisite for the observer to be endowed with great patience, these animals being very sensitive to the least touch; for which reason it is extremely difficult to cut off the part wished to be reproduced: and it has frequently happened, that at the slightest touch of the sharp instrument, they drew in immediately, and retired to the innermost part of their shells, and I was obliged to wait for a more favorable moment, on their re-appearance.

The shell must be placed in a firm position, and the animal watched, until it presents the part you desire to operate upon. The operation must be performed with skill and agility, otherwise the opportunity is lost: the greatest difficulty, however, is with the smaller animals.

On the 8*th August*, 1836, I procured a *Triton nodiferum*, Lam. about eight inches long; cut off one of the *tentacula*, with the eye, which is situated on the external side of its base. I also broke off a piece of the shell; and placed the whole in a cage.

15*th August*. Examined it, but saw no appearance of an attempt at reparation, and then replaced it in the cage, fearing my hopes would not be realized.

28*th August*. Re-examined it, and to my great satisfaction found that the eye and *tentaculum* had appeared, to the length of about six lines; that which had been cut off measured fourteen lines. The shell was nearly repaired, although irregular.

12*th September*. Made similar experiments with another *Triton*, of which a drawing was made, when the reproduced *tentaculum* measured three lines.

6*th September*. Took ten specimens of *Murex trunculus*, from fourteen to eighteen lines long; cut off their heads and tore off their *operculum*.

10*th October*. Found eight alive, six of which had reproduced their *operculum*, and four their heads and *tentacula*.

11*th September*. Cut off the spout and *tentacula* of a *Conus*, fourteen lines long.

8*th October*. Visited it, and found that it had reproduced both, perfectly similar to the others.

6*th September*. Made similar experiments on two other specimens of *Triton nodiferum*, and on the *Fusus lignarius*, with a result similar to the preceding.

To prove my observations, I sent to the Genoese Academy some of the animals alive, and others preserved in spirits of wine, to correspond with all that I assert in this article, as having determined by experiment.

I am making other experiments, and should they be crowned with success, shall do myself the pleasure of communicating the result to the same illustrious Academy. Should my want of knowledge relative to the object of these observations have made me consider my experiments new, I trust, even if they prove otherwise, that I shall receive indulgence, as being deprived of the means of gaining such information, as would have enabled me to ascertain the fact.

[It was in one of the cages spoken of in the preceding communication, that Madame Power placed the Argonauts, after having removed certain portions of the shell; and though, unfortunately, the circumstance of this lady's very slight acquaintance with comparative anatomy and physiology, renders her observations of less importance than they might otherwise have been, yet there is every reason for believing, that experiments conducted in the manner which she has suggested, may satisfactorily determine whether or not the species of the genus Ocythöe, are the true constructors of the shells which they inhabit. Ed.]

Art. III. *On the influence of Man in modifying the Zoological Features of the Globe; with statistical accounts respecting a few of the more important species.* By W. Weissenborn, D. Ph.

(*Continued from* p. 18)

A circumstance which concerns us more especially, and which, in most European countries, has broken in upon the harmonious manner in which the condition of the tame, as well as of the wild animals, might have been regulated under the influence of a monarchical form of government, is the peculiar complication of the feudal system; a political theory, according to which, the liege lord was considered as the original proprietor of a whole country, the divisions and subdivisions of which were entrusted to vassals, sub-vassals, and tenants, on conditions, which were the more arbitrary and oppressive, in proportion as the removes became more distant from the head of the system. This state of things would, of course, restrict the free use of property, both as relates to the domesticated animals, and those of a wild nature, in a manner quite at variance with sound principles of political economy, even after the feudal system had ceased to be the foundation on which the security or existence of the kingdoms once rested. Thus, from the time when that system began to lose its importance to the nations at large, its laws relating to the management of animals, have more and more taken the form of oppressive measures or public nuisances; which, however, are now gradually disappearing, and in many German countries great progress has already been made towards their total abolition.

The laws bearing upon this subject, which were made under the influence of the feudal system, almost invariably bear the stamp of the grossest selfishness and ignorance. They were calculated to preserve the game for the sports of the privileged, with a reckless indifference to the interests of the working classes; whereby not only the increase and improvement of live stock was greatly prevented, but the wild boar, stag, and fallow deer devoured the produce of the farmer, without his receiving any indemnity for the loss: and if he turned poacher from necessity, he forfeited his life. Innumerable are the evils which the game-laws have produced in many countries, by spoliating the peaceable cultivator, or by irritating his feelings, as well as by turning into derision every civil or moral obligation. As to enactments made with a view of destroying the enemies of the game, they went not a step farther than the short-sighted law-giver thought it his interest to let them. The wolf was an outlaw, no doubt; but the inhabitants were not allowed to destroy it indiscriminately, lest the deer might be disturbed; much less was the extirpation of this obnoxious animal encouraged by rewards.—The gamekeepers, however, were tempted to wage war against every animal *reputed* to be injurious to the protected wild quadrupeds or birds, by prizes paid on the heads or feet of such species being delivered up to the officers of the forest department; and under the common appellation of *Raubzeug*, (vermin), the little owl, the kestrel, rook, crow, hedge-hog, and even the wood-pecker, were the objects of the same destructive and persevering persecution, as the *Strix Bubo*, the eagle, marten, weasel, &c.

Science has, however, of late effected a salutary reform in our ideas as to the particular animals to be considered injurious or useful; and the governments of many states, at the head of which is Prussia, are now tending towards regulating the condition of *all* the animals over which their legislation extends, so that it may be in harmony with the interests of the commonwealth. I shall return to this subject when treating more particularly of individual species.

Though the regulations made for whole kingdoms or states, as that law which obliges the proprietor of game to make compensation for the damage it effects, or those which regulate the width of the meshes of fishing-nets, or those which protect the singing birds, or encourage the multiplication, improvement, or introduction of certain species of domestic animals, operate on a larger scale, we must not entirely overlook the exertions which local authorities, as municipalities, or even individuals have made, within their own immediate jurisdiction, towards effecting the same purpose. These measures have been injurious or beneficial, in proportion as the theory on which they were based was erroneous or just. Thus, about thirty years ago, many parishes in Thuringia paid a certain premium for each sparrow's head brought to the mayor, with a view of protecting their white crops from the depredations of that bird. But this measure was found to be incompatible with the preservation of their orchards and green crops from insects. On the other hand, the very serious damage which the hamster, (*Mus Cricetus*), did in the fields of Gotha, and the neighbouring villages, where the deep loamy soil encourages the multiplication of that animal, to an intolerable degree, was most properly and effectually repressed by a *general* extermination of that species, made at the expense of the municipality and parishes. An individual of Dantzic has left a legacy, out of which 100 dollars are annually paid to the fisherman of that town, who makes use of the widest mesh in the exercise of his calling; but some one of the profession may think it to his interest to use *such* a wide mesh as to catch nothing in his net, except the premium, and others may find it more profitable not to try for it at all.

We have still to consider one subject connected with the progress of civilization, which has acted a most prominent part in modifying the relative proportions of the lower animals all over the globe, and has been superadded to every form of government, the pure hierarchical perhaps excepted, viz. *commerce*. This extends its influence far beyond the limits of the territory subjected to the direct agency of the respective nations. The whale-fishery, for instance, in consequence of which a few species of the large *Cetacea*, formerly very numerous throughout about two thirds of the surface of the globe, have already become very scarce, and are almost entirely driven from many seas; and if we try to appreciate how it must have affected the relative numbers of the different inhabitants of the ocean, through all the links of the chain which they form, in their dependence on each other, we shall form an adequate idea of what commerce has effected, in this respect alone; and were it possible to reduce the total effect of the whale-fishery to a strict calculation, we should without doubt arrive at the most surprising results, whereas, for the present, we must content ourselves with referring to that source a few insulated phenomena, such as the well-known multiplication of the dog-fish, and other fish of prey, in the German sea. The cod and herring fisheries must likewise have had a similar influence; and the extensive destruction of *Phocæ*, which are now almost extinct in New South Shetland, and many other localities, where they formerly existed in innumerable herds, is another instance of the same character. The fur animals of North America, where companies keep standing armies of hunters, to supply the trade, as well as of Siberia, which has so long been decimated, both by convicts and the natives, who pay their tribute in furs, have had their ranks likewise very visibly thinned by commerce, as appears from comparing the commercial tables of different periods.

Though, in the present state of the surface of the globe, and of the occupancy of man, it is, upon the whole, quite impossible to predict, with any precision, when certain species of animals will have shared the fate of some already extinct, as the *Didus ineptus*, or at what rate the numbers of others shall diminish or increase, through human agency; yet, in a few instances, and particularly with reference to certain habitats, we may be pretty confident in our anticipations. The large *Pachydermata*, as well as the fiercer animals of prey, or reptiles, will be exterminated in every country brought completely under the dominion of man; and this will ultimately be their fate over the whole of the globe. But it is difficult to say whether the polar bear may not make a successful stand against man, as long as the present climates are not entirely changed; a circumstance which probably never will happen, whilst our species inhabits the globe. In such other localities also, as man cannot make any great impression upon, as the immense deserts of Africa, or the snow region of the highest mountains, several species, that would elsewhere be threatened with extirpation, may protract their existence to an indefinite time, though the Capricorn has been exterminated in the Alps; whereas others, whose existence depends on the primitive state of more accessible and changeable localities, as the elk, the *Bos urus*, the beaver, &c. must certainly become the victims of the progressive influence of man, however individuals or legislation may attempt to preserve them. The same fate ultimately awaits the large birds of prey, as the *Gypaëtos barbatus*, which has already become very scarce, even in the Alps, or the brown eagle, which no longer haunts the lesser primitive mountains of Germany, where it formerly used to breed. In short, every large wild animal, whose existence is not profitable to the commonwealth, will, sooner or later, cease to exist, unless it can be made to continue in a controllable state; and we may anticipate that this principle will extend its influence, more or less strictly, over many of the smaller animals of all tribes.

A particular interest attaches to the ultimate condition or fate of the migratory species of birds, on whose numbers the degree of persecution to which they are subjected, in the different countries through which they pass, or where they periodically settle, must have a proportionate influence. The methods of catching birds, have perhaps, in no country, arrived at so high a state of perfection so early, or have been so extensively used, as in Germany. Only within the last century, the employment of the same means has been gradually introduced, through the emigration of German hunters, all over the eastern countries of Europe; and in the proportion as they have gained ground there, the produce of that sort of sport has visibly diminished in this country, as respects the species of the genus *Turdus*, that are either indigenous, or visit us in autumn. The same observation applies to the sky-larks, of which I have seen, about thirty years ago, above 3000 taken in nets, within a few minutes, at the commencement of twilight, in a locality where 1000 are now reckoned a good return. This sport, which can be exercised during a few weeks in autumn, must, I am afraid, sooner or later, cease altogether; for if introduced in several more localities, over which the lark passes, it will probably not repay the trouble and expense. At present, too, the southern coast of the Black Sea, where the flocks of our sky-larks arrive in such an exhausted state, that the birds may be caught with the hand, is very thinly peopled, and richly stocked with more valuable game of different descriptions, wherefore the larks are there comparatively safe; and so are, for similar reasons, the quails on the northern coast of Africa. On the other hand, the woodcocks have a very bad chance, when, exhausted from the fatigue of their flight over the Baltic, they alight on the southern coast of that sea; and so eager are the inhabitants of the Holstein coast, to hit the right moment, that when it happens to coincide with divine service, the whole congregation rush from the churches, and the minister goes home, without taking offence at what he cannot prevent. Who can say how thinly the larks or quails may be scattered over our fields, when they shall once meet with the same sort of reception in Asia Minor or Africa?

As to the extirpation or great diminution of particular species in particular countries or spots, we may often determine the conditions on which their present existence or numbers depend, with sufficient precision to fix the subsequent conditions through which they would become extinct, or greatly reduced. The bustard, for example, being a very obnoxious and now outlawed bird, would soon disappear in Germany, as it has in England, were the former country as much intersected by hedges as the latter, since the success with which that bird evades its enemy, depends altogether on its commanding a wide range of sight. The great numbers in which the white stork is found in Holland, as well as in many parts of Germany, are owing to the pious prejudice which protects the bird there; whereas it is extremely scarce in England, where there are so many fine localities for it, but where it is wantonly shot, as the heron is with us. The predilection for the chimney-swallow, a bird that would soon be extinct, were man its enemy, is even more general than that for the white stork.

We may also hope, (as has been lately tried in Scotland, but I know not with what success, with respect to the capercailzie introduced from Norway), to see many species reoccupying their legitimate domiciles, when the wanton persecution of them shall have been put a stop to. Certain harmless and interesting species, that have clung to certain spots almost like parasitic plants, have at last been driven from them, by the incessant destruction of the individuals that settled there. Thus, I may refer to the black stork, a species generally scarce, which used to breed on a rock near the village of Dörrenberg, in the Thuringian mountains, but which has so repeatedly been shot and deprived of its young there, that at last none of the individuals which used to pass over that neighbourhood, has been left, to settle on that favourite spot. Then the bluebreast, (*Sylvia suecica*, Lath. *S. cyanecula*, Meyer), has tried, every spring within the recollection of man, to settle on the southern escarpment of a bushy hill near Waltershausen, on the northern slope of the same mountains, but has always been caught by the expert fowlers of that town, almost as soon as it alighted.

Other wild species will, no doubt, be naturalized, in many civilized countries, where they are not indigenous; as was effected last year in Silesia, with the *Tetrao rufus*, introduced from the south of France, by a society of proprietors. The experiment, I understand, promises to succeed perfectly, as the birds bred last summer, and appear to thrive in the neighbourhood of Breslau. Even with fish or other classes, similar experiments will be attended with success, when science shall have made us more perfectly acquainted with the conditions on which their existence depends.

*(To be continued).*

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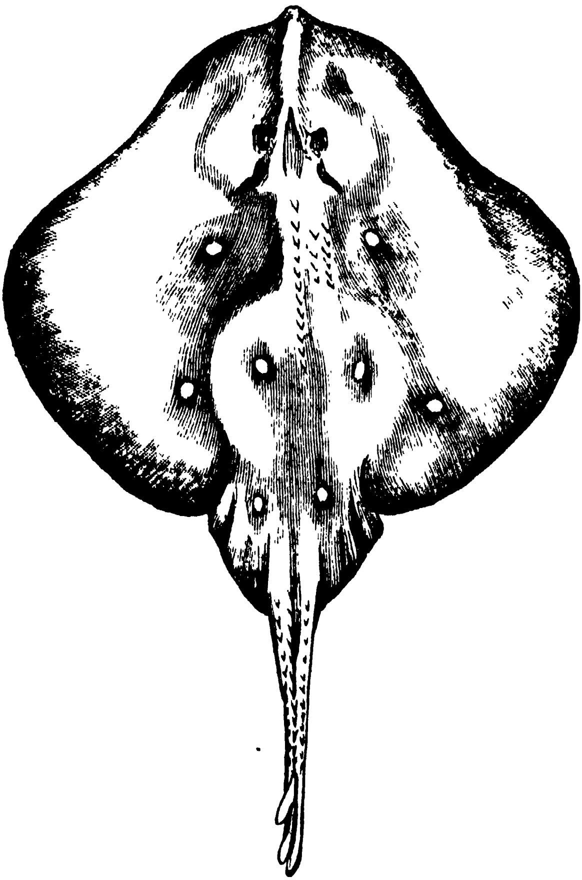


Art. IV. *Description of a species of Ray-fish, not hitherto included in the British Fauna.* By Jonathan Couch, Esq. F.L.S. &c.

We owe it to Mr. Yarrell that we are able to decide what are, and, by consequence, what are not, the British species of Ray; a genus which, until the publication of the History of British Fishes, had been in a state of great confusion. With eight of the species described and figured in that work, I am sufficiently acquainted to be able to decide that they are different to one which I have now to introduce to the notice of English naturalists; and my description and figure, will, I hope, be sufficient to prove that it cannot be confounded with any other, recognized as British: but whether it can be referred to any species described by other authors, I am not able to specify, except that I have, with some degree of hesitation, supposed it to be possibly the *Raia Asterias* of Ray, Syn. Pisc. p. 27. I can find nothing in Risso's Ichthyologie de Nice, 1810, or in Fleming's or Jenyns' Works on British Animals, to lead me to suppose that this fish is known to either of these gentlemen.

The specimen described, which was of the ordinary size, measured 3 feet 8 inches in length, of which the tail was 19 inches; the breadth 2 feet 4½ inches. The snout projected ¾ inch, prominent and elevated; the mouth 3½ inches wide, 6 inches from the snout. Under jaw peaked in the middle, the teeth slender, sharp, in rows not very closely placed.—The body passes off circularly from the snout, the greatest breadth opposite the centre of the disk, and of a rounded form. From the snout the ridge is elevated to the eyes, a distance of 5¼ inches; eyes 2 inches asunder; temporal orifices large. Body thickest posteriorly; the tail stout at its origin, rounded above, tapering; a groove along the body and tail; two fins on the latter, close together. A few spines near the end of the snout, a semicircle of them behind each eye; four short parallel rows on the centre of the back, and a middle one continued along the groove to the tail; which is covered with stout hooks, scarcely in regular order. The remainder of the body smooth. Colour above, a uniform dusky brown, white below. On the back, a variable number of ocellated spots, the size of the section of a large pea, the centre pale yellow, the margin a deeper impression, of the colour of the skin. I have counted from eight to sixteen of these spots in different specimens, and believe they have no determinate number; but they are always placed, on each side, with corresponding regularity.

Besides this description and figure, which I hope will enable those who visit our fishing vessels to ascertain this species, I will further observe, as marks of distinction from the other British species of this genus, that in addition to the form of the teeth, which are crooked and slender, resembling a bird's claw in miniature, but which still are less long, slender, sharp or crooked than in young specimens of the *R. Oxyrhynchus*, it may be distingaished by a great tendency to circularity in the disk, formed chiefly by a rounding off of the pectoral fins, by a flatness of the anterior portion, by the uniformity of its colour, the regularity of the spots, and the comparatively short and tapering tail.

It is properly the sandy ray of fishermen, that name being applied to the *R. maculata,* or homlyn, only by carelessly confounding it with the present species, to which it bears but a distant resemblance, either in appearance or value; for while the homlyn is esteemed as food, either fresh or salted, this is thought worthy only to bait the crab-pot, or, just as frequently, to be thrown aside for manure. It was by an oversight that this fish was not included in Mr. Yarrell's History of British Fishes; for it is of frequent occurrence in moderately deep water, from spring to the end of autumn. In winter, however, it is not often seen, chiefly perhaps because at that season the boats do not venture quite so far from land; but perhaps, also, from the fish having changed its quarters.

I cannot persuade myself but that this species has been described by some author, to whose writings I have no opportunity of obtaining access; I therefore refrain from assigning to it a trivial name, that I may be in no danger of adding to science a useless synonyme. Its English name of "Sandy Ray" will be sufficient as a provisional designation.

While on the subject of British Rays, I have great pleasure in being able to add something to what is already known, respecting another species of which only three specimens, and those females, have been recorded. Since my account of the only specimen of the painted ray I had then seen, (Yarrell's Br. F. vol. ii. p. 433), was communicated to my friend, Mr. Yarrell, a full grown male has come into my possession: having been caught on the 21st of April,—a date I mention the rather, as the former specimen having been caught in January, it points out the period in which it visits our coast. The form of the body was similar to that given in the British Fishes, with the addition of the prehensile organs, and a more formidable armature near the eyes and on the back, common to most species of ray; but the colours were even far more beautiful and varied, and perhaps will be found to differ in different individuals. The ground was a brilliant yellow, on which were numerous beautiful lyre-shaped gyrations, each side exactly answering to the other. These gyrations were formed of a dark line, margined on each side with a contiguous series of pale yellow spots, like beads, as if laid on by the hand of a very fantastic artist. Both the species of Ray which form the subjects of this paper, were taken with the ordinary line and bait of the fishermen; and the first named seems to be an indiscriminate feeder, living on small fishes, and different kinds of *Crustacea*.

**Art. V.** *Observations on the existence of Saline combinations in an organized state, in vegetable structures.* By Golding Bird, Esq. F.L.S. F.G.S. &c. Lecturer on Experimental Philosophy at Guy's Hospital.

Botanists have long been familiar with the fact, that vegetables, during every stage of developement, contain certain saline, and, as usually considered, *inorganic* constituents, dissolved in their sap, or imprisoned in their tissues; and the question has long been agitated, whether these saline matters are derived from external sources, or actually formed by the vital chemistry of the vegetable being. The former seems to be the more probable, and is certainly the more generally received opinion; since it is obvious that the admission of the latter, would be equivalent to asserting, that all, (chemically speaking) simple substances, as potassium, sodium, &c. are elaborated by plants, from the elements yielded by the earth in which they grow, by the water with which they are supplied, or by the aerial medium in which they exist; and, consequently, that all chemical substances are compounded of nitrogen, hydrogen, oxygen, or carbon: a conclusion totally at variance with the received theories of chemistry.

Upon expressing the fluids contained in any vegetable tissue, we find portions of saline matter dissolved in the various secretions; these saline matters being of that class usually denominated *inorganic*, and incapable of being *formed* by the vital energy of the plant: but if, after thoroughly washing the vegetable tissue, exhausted of its juices, we digest it in weak acids, until nothing more is yielded up to these solvents, we shall obtain a substance nearly white, composed of cellular or vascular tissue, or both, and forming, in the opinion of many eminent botanists, the vegetable skeleton. Let us now very carefully incinerate this mass of tissue, exhausted of its juices, and *apparently* also of its saline ingredients, by exposing it to heat on a tray of platinum foil, and examine the results. Now as, according to the opinions of some of the first botanists of the day, all principles except hydrogen, oxygen, carbon or nitrogen, are to be regarded as foreign to plants,* and therefore not necessarily, or perhaps possibly, entering, as organizable constituents, into the formation of vegetable structure, we ought to expect to find left on the platinum tray

*"Those principles are called foreign to plants, which cannot be referred to either hydrogen, oxygen, carbon, or azote; such, for example, are carbonate of soda, sulphate of soda, nitrate of soda, the carbonates of potash, lime, and magnesia, phosphate of lime, chlorides of soda and potash, (query, *sodium and potassium*) and the oxides of aluminum, silicium, iron, and manganese;—&c." *Lindley;—Introduction to Botany*, p. 232.

only mere accidental traces of saline matter; for the other elements of vegetable tissue, are capable of forming volatile combinations, under the influence of the heat employed.—Thus, the hydrogen and nitrogen unite, and are evolved as ammonia; the carbon unites with oxygen from the air, to form carbonic acid; and the remaining hydrogen with the oxygen of the plant, or of the atmosphere, to form water. All these new combinations escape in a gaseous form, and leave behind, not mere insignificant traces of saline matter, but the genuine skeleton of the vegetable tissue employed, formed of siliceous and saline matter, in which may be observed the most delicate forms of the organic structure; spiral vessels, ducts, and the outline of cellular tissue being distinctly visible, notwithstanding that every trace of the organic products of which they are generally considered to be formed, has been expelled by the heat employed in effecting the incineration.

For this highly interesting and valuable observation we are undoubtedly indebted to the ingenious researches of Raspail, whose labours, it is much to be regretted, have neither in this country, nor in his own, attracted that degree of notice and attention to which their importance justly entitles them; a circumstance which may be attributed partly to the peculiar style in which his works are written, and partly to the bitter and sarcastic spirit with which they are, unhappily, imbued. One of this philosopher's experiments is peculiarly worthy of attention, as well from its elegance and interest, as from the light which it throws on the difficulties of the subject under consideration. If we take a fragment of the *epidermis* of a plant, and press it flat upon a plate of glass, after having submitted it to the action of a dilute acid, for the purpose of removing any saline matter *incrusting* its tissue, and examine it with the assistance of a microscope, we shall observe its cellular structure with the utmost readiness. Let us now submit this piece of glass, with the fragment of *epidermis*, to a red heat, and, when cold, again subject it to microscopic examination; and so perfect will the structure of the *epidermis* appear, that we can scarcely believe that its organic matter has been destroyed, all its cellular tissue remaining imprinted on the glass, in a skeleton formed chiefly of phosphate and carbonate of lime; for the addition of a single drop of diluted hydrochloric acid, dissolves these salts, and causes every appearance of organization to vanish.*

* "Mais une seule goutte d'acide, très étendu, suffit pour détruire cette illusion; et ces réticulations y disparaissent avec rapidité."

*Raspail;—Nouv. Syst. de Chim. Organiq. p.* 529.

From this simple but very instructive experiment, we may deduce some highly interesting conclusions. First;—let us recollect that the fragment of *epidermis*, prior to its incineration, was digested in a dilute acid, for the purpose of removing all saline matters soluble in that menstruum; the acid however could not dissolve that portion of saline matter which existed in an organized form, and constituted the fixed skeleton of the vegetable tissue, because this was completely enveloped and enclosed on every side by organic matter, over which the dilute acid employed, exercised no solvent action. Next, we learn, that as the outline of every form of tissue is met with, in the saline matter found in its ashes after incineration, simply *organic* matter, or matter destructible by heat, cannot be regarded as forming the true skeleton of plants, but that this skeleton, like that of any animal, consists chiefly of saline, or, (to use the generally received, but evidently improper term), *inorganic* matter. These facts, if shewn to be universally true, are of the highest importance, and will serve to give new and interesting features to the structure of organic tissue; and even in the present imperfect state of our knowledge on this head, they cast some little light upon the previously most mysterious subject of the fossilization of wood; and although they are at present quite unequal to the task of explaining this curious process, yet they assist in raising, to a certain extent, the veil of obscurity with which it was covered. One of the most puzzling questions that was ever presented to the mind of the naturalist, is the manner in which all, even the minutest and most delicate portions of vegetable tissue, are preserved in a silicified state. It was formerly conceived to be necessary, that in proportion as the minutest atom of a vessel or cell, was removed by decomposition, an equally minute atom of siliceous matter should be deposited from its solution, to supply the place of the organic molecule, in order to preserve so perfectly the delicate vessels and cells which are visible in fossil wood; thus making the process, which can scarcely be considered otherwise than one of decomposition and destruction of vegetable matter, analogous to that of secretion and absorption in animals, and so placing it on a level with a process which, for its perfection, requires the highest efforts of vital chemistry. Having proved, however, that the skeleton of the most elaborate and delicate form of organic tissue consists of inorganic particles, it is no longer a matter of surprise, that these should be spared when decomposition of organic matter goes on; or that when by the action of running water or otherwise, every fragment of organic matter is removed, the indestructible materials which compose the skeleton of the plant, should remain, and serve as *nuclei* for the deposition of saline or calcareous matter from the stream that may flow over, or through them. Thus these depositions, merely by supplying and filling up the vacuities formed by the removal of the organic matter, at length produce a fossil mass, in which the *skeleton* of the cellular and vascular tissue remains the same, not only in form, but in matter, with that which gave support to the vegetable when living; the only portion actually foreign to the original plant, being that which has infiltrated between the delicate meshes of the inorganic skeleton, where it has been deposited, and forms, of course, the great mass of the fossil vegetable.

In the coal formation, which was long merely suspected to be of vegetable origin, we find beautiful and satisfactory evidence of the existence of the same inorganic skeletons of the tissues of plants, as those we have just been considering.— For although the organic portion of these plants, by undergoing what has been, not unaptly, termed the bituminous fermentation, has lost all traces of organization, yet we can find fragments of the inorganic skeletons of tissue, mixed up with the bituminous or carbonaceous mass: thus in the ashes of a common coal fire, we may discover all the usual forms of organic structure, viz. cellular tissue, spiral vessels, annular ducts, &c. And in such a perfect state of preservation are these skeletons, that all the finest markings observed in the recent structures, remain undisturbed: thus proving, beyond the possibility of a doubt, the vegetable origin of our extensive coal-fields. For this discovery of the skeletons of vegetable tissues in coal, we are entirely indebted to the interesting researches of the Rev. J. B. Reade, who is almost the only phytologist in this country, who has devoted his time to this no less curious than important department of vegetable physiology.

If it be granted that the skeleton of vegetable tissue is essentially formed of inorganic matter, we have a right to expect that if we attempt to cultivate plants in media from which all traces of inorganic matter are carefully excluded, their developement will be checked as completely as when we cease to supply them with air or water. And this, from the experiments of Jablonski, appears to be the case. This philosopher planted various seeds in pure sublimed sulphur, taking the precaution to supply them with water saturated with carbonic acid; after some time the *cotyledons* separated, but the *plumula* did not become developed, and in a short time the infant plants lingered and died. Jablonski then planted seeds in the sublimed sulphur of commerce, which contained

4 per cent. of foreign matter, chiefly inorganic; they developed themselves, attained the height of four inches, and died, at intervals between the seventh and tenth week, not having undergone any apparent increase of growth, during the previous three weeks.* These two comparative experiments appear to prove that the presence of inorganic saline matter is absolutely necessary for the perfect developement of a plant; as we might expect from theoretical reasoning.

If we admit that the skeleton of vegetable tissue is formed of saline or siliceous matters, it follows that we can no longer consider them as incapable of being organized, seeing that they assume precisely the form of the tissue of which they are the bases. Hence, although we may apply to such saline substances the term *inorganic*, because they are derived from without, and are not the products of organization, yet, we cannot avoid considering them as organized, seeing they assist in constituting the *parietes* of the vegetable. No better term can perhaps be applied to these saline matters, than that of *saline bases of tissues*, a term applied by Raspail in the work before quoted; although the ingenious web of theory with which he has surrounded this part of his subject, may be more questionable. "Une molécule de carbone, et une molécule d'eau, s'associent pour former la molécule organique sous forme sphérique; la molécule organique, *en se combinant avec une base, forme les parois des tissus ligneux, si la base est fixé, et glutineux ou albumineux, si la base est ammoniacale.*" Nouv. Syst. Raspail. 1439.

From a consideration of the foregoing observations, it is evident that the saline matters existing in the tissues of plants have been too much neglected, seeing that the part they play in the economy of vegetable life, is as important as that of any other constituents; and that we have been far too hasty in declaring their presence adventitious and accidental. And have we not also sufficient grounds to justify our considering that those botanists, however high their names may rank in the records of science, have been in error in assuming that all principles, except carbon, hydrogen, nitrogen, and oxygen, are foreign to vegetable structure?

22, *Wilmington Square, Dec.* 20*th*, 1836.

* Wiegmann's Archiv für Naturgeschichte; 1837. See also the translation of Prof. Meyer's Report on the Progress of Vegetable Physiology, for 1836, in Lond. and Edinb. Phil. Mag. Nov. 1837.

ART. VI. *Illustrations of the Geology of the South East of Dorsetshire.* By The Rev. W. B. CLARKE, M.A. F.G.S.

NO. II. ON THE STRATA BETWEEN DURLSTONE HEAD AND OLD HARRY ROCKS.

(*Continued from Vol.* i. N. S. *p.* 460)

THE particular object of the paper on "The Vertical and Curved Strata of Ballard Head," was to point out, in *general terms*, the features of the district under examination, together with the connection of its superficial phenomena, with those of more distant localities; an object which completely put out of my power any attempt to describe the composition or contents of the beds, now to be more especially considered. That point, together with the proofs of my positions, was, of necessity, reserved for this and the subsequent illustrations. The present paper will, I hope, without further controversy, convince Dr. Mitchell that he has assumed, in his criticism, (vol. i. p. 587—591), a tone and language neither justified by his little knowledge of the extent of my information, nor by the manifest defect in his own. He will find that I have not trusted "too implicitly to the authority of those persons who have previously written on this part of the coast,"—and that the only "error" I have fallen into, has resulted from my not having sufficiently trusted them,—a want of faith, which, on his part, has not placed his own observations in the most favorable light.

Dr. Mitchell says Durlstone Head is stated by *me*, to be "*composed* of curved strata and breccia of Purbeck stone."—Where did I ever say so? Not, assuredly at p. 417, (*fig.* 35). I merely pointed out that at 1 in that figure, the position of the "overhanging, dark, curved strata, and breccia of Purbeck stone, *at* Durlstone Head," were represented. Now Dr. M. denies my general assumption of "curved strata and breccia, in any part of Durlstone Head." He says the strata "are *not curved*, but are in long parallel lines, separated from each other by intermediate masses of clay." The clay has nothing to do with the subject; for I was not describing the contents of the beds, but the appearance of the coast from the sea. The strata may be "in long parallel lines," and yet be *curved*, for there are such things as *parallel curves*, whether long or short. But how any geologist with his eyes open could possibly examine the coast from Swanwich to Durlstone Head, and not see *curved strata*, is most marvellous! Perhaps, in all England, there are no such singularly striking examples of *curved strata*, as are there evident to the most casual observer. These curvatures are exhibited pretty accurately in the wood-cuts, (*figs.* 7 and 8) after two of Mr. Webster's drawings, and together with *fig.* 9 farther on, convey a good idea of the sections.


*Curved Beds and Breccia at Durlstone Head.*

1, Purbeck stone. 2, Brown bituminous schistose limestone.

8


*Curved Beds at Durlstone Head.*

1, Ravine; first fault. 2, Gulley; second fault.

That such was the case on the 16th of June, 1811, the following extract from a letter by Mr. Webster will shew.

"In the north side of Durlstone Bay, the strata are regular, dipping a few degrees to the north: but about the middle of the bay, they suddenly become very much contorted and broken; (pl. xxx.) and this state continues, with more or less variation, *all the way to the south side of the bay, called Durlstone Head.*

"These contorted strata are precisely of the same nature as those which are straight, and the quarrymen can recognise among them the very same beds. Nothing can be more satisfactory than the evidence which the inspection of them affords, that these changes took place when the strata were in a soft and yielding state, yet after their complete formation and separation from each other. The cliffs along the shore are constantly foundering; but it is easy to distinguish between recent and ancient changes: since the former produce only straight fragments, mixed with soft clay, whereas the latter *have bent the strata into the most fantastic forms, and the fragments are cemented together into a most singular rock*, of which plate xxxi exhibits an example.

"*At Durlstone Head*, (pl. xxxii, No. 1), (*fig.* 7), these appearances are the most extraordinary. Here the stratum is *dark grey bituminous limestone*," (NOT, it seems, AN OOLITE), "intersected by numerous veins of calcareous spar, the surface of which has been scooped into hollows. Upon this surface are deposited the *contorted* and broken fragments of the series of *Purbeck beds*, as one would build a wall over rugged rocks.

"It may here be evidently seen, that the contortions do not in the least resemble those which may be supposed to be derived from deposition upon an irregular nucleus, such as are frequent in sandstone: and it is quite impossible to suppose they could owe their forms to any original undisturbed formation. The whole distinctly marks the changes which have been produced by ancient revolutionary causes, the true nature of which it is, perhaps, impossible yet to develope.

"Underneath the series of Purbeck stone, in this hill, there is a thick bed of clay, containing massy gypsum, both fibrous and amorphous; but at DURLSTONE HEAD, *the clay is wanting*. Could the contorted strata at this place, have, at one time, occupied a higher situation? And have they fallen into their present position, by the subtraction of the clay existing below them?

"*Turning round Durlstone Head*, this dark coloured limestone *rises to the West*, continuing till it forms the uppermost stratum of the cliff, about half a mile off, at a place called Tillywhim. The stratum *below it* here, *is* an *oolite*, and, in fact, is the beginning of that series." (Englefield's Isle of Wight, p. 172—174).

In despite of all this, Dr. Mitchell says, "Throughout the coast, *for many miles*, beginning at Swanwich, the strata, though dipping a little, approach to *horizontality* of position"!!

In the elaborate monograph of Dr. Fitton, on the strata below the chalk, just published in the Geological Transactions, vol. iv. p. 208, that accurate observer says, "The whole of the Purbeck series is exposed in the *ruinous cliffs of Durlstone Bay*, where the strata have been enumerated in detail by Mr. Webster, (Geol. Tr. ii. 38, 39).

"*At the upper part* they consist of compact limestone, alternating with clay, and abounding in fresh water shells, especially of the genus *Cyclas:* but including also a thick bed called 'cinder' by the quarrymen, which is almost entirely composed of oyster-shells. At the lower part, the formation consists principally of fissile limestone, the junction of which with the Portland strata exhibits some very remarkable appearances.

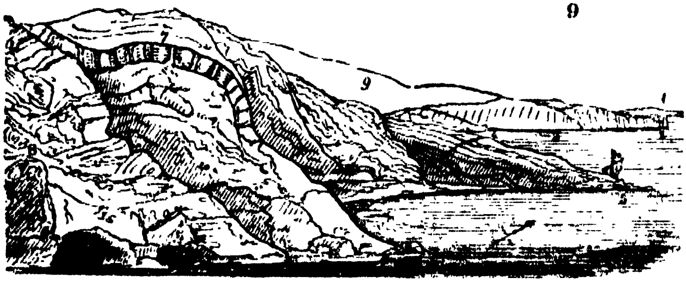
"All the stone which is quarried at present, occurs in the upper part of the series; and from Mr. Webster's list it appears that in a thickness of about 125 feet, 55 consist of beds of useful stone; 12 feet of the 'cinder,' composed of oyster-shells; and the remaining 58 feet, of slaty clay, and thin beds of unprofitable stone. I was informed that about 150 feet more, of what the workmen call 'rubbish' and 'slate,' intervene between the lowest of the courses, (or 'veins') of good stone, and the top of the Portland formation; so that the total thickness of the Purbeck formation, is about 275 feet," (274 feet 8 inches). What becomes then of Dr. Mitchell's "two sections observed at Durlstone Head in 1833," ? (p. 588). He speaks of 8 and 11 alternations of "*stone;*" Mr. Webster enumerates and *names* 52 beds, alternating with clay or shale!

Dr. Fitton continues;—"The high ground between Peverill Point and Durlstone Head, is divided by a depression or ravine, on the north of which, in addition to the *flexures and contortions seen in all the sections*, and well represented in Mr. Webster's plates, the strata are traversed by fissures, produced by upheavings, or subsidence, or both. The effect of these disturbances can be traced by means of the 'cinder' bed; disjointed portions of which are still visible, inclined at different angles, in three or four successive falls, the first throwing down that bed more than 100 feet, and others 40, 15, and 3 feet. The fissures which separate the disjointed masses, are widest at the top, and are filled with fragments of the dislocated strata. The place where these derangements occur, is called 'the Gulley:'* on the south side of it the strata are much less disturbed, and the 'cinder' can be traced almost continuously in its proper situation, till it disappears near the face of the hill, not far from Durlstone Head." (G. T. iv. p. 209).

* This spot is marked in my Fig. 35.

The upper bed, (called marble rag), distinguished for its multitude of *Paludinæ*, may be traced from the level of the sea at Peverill Point, to the top of the hill above the Gulley; and again from the level of the sea, below that great fault, to the top of the opposite cliffs; in passing whence it forms a double arch, convex and concave, the former being cracked in the direction of its radii, as represented at 7 in the following sketch, (*fig.* 9), taken near the spot, and affording an

9

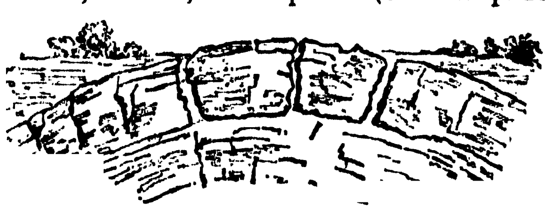



*Coast section from Peverill Point to Durlstone Head.*

1, Coast from Poole to Christchurch, (Plastic clay). 2, Old Harry, (Chalk). 3, Ballard Point, C. 4, Cliffs in Swanwich Bay, Hastings Sands. 5, Peverill Point, Purbeck beds. 6, Gulley, P. 7, Arched strata, Durlstone Head, P. 8, Breccia on the shore, P. 9, Chalk downs.

analogous example to that given by Dr. Fitton elsewhere, of the conditions of the saddle of lower green sand, which extends from Sevenoaks to Godstone in Surrey, at a spot near Brasted Place, in Kent, here copied. (G. T. iv. p. 185).

10



*Bending of the strata of Green Sand, at the 'New World,' Brasted Place, Kent.*

**Mr. Webster mentions that on the shore near Peverill Point, fragments of bone are frequently found in the masses of rock thrown down. I have observed, very near the stair-case that descends to the beach at Peverill Point, an imbedded bone in the cliff, through which has passed one of those cracks that have separated the rock into so many masses, leaving portions of the bone on each side; a proof this, that the derangements have taken place since the consolidation of the rock.**

Dr. Fitton also says, in further contradiction of Dr. Mitchell's 'horizontality of position' for *some miles from Swanwich*, —"between the extreme points of Durlstone Head and Gad Cliff, a *real curvature*, combined with the general inclination of the strata towards the north, which is, in some places, *very rapid*, has caused an extensive disclosure of the lower beds, excellent sections of which are visible on the west of St. Alban's Head."—p. 210.

I pass on to Dr. Mitchell's 'remark,' "on what are called the highly inclined red cliffs of Hastings sand, in Swanwich Bay." (p. 589). He criticises the wood-cut, and says, "it would be supposed, that the cliffs referred to were close to the town, and rose at a high angle." The wood-cut, as before stated, represents the coast *as seen from the sea*, and is merely a sketch from a certain point, giving what is actually seen from that point. The flat space Dr. M. alludes to, could scarcely be seen from that point of view; but if it could be seen, it is *not* "about half a mile" in length, but exactly 200 paces! (Measured by Dr. Fitton; G. T. iv. p. 207).

Dr. M. goes on;—"*Half a mile* from Swanwich, and for *the extent of more than half a mile*, as far north of the chalk,"—&c. &c. I suppose these two measurements make more than a mile to the chalk. Now the *first half mile* is about 200 paces, and the second more than 20 times as far! For, from the end of these 200 paces to the chalk, there are about 4250 paces; the whole space is about 4270 paces. This space is occupied by

| | |
|---|---|
| Upper green sand, | 250 paces. |
| Gault, | 200 |
| Lower green sand, | 240 ? |
| Weald clay, | 46 ? |
| Hastings sand, | 3500 |
| | 4236 |

(See Fitton's Monograph, p. 207).

Dr. M. says the dip is 15°. I have *frequently* measured portions of the series, and found the dip to be 24°. Mr. Webster, Dr. Fitton, and others, call the beds "*highly inclined.*" Dr. Buckland says they vary from 15° to 30°. (G. T. iii. p. 429). Since the publication of Dr. M.'s criticism, I have measured the beds again, and near the junction of the Hastings sand with the weald clay, I found the inclination to be 56°! This is, I think, "*highly inclined.*"

Dr. M. says the "*red stripes*" "in the Hastings sands, are the changed form of *brown sand.*" I can assure Dr. M. that *there is red* sand, as well as *brown*, yellow, green, whitish, drab, and various other coloured sands and marls.

He goes on:—"It is for *theorists* to identify these beds with what are called Hastings sands." *Theory* is, surely, a most illogical way of identifying one thing with another; and it is *not* by *theory*, but by an actual comparison of the *fossils*, which Dr. M. says "*he has never heard of*," (!) as well as by the *mineralogical* character, that the identity with the strata at Sandown Bay, Isle of Wight, has been made out. He will find *there* precisely similar beds of yellow and brown sand. As to the term, *theorist*, it can only apply to one who would class beds between the chalk and the wealden strata, with the sands of Alum Bay, or, "what is more," with those over the London clay! In the first place, I may observe, the sands at Alum Bay, are *not* opposite to *Swanwich Bay*.—Alum Bay is opposite to *Studland Bay*, and Swanwich Bay is opposite to the east side of *Freshwater Bay*, on the other side of the Isle of Wight. The chalk, in each case, separates the plastic clay from the sub-cretaceous beds. In the next place, mineralogical character alone is but of little avail, in many cases, as a geological test. I could shew, from my own collection, specimens from the ascent to Fairlight Down near Hastings; the plastic clay of Dorsetshire; the quarries in the Gres Bigarré at Liverpool; and from the old red sandstone near Huy, in Belgium; which so exactly resemble each other, that no eye could detect whether they belong to one or to four formations; and every geologist, who has extensively worked out his own acquaintance with rocks, knows well, that mineralogical character is most deceptive. Mr. Lyell, (Principles, 5th ed. vol. iv. p. 148), speaking of the tertiary fresh water deposits of Auvergne, says that there are beds of "red sandstone and red marl, which are *identical*, in all their characters, with the *secondary new red sandstone* and marl of England. In these secondary rocks, the red ground is sometimes variegated with light greenish spots, and the same may be seen in the *tertiary* formation, of fresh water origin, at Coudes, on the Allier." I am able to confirm, from examination, Mr. Lyell's remark; as strongly I deny, from examination, Dr. Mitchell's position, that the sands of Swanwich Bay "are not to be distinguished from some of the perpendicular strata directly opposite, (?) in *Alum Bay*." I have now before me, bottles filled with sand from both localities. I can see a material distinction in the character,—mineralogically, however, they agree in both being *quartzose*, and both *coloured by iron*! Is this sufficient for a geologist, and one who criticises others upon such grave topics as the proper classification of strata? It ought not to be, most assuredly.

Dr. M. says he "*has never heard of any fossils being found*" in the Swanwich Bay sands. Has he then never read Dr. Buckland's paper, (G. T. vol. 3), on the discovery of the bones of the *Iguanodon*, *Plesiosaurus*, *Megalosaurus*, and *Crocodile*, in these very cliffs, by the Rev. Mr. Bartlett and Col. White, and which I have seen in the former gentleman's museum? Has he never seen Mr. De la Beche's Geological Manual, wherein are distinctly named, from Swanwich Bay, a *Cardium*, a *Pinna*, a *Venus*, three species of *Cyclas*, a *Paludina*, two species of *Melania*, and a *Cypris?* (2nd Ed. p. 304).— Or has he never become acquainted with Dr. Fitton's learned paper before alluded to; in which he will find that the mineralogical characters given by Dr. Fitton, are a vast deal more to be depended on, than his own generalising similarities?— "In the coast section on the east of Purbeck, the whole series from the chalk down to the Portland stone is disclosed:" (this is represented in my fig. 35, p. 417). "The upper green sand, gault, lower green sand, and weald clay, in strata *highly inclined*, occurring in a nook or recess called Pemfield, at the southern foot of Ballard Hill; and the Hastings sands, occupying the whole of the range of cliffs thence to the town of Swanage, (see *fig.* 9); the section of which is so distinct, that *with sufficient labour all the details can be made out.*— The strata correspond, however, *precisely* with what I have mentioned in the preceding account of the Isle of Wight, and of the coast near Hastings, and, *as at those places*, consist of sand and sand rock, including concretions of calcareous grit, and alternating with *a very large proportion* of *reddish* and greenish cohesive sandy clay. Detached portions of *lignite* are frequent also throughout the series here. Fragments of the *trunks of silicified coniferous trees* have been found in dark brown masses; and detached bones of the *Iguanodon* sometimes occur loose on the shore, beneath the cliffs near the town of Swanage." (G. T. iv. p. 207).

Fragments of nearly perfect coal are also found at the side of the road from Studland.

Dr. Fitton also gives the following, (in a list of fossils) from these cliffs.

| | |
|---|---|
| *Gryphæa vesiculosa* | |
| *Pecten quinquecostatus* | |
| *sper* | |
| *rbicularis* | Upper green sand under Ballard Hill. |
| *dricostatus* | |
| *Serpula antiquata* | |
| *Terebratula pectita* | |
| *Mya mandibula* | Gault, Pemfield. |

| | |
|---|---|
| *Cyclas media* | |
| ———*membranacea* | |
| *Cypris tuberculata* | |
| ———*Valdensis* | |
| *Exogyra?* in brown clay | |
| *Melanopsis? attenuata*, in blue clay | |
| *tricarinata*, in blue clay | |
| *Ostrea*; a plicated species. In a bed of stone subordinate to the weald clay, *the greater part composed of shells*, with a striated bivalve, (a *Cardium?*) | Wealden, Pemfield. |
| *Ostrea*; a smooth species | |
| *Paludina acuminata* | |
| ———*elongata* (with *Cyclas media*) | |
| *Unio* | |
| *Cyclas media*; Sand cliff between Swanage and Pemfield. In nodules of clay iron ore, with *Paludinæ*. | Hastings sand. |
| *Unio*, one or more species between Pemfield and Swanage. | |

To this list I add, on my own authority, collected on the 7th November, 1837, the following. *Vermetus concavus, Dentalium medium, Trigonia rugosa, Ammonites varicosus, A. marginatus*; all from the lower green sand: *Solarium ornatum*, and a *Mytilus*, from the gault: besides a huge Ammonite, and some other characteristic shells, from the lower chalk at Pemfield.

Whether 'theorists' may or may not identify the 'stripes of red sand, and stripes of yellow sand,' with what are called Hastings sands, it is, at any rate, certain, that Dr. Mitchell ought not to have set up for a critic upon the point, until he "*had heard of any fossils being found in them.*" He tells us that he found [at Pemfield], "at the point of junction near the sand" (and chalk), "an immense mass of debris, thickly overgrown with grass. The *theorists* say that the green sand formation is there: *I saw none of it.*"! The only wonder is how he could avoid seeing it. The disengaged blocks and pebbles of the upper green sand, (as *green* as the '*grass*' which he *did* see), lie in all directions amongst that debris; and the extent of the beds may be distinctly traced, not only at the point of junction, but up the steep pathway to the top of the cliff, and along the fields to the road from Studland to Swanage. But Dr. M. saw nothing but *grass*. I should have supposed that he must have seen the *rushes* also, that distinctly point out the existence of the black bed of *gault*, that lies between the upper and lower green sands!

Professor Sedgwick, in a letter to me dated 13th Nov. says "So your opponent denies the existence of green sand between the Ballard Head chalk and Swanwich Bay! Now it is odd enough, that I collected, (in the summer of 1820), from that locality, *the best green sand fossils I have in my museum.*"

*(To be continued).*

ART. VII. *On the generic characters of Cartilaginous Fishes, with Descriptions of new genera.* By DR. J. MULLER, Professor of Anatomy and Physiology at the Royal University of Berlin; and DR. HENLE. Communicated by the Authors.

*(Continued from page 37).*

THE three following genera are all as different from each other as from the preceding group; and would, therefore, in a system, take the place of families.

*TRIGLOCHIS*, Nob.

Large branchial openings and small spiracles, as in *Lamna*. The tail like *Carcharias*, but without the dimple. The first dorsal fin stands before the abdominal ones; the second dorsal between the abdominal and anal fins; they are all pretty large. Teeth long, pointed, with one lateral denticle, or two on each side. We are not acquainted with the valve of the intestine.

To this genus, or to a very confined one, will probably belong the genus *Odontaspis*, Agassiz; the author himself referring to it the *Squalus ferox*, Risso, which has all the characters of our *Triglochis*.

*ALOPECIAS.*

Head, dorsal and anal fins, and spiracles, as in *Lamna*, (the latter having been hitherto overlooked), but the branchial openings are small, and the last above the pectoral fins, and the upper lobe of the caudal fin, extremely elongated. A dimple on the tail, but no lateral keel. Teeth sharp, triangular, without serrature or protuberance. Intestinal valve in a spiral. (1 sp.)

*CESTRACION.*

Branchial openings as in *Alopecias*; second dorsal fin between the anal and abdominal ones, like *Triglochis*. Spiracles small. Teeth arranged in pavement; the anterior rows small and pointed. A prickle or sting before each dorsal fin. (1 sp.)

The Sharks of the third division possess, like the preceding, an anal, but only one dorsal fin, and six or seven branchial openings. It is the genus *Notidanus*, Cuv. which we divide, with Rafinesque, into two genera; *Hexanchus*, with six branchial openings, (1 sp.) and *Heptanchus*, with seven. (2 sp.)

The fourth division of the Sharks, without an anal fin, we separate into two groups; the first of which has a sting before every dorsal fin; the second wants this sting. Both have spiracles, and are without the *membrana nictitans*.

The group with dorsal stings, (*Acanthorhinus*, Blainv.) contains four genera:—

1. *Acanthias*, Bonap. Teeth with a transverse edge, the point being directed outwardly, of the same shape in the upper and the lower jaw.— (4 sp.)

2. *Spinax*, Bonap. Teeth of the lower jaw as in the preceding; teeth of the upper jaw with a long point in the middle, and two shorter ones on each side. (1 sp.)
3. *Centrina*, Cuv. Teeth of the lower jaw nearly straight, leaflike, with a serrated edge, and a flat triangular point; those of the upper jaw also straight, but more narrow, conic, pointed, forming a cluster in the central part of the *maxilla*. (1 sp.)
4. *Centrophorus*, Nob. The lower teeth have a transverse edge, indistinctly serrated, the point of each being directed towards the corner of the mouth; the point of the upper teeth is directed downwards; they are equilateral, without any serrature. (1 sp. *Sq. squamosus*, Bl. Schn.)

To a new genus, but which, perhaps, is nearly allied to this, probably belongs the *Squalus squamosus*, Bl. Schn. with the teeth of which we are not acquainted.

The group without dorsal stings, (*Scymnus*, Cuv.) embraces three genera:—

1. *Scymnus*, Nob. Teeth in the upper jaw straight and narrow, in the lower jaw crooked, pyramidal, equilateral. The first dorsal fin before, the second behind, the abdominal fins. (2 sp.)
2. *Laemargus*, Nob. The situation of the fins is the same as in the preceding, but the lower teeth have a transverse edge, as in *Acanthias*; the upper teeth are narrow, conic, straight, or curved outwardly. (3 sp.)
3. *Echinarrhinus*, Blainv. (*Gonoidus*, Agass.) The first dorsal fin opposite to the abdominal ones. Teeth in both jaws broad and low, the edge nearly horizontal. The lateral edges have one or two transverse denticles. (1 sp.)

The fifth and last division consists only of the genus *Squatina*, (2 sp.) without an anal fin, with a protractile mouth at the top of the head, and the peculiar and sufficiently known form of the pectoral fins.

Amongst the Skates, the genus *Pristis* should be placed next to the Sharks, from the general shape of the body. The *Pristis cirrhatus*, Lath. forms the type of our new genus,

*Pristiophorus.*

The branchial apertures on the sides of the neck, before the pectoral fins, which begin with a slender base, as in the Sharks; the fifth branchial opening approximates to the fourth, as in many *Scyllia*. Teeth pointed. (1 sp.)

In *Pristis*, s. s. the teeth are pavement-like, and the branchial apertures open on the inferior surface, as in the other Skates. (5 sp.)

The family *RHINOBATIS* we form into two divisions and five genera.

a. *First dorsal fin opposite to the abdominal ones; caudal fin terminating in two lobes. Mouth undulated.*

1. *Rhina*, Schn. The nasal valve extending to the interior corner of the nostril. Body orbicular. Teeth round. (1 sp.
2. *Rhynchobatus*, Nob. The nasal valve does not extend to the interior corner of the nostril. Body oval, as in *Rhinobatus*. The teeth broader than long, elliptical. (1 sp.)

b. *The two dorsal fins placed upon the tail. Extremity of the caudal fin cut obliquely, forming only one lobe.*

1. *Rhinobatus*. The nasal valve like *Rhynchobatus*. (1 sp.)

2. *Platyrhina*, Nob. The nasal valve extends beyond the inner corner of the nostril, nearly to the middle of the snout, which is obtuse, and the body orbicular, approaching *Torpedo*. (1 sp.)
3. *Trygonorrhina*, Nob. Tail of *Rhinobatus*, with the nose of *Trygon*. (1 sp.)

The *TORPEDINES* constitute four genera:—*Torpedo*, s. s. (3 sp.) *Narcine*, Henle, (4 sp.) *Astrape*, Nob. (*T. capensis* and *dipterygia*, aut.) and *Temera*, Gray. (1 sp )

The true *RAIÆ* contain three genera:—

1. *Raia*, Cuv. (17 sp.)
2. *Sympterygia*, Nob. Tail of *Raia*; the pectoral fins, which do not reach to the keel of the snout in the true *Raiæ*, are, in the *Sympterygiæ*, extended to the mesial line, touching each other with their inner edges. The abdominal fin is not divided into two lobes by an incision, as it is in *Raia*. (1 sp.)
3. *Uraptera*, Nob. differs from *Raia* only by the want of a caudal fin.—(1 sp.)*

The genus *TRYGON*, Cuv. has become a large family, containing the following genera:—

*Trygon*, s. s. are the Sting Rays, the teeth of which are elliptical, and have a transverse wreath. There is either no fin at all on the tail, or a low one, which does not extend to the extremity of the tail, or a fin below only, or one both above and below: therefore we can form three sub-genera;—

1. *Trygon*, (restricted). A fin on the tail, above and below. (11 sp.)
2. *Hemitrygon*, Nob. Fin of the upper margin of the tail wanting.—(2 sp.)
3. *Himantura*. No fin on the tail. (6 sp.)

*Pteroplatea*, Nob. The Sting Rays, which are much broader than long, with a tail shorter than the body, and teeth terminating in one or thre points. (3 sp.)

*Taeniura*, Nob. has no upper caudal fin, the inferior one extending to the extremity of the tail. Teeth pointed, with an elliptical base. Mouth undulated, the projecting parts of the upper jaw form a sharp edge on each side. (1 sp. *Tr. ornata*, Gray and Hardw.)

*Hypolophus*, Nob. Distinguished by its inferior caudal fin, which is very high, and does not reach to the end of the tail. Teeth hexagonal, very small in the middle of the upper jaw, large at the sides. (1 sp. *Raia* )

Lastly, the *Raia cruciata*, Lacep. is the type of our genus, *Urolophus*, remarkable for a fin at the point of the tail. Teeth as in *Raia*, bearing in the middle a wreath or point. (1 sp.)

Another family has the tail of *Trygon*, but wants the sting. To this belong two genera:—

*Anacanthus*, Ehrenb. Tail without any fin. (1 sp.) And

*Urogymnus*, Nob. having, on the under side of the tail, a low fin, which does not reach to the extremity of the tail. (1 sp. *Raia asperrima*, Bl. Schn.)

*Myliobatis*, Cuv. (*Aetobatis*, Bl.) *Rhinoptera*, Kuhl, and a new genus, are put in one family, characterized by its large teeth, arranged as in a pavement, or like mosaic work;—by the pectoral fins being separated from the fins of the head;—by a fin upon the root of the tail, and a sting behind this fin.

* The genus *Propleygia*, Otto, is founded on a kind of monstrosity, which is not seldom met with in Skates.

*Myliobatis* has the teeth large in the middle, and small on the sides of the jaws. The nasal valve has a straight edge. The fins of the head united. *(5 sp.)*

*Aetobatis*, Nob. has the same fins of the head, but the lower jaw projects far beyond the upper one. Only one row of teeth in each jaw, and the nasal valve deeply cut. *(2 sp.)*

In *Rhinoptera* the fin of the head has an excision in the middle. The teeth are hexagonal plates, large in the middle of the jaw, diminishing in size as they approach the sides. *(3 sp.)*

In the last family, *CEPHALOPTERÆ*, we place two genera :—

*Cephaloptera*, Dum. Mouth on the under side of the body; teeth small and pointed, or like tubercles in both jaws. *(4 sp.)*

*Ceratoptera*, Nob. the type of which is the *Cephaloptera* described by Lesueur. The mouth is at the top of the head; the teeth, distinct only in the lower jaw, are little scales or leaves. *(3 sp.)*

The number of genera indicated in the preceding Synopsis, amounts to 64; of which 36, including 85 species, belong to the family of Sharks, and 28, including 96 species, to the Rays. In a paper which we published some months ago, in the 'Reports of the Academy of Sciences, of Berlin,' (July, 1837), we enumerated 30 genera of Sharks, and 24 genera of Skates. The genera which we have subsequently added, we found by visiting the collections of Leyden and London.—They are *Hemiscyllium*, *Leptocharias*, *Loxodon*, *Triakis*, *Carcharodon*, and *Rineodon*, in the division of the Sharks; and *Platyrrhina*, *Trygonorrhina*, *Temera* and *Hemitrygon* in the division of the Skates.

We gladly avail ourselves of this opportunity to express our sincere and grateful acknowledgements, to the distinguished naturalists, through whose liberality we were allowed the free use of the collections under their care; especially of the Museum at Leyden, and, in London, that of the British Museum: also of the collections of the Zoological Society, the Royal College of Surgeons, the London University College, and that of the United Service Museum. The obligations which we owe to them, and to many others in London, we shall make it a point to advert more explicitly to, in our forthcoming work. With regard however to the genera established by Dr. Andrew Smith, and which in part are here for the first time brought before the public, we feel bound to embrace the earliest opportunity of acknowledging the liberality and generosity, with which this eminent individual has assisted us in our enquiries, by allowing us to make an unlimited use of the rich collection of Sharks, which he has recently brought from the Cape of Good Hope.

*Berlin, Dec.* 12*th*, 1837.

ART. VIII. *Contributions to the Natural History of Southern Africa.* By ANDREW SMITH, M. D. Surgeon to the Forces.

*(Continued from page 33)*

Genus *NAJA*, Dand.

*N. nigra.* Colour above, livid black, beneath, greenish black; each abdominal plate margined behind by a tint of a lighter hue. Scales on the upper part of the neck near to the head, somewhat circular, those on the body ovate. Abdominal plates 224. Subcaudal scales 75 pairs. Length 5 feet 9 inches, of which the tail measures 13 inches. Circumference of the thickest part of the body 3½ inches. Inhabits the districts towards the Orange River; and is called the "Spitting Snake," from its being in the habit, according to the natives, of casting its poison at individuals who may be passing near it.

*N. gutturalis.* Colour above, a light yellowish brown, sometimes finely mottled with delicate short white and almost invisible streaks; beneath, nearly the same tint, with a dark brown collar, nearly 2 inches in breadth, about an inch behind the head; and towards its anterior extremity extending upwards on the sides of the neck, so as to be visible when the snake is lying flat on the ground. Abdominal plates 204. Subcaudal scales 59 pairs. Length 1 foot 10 inches. Inhabits the country near the mouth of the Orange river.

Genus *VIPERA*.

*V. ocellata.* Colour above, a yellowish or reddish brown, with a row of large brown spots along each side, and each spot marked with a blue tint near its centre. Along the middle of the back is a series of transverse black bars, each edged, on one side at least, by a white or yellowish white line; beneath, of a yellowish white or pearly hue. Over each eye a conical elevation, out of which projects a cylindrical spine, slightly curved backwards, and about a line and a half, or nearly two lines in length. Abdominal plates 149. Subcaudal scales 27 pairs. Length 14 inches. Young specimens exhibit no appearance of spines over the eyes. Inhabits sandy districts north of the Cape Colony, and is very dangerous from its being liable to be trodden upon, owing to its colour being so nearly that of the sand.

Genus *LACERTA*.

1. *Palpebral plates* not edged by granular scales.*

*L. elegans.* Scales somewhat circular, small and flat, placed in transverse rows; abdominal plates disposed in 6 rows; collar formed of 8 scales; femoral pores 14 or 15. Colour of back and sides light reddish brown, tail and legs light red; under parts reddish white. Length, from 12 to 15 in. Inhabits Little Namaqualand and the country towards the Orange river.

*L. tesselata.* Anterior part of back, and the sides, for nearly their whole length, black, the former variegated by 4 fine, white, longitudinal lines, the latter by vertical white stripes. Posterior part of back and tail greenish brown; beneath yellowish white; fore legs variegated by white spots.—Abdominal plates disposed in 6 longitudinal rows; collar composed of 10 plates; femoral pores 12 or 14. Length about 14 inches. Inhabits the eastern parts of the Cape Colony.

*L. livida.* Back brown, sides black, the latter closely spotted or striped with white, the former with 6 white lines, either continuous, or formed of short stripes or spots; fore legs spotted with white. Tail greenish brown,

* Plates immediately above the eyes.

with a black irregular line on each side towards its base; under parts white. Six rows of abdominal plates, collar formed of 10 scales. Femoral pores 10. Length about 12 inches. Inhabits the northern parts of the Cape Colony.

This may perhaps be only a variety of the last; in many points they approximate, and in others, some of them essential points, they differ.

*L. tæniolata.* Back brown, with two fine black lines, in places composed of dots; sides black, with 3 longitudinal white lines, vanishing at or near the base of the tail. Tail brown above, inclined to red near the extremity, and marked on each side, towards the base, with a blackish line; under parts dull white. Abdominal plates in 6 longitudinal rows; collar of 9 scales; femoral pores 14. Length about 9 inches. *Young*—Black above, with 9 longitudinal white lines, the central one extending only a little distance along the neck. Inhabits the grassy districts of the Cape Colony.

*L. intertexta.* Colour above, reddish brown, with two rows of circular white spots, discontinued about half way between the anterior and posterior extremities, each spot surrounded by a black ring; sides chequered, black and white, the latter colour disposed in narrow vertical stripes. Tail light brown, with a dotted black line on each side, and the space between them above, irregularly marked with small black spots; under parts white. Abdominal plates in 6 rows; collar consisting of 12 or 13 scales; femoral pores 11. Length about 9 or 10 inches. Inhabits the country near Latakoo.

2. *Palpebral plates partially or entirely surrounded by one or more rows of small granular scales.*

*L. ctenodactylus.* Colour above rusty yellow, sometimes greenish brown, and finely variegated with brown or black points; sides brownish black, with two longitudinal whitish lines, either continuous, or formed of distinct spots; space between the lines also variegated with white spots; each side of the tail towards the base, marked with a black stripe; under parts yellowish white; extremities freely variegated with irregular yellowish white spots. Palpebral scales margined on their outer and hinder edges, by small granular scales. Abdominal plates in 18 longitudinal rows; collar formed by 11 scales; femoral pores 29 or 30. Length from 6 to 8 inches. Outer edge of each toe margined by a row of projecting, pointed scales, like the teeth of a comb. Inhabits the sandy deserts of Little Namaqualand.

*L. undata.* Colour above reddish yellow inclined to orange, with five broad black longitudinal lines, the central one lost on the neck, the next of each side united near the base of the tail, and from thence extend as one, a little way on the latter; the outermost on each side waved, or slightly tortuous, and below edged with some yellow spots. Palpebral plates edged on their posterior, anterior, and outer margins, by small granular scales. Collar composed of 13 scales; femoral pores 9 to 12; abdominal plates disposed in 10 longitudinal rows. Length about 6 inches. Inhabits the northern and western parts of the Cape Colony.

*L. lugubris.* Palpebral plates completely surrounded with small granular scales. Scales on the body small, inclined to 4-sided, and placed in oblique transverse rows. Collar formed of 8 scales; abdominal plates disposed in 6 longitudinal rows; femoral pores from 14 to 16, or more. Colour of the body above and below, deep black or brown, more or less tinted with black, and above variegated with three golden yellow longitudinal stripes, either continuous or interrupted, the centre stripe bifid near the head; tail generally light red; extremities black or brownish, with yellow spots. Length about 6 inches. Inhabits the district immediately beyond the northern frontier of the Colony.

*L. Capensis.* Anterior, posterior, and outer margins of palpebral plates, edged by several rows of small granular scales, their inner margin by a single row. Collar formed of 9 scales; femoral pores 11 or 12; abdominal plates in 14 longitudinal rows. Colour above, blueish green, with 5 longitudinal black lines, the central one very narrow, and bifid at its anterior extremity, the lateral ones slightly broken, and the one on each side next to the central one, inclosing white spots; tail above, and on the sides, of a light brown tint, under parts whitish. Length about 8 inches. Inhabits the arid districts of Cape Colony.

Genus *ALGYRA*, Cuv.

*A. Capensis.* Colour above, reddish yellow, with two or three irregular rows of black spots or stripes, many of the spots being encircled, or partially margined by white; along each side one, and sometimes two rows of white spots, or continuous white lines, the lowermost, when two exist, extends across the temples, as far as the eye; tail above, towards the base, marked with black spots; under parts yellowish white. Plates on upper surface of head, rough and furrowed, frontal plate concave towards its anterior extremity, and from the latter a deep groove extends to the apex of nose. Femoral pores from 10 to 13. Abdominal plates imbricate, and disposed in about 10 rows. Length from 7 to 9 inches. Inhabits the sandy deserts around Latakoo.

(*To be continued.*)

ART. IX. *Letter from* RICHARD OWEN, Esq. F.R.S. &c. Hunterian Professor to the Royal College of Surgeons, *addressed to* M. ARAGO, Perpetual Secretary to the French Academy of Sciences. Communicated by the author.*

Royal College of Surgeons,
London, January 21st, 1838.

Sir,

I regret that, owing to absence from London, and other causes, I have not, until this day, perused the paragraphs relating to the *Allantois* of the Kangaroo, which have appeared in the 'Comptes Rendus' of the Academy of Sciences;—Nos. 18, 19, and 20, of which have been placed in my hands, by my friend, Mr. Robert Brown.

With reference to the description of the *allantois* of the kangaroo given in No. 18, p. 638, I have briefly to state that M. Coste is mistaken, in supposing that an undissected *ovum* of a kangaroo, was submitted by me for his examination; it was the *fœtus* of a kangaroo, with the vitelline sac and *allantois* appended to it: the *ovum*, (l'œuf de kangaroo), had been

* The preparation of the membranes in a fœtal kangaroo, described and figured in the Mag. Nat. Hist. (Vol. i. p. 483, n. s.) was shewn by Mr. Owen to M. Coste, during a late visit of the latter to this country. On his return to Paris, M. Coste communicated to the French Academy, the existence of the *allantois*, accompanied by a direct intimation that this highly interesting and important discovery had been effected by his, M. Coste's dissection. ED.

dissected several weeks before his visit to London; and the external investing membrane, or *chorion*, removed. I need not observe that the dissection of a mammiferous *ovum*, and the consequent detection of the sacs appended to the *embryo* imply, that the *chorion* should be previously entire. Now, this external membrane of the *ovum* in question, was not exhibited to M. Coste, nor has he ever seen it.

The modifications which I detected in the *chorion* of the *ovum* in question, as compared with that which I had previously dissected and described,* afforded the additional fact, of chief importance in the history of marsupial developement;† but this fact I did not feel myself called upon to communicate or demonstrate to M. Coste, as it had not, at that time, been published.

With respect to the *allantois*, as its presence afforded merely a confirmation of my previous statements, founded on dissections, the results of which were published in the Philosophical Transactions for 1834, I had no hesitation in affording M. Coste the means of obtaining ocular demonstration of the fact; and I was chiefly induced to place before him the *fœtus* of the kangaroo, with the appended *allantois*, because I found that in his work on 'Embriogénie,' p. 118, he states that the *allantois* is not developed in the *Marsupiata*, a statement which is in accordance with the figure of the dissected *embryo*, (pl. ix), which is copied from my paper, but which is in direct opposition to my text, where the evidences of the existence of an *allantois* in the more mature marsupial *fœtus*, are fully described.‡

In order to gratify M. Coste's praiseworthy desire to obtain full evidence respecting the nature of the membranous sacs, appended to the *fœtus* of the kangaroo, I permitted him to dissect the *fœtus*, and, with the assistance which I was happy to afford him, the same connections of the vessels of the umbilical sac with those of the *fœtus* were demonstrated, as are described and delineated in my memoir of 1834; and the *urachus*, which is described and figured in the same memoir, was found to be connected with the smaller sac, or *al-*

* Phil. Trans. 1834. Coste, Embriogenie Comparee, pl. ix.

† Proceedings of the Zoological Society, 1837, p. 83.

‡ In the Philos. Trans. 1834, I state (p. 338), that "I have detected the remains of a *urachus*, and of umbilical arteries, in a mammary *fœtus* of a kangaroo about a fortnight old; and of a *urachus* in a very small mammary *fœtus* of a *Petaurus*, and *Phalangista*." (These preparations I also exhibited to M. Coste), and from them I inferred, (p. 342), "that an *allantois* and umbilical vessels are developed at a later period of gestation, than the uterine *fœtus* here described, had arrived at."

*lantois*, discovered when the *ovum* was originally examined. Had any new fact been brought to light in this dissection of the *fœtus*, I should always have had great pleasure in acknowledging the share which M. Coste had taken in its revelation.

I have only to add the expression of my regret, that M. Coste, in rectifying, by this dissection, an error into which he had fallen by a too hasty perusal of my memoir, should have compelled me to notice another erroneous statement, in reference to the embryology of the kangaroo. He adds, in a note at the conclusion of his description in the 'Comptes Rendus', No. 18, p. 639, '*Le chorion* est confondu avec la *vésicule ombilicale*."

I would not, by any means, attribute this extraordinary statement to the necessity which M. Coste felt, of saying something about the *chorion*, after having asserted that he had dissected the *ovum*, "(l'œuf de kangaroo, qu'il n'avoit point encore examiné);"—but would rather suppose that M. Coste, having fallen into that belief, and finding that his notes and figures related only to the *fœtus*, and its appended vesicles, had no other alternative than to suppose that the *chorion* was blended, (*confondu*), with the umbilical vesicle. The true condition of the *chorion* of this *ovum*, I have, however, described in the Proceedings of the Zoological Society, for August, 1837, and it has induced me to modify my opinion of the ovo-viviparity of the *Marsupiata*, at least of the kangaroo.

I have the honor to be, Sir,

Your obedient Servant,

RICHARD OWEN.

To M. Arago,

Secret. Perpétuel de l'Académie des Sciences, &c. &c.

ART. X. *Description of a new genus of Trochidea, belonging to the family of Gasteropoda phytophaga.* By G. B. SOWERBY, Esq. F.L.S.

THE remarkable shell which forms the subject of the following observations, was brought to this country some years since, by Captain Beechey, but it has been impossible to ascertain where it was found. The specimen from which the description is taken, is in the possession of Thos. Norris, Esq. of Redvales, who has kindly permitted me to draw and describe it. Another specimen, though in very bad condition, is in the possession of Miss Banks, of Leeds.

On account of its resemblance to two well-known genera, namely, *Trochus* and *Rotella*, to neither of which can it, with propriety, be referred, I have thought it necessary to give it a generic appellation; and for this purpose, I have chosen *Trochiscus*, (from Τροχισκος, *Rotula*). I would have used the word *Rotula*, but that it is preoccupied, or a corruption of it, for one of the most nearly cognate genera, (*Rotella*).

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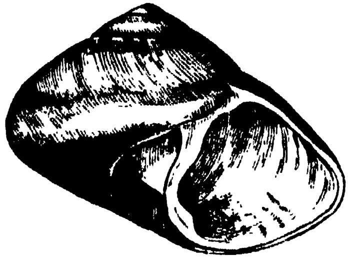

*Trochiscus Norrisii*, Sowerby.

*TROCHISCUS.*

Char. Gen. *Testa* suborbicularis, depressiuscula, crassa, umbilicata, intùs margaritacea, spirâ brevi, conicâ, obtusâ; aperturâ subtrigonali, posticè subacuminatâ, angulis rotundatis; labio columellari incrassato, anticè obsoletè unituberculato; umbilico majusculo, profundo.

I have designated this very curious and rare shell, by the specific name of *Trochiscus Norrisii*, in honour of the gentleman to whose liberality I am indebted for the opportunity of describing it.

In its general form it approaches very nearly to *Rotella*, but differs from that genus in having a rather large and deep open *umbilicus*. The shell is nearly smooth; its lines of growth are, however, distinct, but not prominent. Its outer coat is of a chesnut brown colour, but the inside is of a brilliant pearly lustre. The border of the outer lip is nearly black, that of the inner lip is green, and the inside of the *umbilicus* is nearly colourless. Width 1.7, axis, 1.3 inches.

## Art. XI. *Notes on Raputia aromatica.* By Mr. Thomas Hancock, M.B.S.

The natural affinities of *Raputia* are extremely equivocal, and have puzzled the brains of more botanists than one. Sir J. E. Smith considered the plant as strictly allied to *Euphorbia*, whilst Decandolle insisted on its relationship to the *Simarubeæ*. Jussieu, however, placed it in the second tribe, *Cusparideæ*, of the natural order *Rutaceæ*,—to which, indeed, it rightly belongs: and the same distinguished botanist has further suggested its affinity to *Monniera*, but with this genus it has little analogy, except in the dotted character of the leaves.

These conflicting opinions may doubtless be accounted for from the want of a due examination into the subject; both species of *Raputia* being extremely scarce, and but few specimens of either having been brought to this country.

Having specimens of *R. aromatica*, I have carefully compared its characters with those of the several families to which it has been represented as allied, and have arrived at the conclusion that it is a legitimate species of *Galipea*. Like the latter, three of its *stamina* are sterile, and the germ is surrounded by an angular gland. The foliation, too, and inflorescence, are precisely similar to *G. cusparia*.

Leaves villous; bracteas armed with stiff hairs; middle foliole large and petiolate, the lateral ones subsessile, pellucid, and sometimes without *punctæ*. In *Raputia*, the seeds are inclosed in a tunic of two elastic valves, which is likewise the case in *Galipea*: and both possess the same peculiar aromatic properties,—which, according to Sir J. E. Smith, remain unaltered for twenty years after the plant has been dried.

The other marks of generic distinction presented in *Raputia*, (or *Sciuris*, as it has been termed by Persoon), are precisely those of *Galipea*;—so that the description of the latter is fully and correctly applicable to the former. Further investigation will confirm these statements, and establish the fact, that *Raputia* not only forms a part of the important order, *Cusparideæ*, but that it is, itself, a true and legitimate species of the genus *Galipea*.

*Dec. 25th*, 1837.

## ART. XII. *Observations upon the best mode of preserving marine productions.* By J. B. HARVEY, Esq.*

HAVING been asked to give a description of the method which I adopt in preserving marine productions, I have ventured to trespass upon your valuable pages. I am not aware that I

* The most successful instance that we have ever seen, of the preservation of Zoological specimens, is exhibited by the *Echini*, *Asteriæ*, &c. in Mr. Harvey's interesting collection, at Teignmouth. ED.

employ any means but those which ought to suggest themselves to every person who collects specimens in their living state: but if this should meet the eye of any collector going abroad, it may be instrumental in preventing his sending home specimens preserved in the very careless manner which is usually adopted; and of which, the rare and interesting specimens at present seen in the British Museum, and other public collections, shew the most lamentable proofs. I feel quite convinced, and I say it with much sorrow, that most of the specimens of *Echinodermata*—particularly the larger *Asteriæ*, contained in those collections, are in a state of decomposition; they are quite pliant, and will not bear to be handled for the purpose of examination; many of them are covered with mildew, and their spines are continually falling off:—this is owing to the quantity of animal matter contained in them, which is saturated with salt;—a state ill adapted to withstand the effects of a damp atmosphere.

I conceive that the great object to be kept in view in preserving these specimens, is to get rid of *all* the animal matter, for, when dried, it does not convey the slightest idea of its form while living, and it prevents the beautiful structure of the shell of the animal being seen,—and to free the specimen from every particle of salt. This is a work requiring a great sacrifice of time, and it is a tedious and dirty job; but it is indispensable in order to procure a fine specimen, and one that will keep:—(the specimen which accompanies this paper should be carefully examined.) Specimens preserved in the manner which I shall describe presently, do not lose their firmness, and they look as fresh as when taken alive. I am of opinion, that if many of the more valuable specimens which are in the national collection, were soaked in warm water, (changed every six hours) for two days, and then dried, if even nothing more were done to them, they would last longer, and look better than they do now.

Of course if some of the animal matter were carefully removed, (this can be done with the more solid ones, for I have tried upon an old West-Indian specimen;) greater value would be added in proportion as the specimen became completely freed from it. The specimen might be varnished or not, when dried; I think the inner surface should have a thin coat. I use a cheap and useful varnish, composed of one ounce of Canada balsam, dissolved in two ounces of rectified oil of turpentine; and my cement for small specimens, is Canada balsam only: both of which I find to answer extremely well.

When I go to sea for the purpose of dredging, I take out a jar filled with distilled water, and a bottle of spirit of wine.

The moment the dredge is pulled up, I take out the more delicate specimens,—*Comatulæ*, *Ophiuræ*, &c. and put them into spirit of wine mixed with an equal quantity of water.—The larger specimens,—*Asteriæ*, *Echini*, *Spatangi*, &c. I put into distilled water, which *instantly* kills them. By this method I secure all their feelers and spines perfect. It is next to impossible to preserve an *Ophiura* or a *Comatula*, in any other manner, for they drop off all their feelers the instant they leave the sea water. When I reach home, I first take all the specimens which I intend to dry, and put them into pans, filled with distilled water, (or if that be not easily obtained, rain water will do, but having a steam apparatus, I am never without a sufficient supply, and therefore I cannot speak very positively about it). The smaller specimens I allow to soak for a day, or twenty-four hours, if in cold weather; and the larger ones two or three days, changing the water frequently; (every two or three hours, when it becomes turbid). In cleaning them, I merely wash the *Comatulæ* with a camel's hair pencil, in warm water, and pin the specimen out upon *oiled* paper, placed upon cork; (otherwise the feelers could not be separated from the paper, when dry). The *Ophiuræ* I squeeze all over the body, to press out the *ovaria*, &c. wash, and pin them out as before. The *Asteriæ* I cut open through every finger, and take out all their contents, then wash the *inner* as well as the outer surface, with a tooth-brush, scraping off all the soft feelers, but leaving the bony ones; then pin the specimens on cork or board, covered with white blotting paper, three or four times doubled. The larger specimens, which, if not dried quickly, will fall to pieces, I put into the oven until they are set; I keep the heat to 110° only, and turn the specimen every half hour, putting fresh blotting paper under it each time. Generally about three hours is sufficient, to keep them in the oven. I then place them in a current of air to harden. All these specimens, particularly the red ones, should be dried in the shade, and coverered over loosely, for they lose their colour on exposure to the sun while drying.

The *Echini* I clean by taking out all the internal matter, and soaking them in rain water, changed frequently, for three or four days, after which I hang them in the air for a week or so, to take off the faint smell which is peculiar to them.

To preserve the spines on *Echini*, which have been dried without cleaning, I recommend the whole specimen to be dipped into a weak solution of isinglass, two or three times, which, when dry, will exclude the air from their attachments, besides acting as a cement to make them adhere more firmly.

*Teignmouth*, *Nov.* 15*th*, 1837.

## SCIENTIFIC NOTICES, INTELLIGENCE, &c.

[Since our first sheet was made up, containing a translation of M. Turpin's notes upon Mr. Crosse's new species of *Acarus*, a report has appeared in the Morning Post of January 22nd, furnishing the substance of a communication made by the latter gentleman, to the Electrical Society; and as the article bears the stamp of authenticity, we have transferred a considerable portion of it to our own pages. ED.]

"IN endeavouring to form artificial minerals by a long-continued electric action on fluids, holding in solution such substances as were necessary for the purpose, every variety of contrivance had been employed by Mr. Crosse which might enable him to keep up a never-failing electrical current of greater or less intensity, or quantity, or both, as the case required, and which would expose the solutions used to the electric action, in the manner best calculated to effect the object in view. Amongst other contrivances, a wooden frame was constructed of about two feet in height, consisting of four legs proceeding from a shelf at the bottom, supporting another at the top, and containing a third in the middle, each of these shelves about seven inches square. The upper one was pierced with an aperture, in which was fixed a funnel of Wedgewood ware; within this rested a quart basin, on a circular piece of mahogany placed within the funnel. When this basin was filled with a fluid, a strip of flannel wetted with the same was suspended over the edge of the basin, and inside the funnel, and, acting as a syphon, conveyed the fluid out of the basin through the funnel, in successive drops. The middle shelf of the frame was likewise pierced with an aperture, in which was fixed a smaller funnel, of glass, supporting a piece of somewhat porous red oxide of iron, from Vesuvius, immediately under the dropping of the upper funnel. This stone was kept constantly electrified by means of two platina wires on either side of it, connected with the poles of a voltaic battery of nineteen pairs of five-inch zinc and copper single plates, in two porcelain troughs, the cells of which were filled at first with water, and 1-500th of hydrochloric acid, but afterwards with water alone. (In all the subsequent experiments relative to these insects, the cells of the batteries employed were filled with nothing but common water.) The lower shelf merely supported a wide-mouthed bottle, to receive the drops as they fell from the second funnel, to be poured back again into the bason above, without disturbing the position of the stone. The volcanic substance was selected by mere chance, in consequence of its partial porosity, and Mr. Crosse did not believe that it had the slightest effect in the production of the insects. The fluid with which the basin was filled was made as follows:—A piece of black flint having been exposed to a red heat, and quenched in water, to make it friable, was reduced to powder, two ounces of which were intimately mixed with six ounces of carbonate of potassa, and the compound was exposed to a strong heat for 15 minutes, in a black lead crucible, in an air furnace. In this fused state it was poured on an iron plate, reduced to powder, whilst still warm, and boiling water poured upon it; it was then kept boiling for some minutes in a sand bath. The greater part of the soluble glass thus formed was taken up by the water, together with a portion of alumina from the crucible, (a silver one would have been used but Mr. Crosse had none sufficiently large.) To a portion of the silicate of potassa thus formed boiling water was added to dilute it; and then slowly, to supersaturation, hydrochloric acid. This fluid was subjected to a long-continued electric action, through the intervention of a porous stone, in order that, if possible, crystals of silica might be formed at one of the poles of the battery; but Mr. Crosse failed in accomplishing this by these means. On the fourteenth morning from the commencement of the experiment, were observed, through a lens, a few small whitish excrescences or nipples, projecting from about the middle of the electrified stone, and nearly under the dropping of the fluid above. On the eighteenth day these projections were enlarged, and seven or eight filaments, each of them larger than the excrescence from which it grew, made their appearance on each of the nipples. On the twenty-second day these appearances were more elevated and distinct, and on the twenty-sixth day each figure assumed the form of a perfect insect, standing erect on a few bristles which formed its tail. Until this period Mr. Crosse had no notion that these appearances were any other than an incipient mineral formation, but it was not until the twenty-eighth day, when he plainly perceived the little creatures move their legs, that he felt any surprise; and when this occurred, as may be easily imagined, he was not a little astonished. Mr. Crosse endeavoured to detach with the point of a needle one or two of them from their position on the stone, but they immediately died, and he was obliged to wait patiently for a few days longer, when they separated themselves from the stone, and moved about at pleasure, although they had been for some time after their birth apparently averse to motion. In the course of a few weeks, at a hundred made their appearance on the stone. At first each of them fixed itself for a considerable time in one spot, appearing to feed by suction, but when a ray of light from the sun was directed upon it, it seemed disturbed, and removed itself to the shaded part of the stone. Out of about a hundred insects, not above five or six were born on the south side of the stone. On being examined with a microscope the smaller ones appeared to have only six legs, but the larger ones eight. Mr. Crosse states that "It would be superfluous to attempt a description of these insects, when so able a one has been transmitted from Paris. It seems they are of the genus *Acarus*, but of a species not hitherto observed." They have been seen and examined by many scientific men and eminent physiologists, who all coincide with the opinion of M. Turpin, and the members of the Academie des Sciences, as to their genus and species. Mr. Crosse has never ventured an opinion as to the cause of their birth. He conjectured that they arose from *ova*, deposited by insects floating in the air, and that they might possibly be hatched by the electric action; but he could not imagine that an *ovum* could shoot out filaments, and that these filaments would become bristles; and he could not, on the closest inspection, detect any remains of a shell. Moreover, we have no right to assume that electric action is *necessary* to vitality, until such fact shall have been most distinctly proved. Mr. Crosse next imagined their origin to be from the water, and closely examined several hundred vessels in the same room, filled with the same water as that which held in solution the silicate of potassa, but could perceive no trace of an insect of that description. He then examined the crevices and dusty parts of the room, with no better success. In the course of some months these insects so increased, that when they were strong enough to leave their moistened birthplace, they issued out in different directions, Mr. Crosse supposed in quest of food, but they generally huddled together under a card, or piece of paper, in their neighbourhood, as if to avoid light and disturbance. In the course of experiments on other matters, a glass basin was filled with a concentrated solution of silicate of potassa, without acid, in the middle of which was placed a piece of brick, consisting chiefly of silica, connected at each end with the poles of a voltaic battery, of sixty-three pairs of plates, each about two inches square. After many months' action, silica, in a gelatinous state, formed on the bottom of the brick, and as the solution evaporated, it was replaced by additions, so that the outside of the glass basin, being constantly wet by repeated overflowings, was of course constantly electrified. On this outside, as well as on the edge of the fluid within, the insects were similarly produced. The apparatus was covered with them; they hid themselves wherever they could find shelter; many were plainly perceptible to the naked eye, as they nimbly crawled from one spot to another. On examining the table with a lens, no such excrescence as that which marks their incipient state, cauld be perceived. Other experiments were also in progress at this time, with different-sized batteries. On a clay slate, suspended in a glass cylinder by two platina wires, in a similar solution to the foregoing, similar excrescences, and growth to perfect insects, were observed. Between the poles of the battery were interposed a series of seven glass cylinders, filled with the following concentrated solutions:—1, Nitrate of copper; 2, sub-carbonate of potassa; 3, sulphate of copper; 4, green sulphate of iron; 5, sulphate of zinc; 6, water, acidified with a minute portion of hydrochloric acid; 7, water, poured on powdered metallic arsenic, resting on a copper cup connected with the positive pole of the battery. All these cylinders were electrically united together by arcs of sheet copper, so that the same electric current passed through the whole of them. After many months' action, and consequent formation of certain crystalline matters, similar excrescences appeared at the edge of the fluid, in every one of the cylinders, excepting the two which contained the carbonate of potassa, and the metallic arsenic, and in due time a host of insects made their appearance. In another experiment, a bent iron wire, one-fifth of an inch in diameter, in the form of an inverted syphon, was plunged some inches into a concentrated solution of silicate of potassa, and connected with the positive pole, whilst a small coil of fine silver wire joined it with the negative. Similar insects were formed on the gelatinous silica on both wires, also on that part of the wires free from the siliceous deposits, about half an inch below the surface of the fluid. Some of them were formed on the inverted part of the syphon-shaped wire, yet did they repeatedly contrive to arrive at the surface, and to extricate themselves from the fluid. The room in which the three last batteries were acting was kept almost constantly darkened.—*Morning Post, Jan. 22nd*, 1838.

*At the Linnean Society. Nov. 7th*, a paper was read from Dr. John Hancock, on the Angostura bark tree, (*Orayuri*), and its botanical characters, compared with those of *Cusparia*, or *Bonplandia trifoliata*, Willd. The essay consisted chiefly of answers to some objections which have been urged against the former being considered a distinct species, and a vindication of the accuracy of the description, published by the author some few years since. In the Angostura bark tree, (*Galipea officinalis*), the sterile stamens are broad, or dilated and foliaceous; they are crowned, each with a small pellucid glandule, which is very perspicuous in the recent flowers.—Dr. H. was not aware if the same obtains in Humboldt's, or other species; and he thought that, if not so, it might almost afford a generic distinction: such small parts in the flower, indeed, are often employed as generic characters,—nature, as Linnæus and others have remarked,—being more constant in her minuter works. In Humboldt's plant, too, there are *five* stamens and five capitate stigmas; but in this, *Orayuri*, are constantly *seven* stamens, and one single and simple stigma; if these be real facts, and they appeared fully proved, the author considered them amply sufficient for distinguishing the two species. The native names, also, were suggested, as affording presumptive evidence of the fact; and besides, the *Bonplandia* is a large tree, growing to the height of 60 or 80 feet;—whereas, so low was the *Orayuri*, that the author ever found it easy, standing on the ground, to reach its branches, and thus procure abundant specimens. The probability is, that the Baron Humboldt and Bonpland never saw the flowers of the true Angostura bark tree; and the time of the year they visited Angostura,—for they did not visit Carony,—was prior to the season of its flowering. M. Ravago, as he himself informed Dr. Hancock, sent an Indian, at Mr. H.'s request, for specimens of the tree; he returned with them, but without flowers, to the great regret of the travellers. They afterwards met with a tree in Barcelona, (*Bonp. trifoliata*), which they considered to be identical with it.

The author thus concludes;—"Had my printed statements of 1829 been unfounded, M. Humboldt, whose paramount objects are ever to elicit truth, would probably have corrected them; and more especially, since they have been noticed in several French, German, and other European works. It might farther be remarked, that in 1828 or 9, complete specimens were given to several of the most eminent botanists—Messrs. Brown, Lambert, and Don; and, ever zealous as they are for the interests of truth and science, it may be presumed that, had my published description not been found, in the main points, correct, one or other of these gentlemen would, ere this, have exposed its fallacy."

*The following Note* by Dr. Lindley, upon the plant named *Victoria regia*, was read at the last meeting of the Royal Geographical Society, Jan. 22nd.—I have great satisfaction in stating to the Royal Geographical Society, that some specimens of the flowers of this extraordinary plant, which have lately been received from M. Schomburgh, completely confirm the statement of that traveller, in all essential particulars, and, at the same time, establish the new genus *Victoria*, upon the most complete evidence. The most startling circumstance named by M. Schomburgh was, that the flowers measured fifteen inches in diameter; one of the specimens now received measures fourteen inches in diameter, although its petals have rotted off, in consequence of the bad manner in which they have been prepared.

With respect to the genus, it has already been mentioned in the Journal of the Geographical Society, (vol. vii. p. 350), at my request, that although *Victoria* is possibly the same as the *Euryale amazonica* of Pœppig, yet it is, in my opinion, quite distinct from the latter genus. I am not aware that any one in this country, of any botanical reputation, has called this opinion in question; and therefore it may appear unnecessary to notice it further. But Professor Pœppig is so good a naturalist, that it is due to him to state upon what grounds I consider him to be wrong in the genus to which he referred the plant.*

*Euryale* is an East Indian water plant, with very large floating leaves, sometimes as much as four feet in diameter, light purple underneath, and reticulated with numerous, very large, prominent veins. It is, moreover, covered with sharp prickles on the under side of the leaves, the leaf-stalks, flower-stalks, and calyx. In these particulars it agrees with *Victoria*, but in little else. *Victoria* has the inner petals rigid, and curved inwards over the *stamina*, into which they gradually pass; in *Euryale* there is no transition of this kind. In *Victoria* is a double row of hornlike sterile stamens, curving over the stigmas, and adhering firmly to their back; *Euryale* has no such structure. In *Victoria* there are thirty-six large, reniform, compressed, fleshy stigmas; in lieu of this very singular character, *Euryale* has only the margin of a cup, with six, seven, or eight crenatures. *Victoria* has twenty-six cells to the ovary; *Euryale* only from six to eight. And, finally, to say nothing of minor distinctions, the ripe fruit of *Victoria* lies at the bottom of a regularly truncated cup, which stands high above the water; while the flower of *Euryale* sinks into the water after flowering, and the fruit, when ripe, is invested with the decayed remains of the calyx and corolla.—These facts will, I think, confirm my original statement, that notwithstanding the prickles of the leaves and stalks, the ge-

* For the description of Pœppig's *Euryale amazonica*, see Mag. Nat. Hist. vol. i. N. S. p. 606.

nus *Victiria* is more closely allied to *Nymphæa* than to *Euryale*, and will, I hope, set at rest all future ingenious speculations, upon the first of these genera being untenable.*

*Botanical Society of London.*—By a report which we have received of this Society, established Nov. 1836, it appears that the number of members is sixty-five. The number of British plants received, as donations, amounts to 4819 specimens, including Ferns; 767 species, including 1313 specimens, have been arranged in the herbarium, according to the system of DeCandolle. The remaining 3506 duplicates, including 515 species, will be distributed to those persons who have favored the curator with lists of desiderata.

The council beg to inform the members, that in order to afford every facility for examining the herbarium and library, the rooms of the Society will be open one hour and a half previous to the ordinary meetings of the Society, when the curator and secretary will attend, to render any assistance that may be required, and to circulate the books.

The meetings of the Society are held on the first and third Friday in each month, from November to June; and the first Friday of every other month; at their rooms, No. 75, Newman St. Oxford St. at 8 o'clock, p. m. precisely: where all communications to the secretary are requested to be addressed.

*Mr. Gould, the eminent Ornithologist*, has determined on leaving England, in tho spring, for Australia. He purposes spending two years there; his object being to render the splendid work which he has commenced, on the birds of that portion of the globe, a contribution to science which shall furnish naturalists, not merely with faithful delineations of the numerous and interesting forms inhabiting that country, but also containing a history of the habits and general economy of the subjects represented. That no interruption to the progress of the work may occur, all the materials necessary for continuing its publication will be carried out with him. The outlines of the subjects will be made by his own hand, and the lithography, as in all his previous Illustrations, will be executed by Mrs. Gould, who will accompany him in his travels.

*A large and beautiful* new species of antelope has recently reached this country from Africa. It was discovered by Captain W. C. Harris, of the Bombay Engineers, whilst on an exploring expedition, between the 24th and 26th parallels of south latitude, and within 28° and 30° east longitude, on the northern side of the Cashan range of mountains, about a degree and a half south of the tropic of Capricorn. It belongs

* From a Report in the Athenæum.

to the sub-genus *Aigoceros*, and the discoverer has proposed toname it *A. niger*, (Sable Antelope. The specimen has been admirably stuffed by M. Verreaux, of Cape Town, and its disposal to some public collection is contemplated, with a view of defraying the expenses of the exploring party, who were so fortunate as to effect its capture: no other individual of the species having been seen in Europe, or indeed known to African travellers.

*By accounts received from* M. Russegger, dated Urbeith, the capital of Kordofan, on the limits of the explored part of north-eastern Africa, M. R. found the White Nile swarming with *Hippopotami* and crocodiles, and the primitive forests in those regions crowded with new species of birds, apes, &c. He left the White Nile near Ternah, where it is still a noble river; and on his way to Urbeith, (travelling nine days on dromedaries), saw the tracks of Giraffes. A second communication from the same traveller and place, states, that he has travelled to the south as far as 10° N. L. with an escort of 300 regular infantry, and 140 horse, all Berbers. The farther he advanced to the south, the more fertile became the country. Palm-trees, with smooth trunks, 80 feet in height; sotor-trees, heavily laden with fruit and flowers; Adansonias, measuring 50 feet in circumference;—excited the astonishment of the beholder. Antelopes, leopards, lions and elephants, were observed in great numbers in the forests. After ten days they reached the gold works of Djebel-Tira. The gold is washed from the alluvial soil of the rivulets at the foot of the mountains. This part of Africa was never before trodden by a European.

*The latest news from* M. Schimper, (who, after having returned from a journey in Egypt and Arabia, made during the years 1834—36, with rich collections for the Wurtemberg Society for encouraging the travels of natural philosophers, has set out for Abyssinia), are from Adowa, the residence of Ras Ubie, who is the ruler of the part of Abyssinia called Tigre. He set out in November, 1836, travelling by Dshidda and Massawa, where he arrived in January, 1837, and on by Arkiko and Haley, to Adowa. His journey was attended with much danger, as well as pecuniary loss, because two Frenchmen had killed a native of Abyssinia, a short time before he reached that country. He was, however well received by King Ubie, as he was the bearer of an introductory letter from the consul-general of Austria, at Cairo. At Adowa M. Schimper is awaiting fresh funds, to enable him to continue his journey. He lives at the house of the English missionaries; and intends next to pay a visit to the

Semmen mountains, a branch of the Abyssinian Alps, chiefly for the purpose of collecting plants and seeds. Several new plants, raised from seeds brought by M. Schimper from Arabia, flowered last year, (1837), in the botanic garden of Stuttgart; but his expedition to the mountains of thetorrid zone of Africa, promises to give much more interesting results.

*The French traveller,* M. Diard, who was induced, by Baron Cuvier, to undertake a Voyage to the East Indies, and the Indian Archipelago, with a view of collecting objects in natural history, is now in Batavia, where he is in high favour with the Dutch authorities, in his capacity of president of the board of agriculture. His collections are particularly rich in Botany and Zoology. He passed a year in Cochinchina, where he became accustomed to the flesh of crocodiles, which is a favorite dish with the natives.

*Forthcoming Works on Natural History.*—Mr. Van Voorst will shortly publish a History of the Fossil Fruits and Seeds of the London clay; by James Scott Bowerbank, Esq. F.G.S. &c. Being acquainted with the extensive materials which the author has been accumulating for several years past, with a view to the publication of this work, and having examined the plates, (executed by Mr. J. D. C. Sowerby), with which it will be illustrated, we are able to speak with confidence of its value, as likely to elucidate the history of a class of fossils highly characteristic of the most important tertiary deposit in this island, but of which no naturalist has hitherto attempted the determination of either genera or species. We understand that Mr. Bowerbank has examined, or had in his possession, upwards of one hundred thousand fossil fruits since he first directed his attention to this class of organic remains. Figures will be given of all the species that can be satisfactorily determined.

Mr. Van Voorst has also in preparation, a Geographical and Comparative List of the Birds of Europe and North America; by Charles Lucien Bonaparte, Prince of Musignano.

*Professor Phillips, of York,* has announced the intended publication of a work on British Belemnites, to be illustrated by the author's own drawings, and to contain about one hundred and fifty figures.

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## SHORT COMMUNICATIONS.

*Instances of longevity in Animals.*—A German paper (Nürnberger Correspondent, October, 1837,) mentions, that a merchant of Amsterdam has been in possession of a grey parrot for the last 32 years, after a relation had had the same bird 41 years. This would make its present age 73 years. exclusively of the age it had when it was brought to Europe. It is now in a complete state of *marasmus*. Its power of vision and memory are gone, and it is constantly dozing. The owner feeds it at regular intervals, on sweet-meats dipped in old Madeira. In its youth this bird was a prodigy of learning and loquacity. At 60, its memory began to fail, it could not be taught any thing new, and it jumbled the phrases it knew in a most ridiculous manner. Till 60, it regularly moulted once a year, and the last time, the red feathers in its tail were exchanged for yellow ones.

This history is the more credible, as it contains nothing *very* extraordinary: parrots after living to a very great age, and old birds frequently deviating from the common colour of the plumage of the species, especially in captivity. The following, however, I should be less inclined to believe, were it not communicated to me on very good authority. A respectable tradesman of this town, (Weimar), had a nightingale which hung for 16 years in his parlour. He obtained it from a merchant of Gera, who had had it during six years. The former paid great regard to the bird's cleanliness and *always* fed it on *pupæ* of ants, either fresh or dry, according to the season, with a few meal worms a day, and whenever the bird appeared unwell, a spider, if it could be obtained. It sung beautifully, throughout the year, except in *April* and *May*, when it moulted. After the tradesman had had it 16 years, a tax of 6 dollars a year was levied upon every nightingale kept in captivity, and the man, thinking it very unjust that he should pay it for a bird caught so long ago, gave it to a physician, who kept it for five years; during which it sang very little. From the latter person it came into the possession of a fourth, who had it three or four years, and where it used to sing again. It died at a merchant's house, after it had been with him about two years. The length of the last three periods is not quite so certain as that of the first two; however, it may be taken for granted, that this nightingale, which had been caught in its adult state, cannot have lived much less than thirty years in its prison.—*W. Weissenborn.*

*We have received* a communication from the Rev. Francis Orpen Morris, requesting us to inform all those whom it may concern, that he has resigned his proprietorship of the *Naturalist*, and ceased to have any connection with that periodical.—*Ed.*

# THE MAGAZINE

OF

# NATURAL HISTORY.

## MARCH, 1838.

Art. I. *Considerations upon the position in the Tertiary System, to which the Faluns of the Loire, and the Crag of England, ought to be referred; and upon the difficulty of determining their relative age, solely by the law of the proportional number of fossil species, analogous to species now in existence.** By M. Desnoyers.

This law, which consists in regarding a tertiary formation as so much the more recent, in proportion as it contains a greater number of species of shells analogous to those now existing, all other characters being put aside, may be excellent in itself, (as M. Deshayes has shewn, who has drawn from it the most positive inferences) especially when it is strengthened by geological considerations, derived, either from the more or less direct superposition of beds, or from the geographical relations of basins: it is, however, of very difficult application, and may lead into serious errors, or, at least, into contradictory results, in a case where the fossils of similar strata are examined by conchologists, who form different estimates of the value of characters, in the discrimination of species; or, more particularly, when it is endeavoured to fix the relative age of many strata, according to numerical results, obtained separately by observers who do not agree upon the essentially distinguishing specific marks.

Now we know how far naturalists are from a general understanding, with respect to the extremely nice question, as to the limits of possible variations occurring at particular periods of growth, or in consequence of the influence of this or that situation, and other local circumstances; not only as respects the *Mollusca*, but in all the other branches of zoology.

* From the 'Bulletin de la Société Géologique de France;' April 3rd, 1837.

The particular views according to which different observers form their respective estimates of specific limitations, must then occasion a considerable variation in the numerical results, connected with the identification of fossil with recent shells; and, consequently, a corresponding difference in the determination of the age of the strata in which the former are contained. It is, however, upon this foundation, that geogenic inferences, of the most important character, are based; such as, the progressive changes of temperature, and the successive creation of species, or their insensible modification from one epoch to another, and from one, to a neighbouring basin.

It is then necessary, for greater certainty, that the fossils of different tertiary strata should be compared among themselves, and with living forms, by the *same* conchologists; or that, at least, specific characters should be adopted, which are uniform, and of fixed value. But it will be a long time before this can be the case; nevertheless, this chronometer, once introduced into the science, will necessarily be made use of by all those who may think themselves sufficiently acquainted with comparative zoology to employ it practically, however different may be their principles of specific recognition.

It is thus that the attentive study of the fossil shells of two tertiary formations, the faluns of the Loire, and the crag of the eastern side of England, has recently led to results so contradictory, that it seems to me important to call attention to them, before we allow them to be definitively established in the science. It is now no longer doubted, that these two important deposits are more recent than the whole of the Parisian strata: but if this opinion, (which I have endeavoured* to establish from the direct superposition of the faluns of the Loire, upon the last freshwater stratum of the basin of the Seine, and from a very striking general resemblance between the faluns and the crag,) has been generally adopted, it has not been the same with regard to their mutual agreement in age, which I also pointed out as very probable. Yet it was not merely from external characters, owing to the deposition of these two strata under analogous physical circumstances, that is to say, in shallow gulphs, and upon shores, that I had pointed out this connection, but from the amount of analogies among fossils of different classes, common to the two

* Annales des Sciences naturelles, February and April, 1829, (v. xvi. p. 171 and 402): Observations on a series of marine deposits more recent than the tertiary strata of the basin of the Seine.

deposits. M. Deshayes, and Mr. Lyell,* while they admit the incontestably later date of the faluns and crag, than of the whole Paris basin, have made of the former, two distinct formations, from the proportional number of their fossil shells, analogous to species now existing; which, according to M. Deshayes, differs greatly in each: and it has been concluded from this, that they are separated from each other by some one of the revolutions which have determined the formation of the last great chain of mountains. The faluns, according to M. Deshayes, (whose zoological results Mr. Lyell has entirely adopted, by making them the basis of his three tertiary periods, *eocene*, *miocene*, and *pliocene*), should contain 19 per cent. of shells analogous to recent species, and should belong to the middle tertiary formation, the *miocene* of Mr. Lyell; which comprehends also the greater part of the tertiary strata of the Gironde, those of Vienna, Turin, &c. The crag on the contrary, containing at least 50 per cent. of species analogous to the recent ones, should belong to the upper tertiary formation, the *pliocene;* to which also are referred the sub-appennine hills, Sicily, and other deposits in the basin of the Mediterranean, and even the littoral deposits, formed almost entirely of species now living in the neighbouring seas, as those of Nice, Uddewalla, and many others.

Now results so positive are found to be contradicted, and this order set aside, at least provisionally, by the more recent observations of M. Dujardin, upon the faluns; and those of Dr. Beck, upon the crag. Biassed by preconceived opinions of a completely opposite nature, M. Dujardin, inclining to admit analogous species, and Dr. Beck not to acknowledge any; these two naturalists arrive at results, each entirely different from those of M. Deshayes, which have been the sole cause for distinguishing between the faluns and the crag. M. Dujardin,† after having for a long time hesitated to admit, in support of the recent age of the faluns, the close and indisputable connection which I had pointed out, between the freshwater stratum of the Loire, covered by the faluns, and the Parisian freshwater stratum, has been led, by the mere examination of the fossil shells of the faluns,—an examination

* Lyell, Principles of Geology, first edition. The tables of M. Deshayes, published in an appendix at the end of the third volume, May, 1833. The results of his important labours since published in several other works, have been again brought forward by M. Deshayes, in his last memoir on the temperature of the tertiary periods. (Annales des Sciences naturelles, May, 1836.)

† Memoirs on the deposits in Touraine. Memoires de la Société géologique de France. Vol. II. 2nd part, 1837.

more exact than I had been able to make,—to regard them as belonging to the most recent of the tertiary formations.—He points out there, indeed, 50 per cent. of species analogous to those still existing, for the most part, in the Mediterranean; and he connects them with the strata of Sicily, and the subappennine hills, in which M. Deshayes indicates the same proportions, but which he distinguishes from the faluns, as forming a more recent tertiary stage.

While the researches and exact determinations of M. Dujardin tend to lessen the antiquity of the deposit of the faluns of the Loire, an examination of the fossil shells of the crag of England, rendered easier by the assemblage of a larger number of species than M. Deshayes had been acquainted with, led to a diametrically opposite result. A very numerous collection of these shells, studied about a year since, in London, by Dr. Beck, of Copenhagen, curator of the museum belonging to the Prince Royal of Denmark, presented to him numerical results, very different from those previously established by M. Deshayes, and adopted by Mr. Lyell, in support of the classification of the crag in the upper division of the tertiary strata. Instead of recognising there 50 per cent. analogous to the living species of the German ocean, Dr. Beck considers almost all the fossil species of the crag which he has examined, to the number of four hundred and fifty, as distinct from any known existing species; though he finds among them in general, more resemblance to those of the north seas than to any others.* Mr. G. B. Sowerby has joined in the same opinion, as to the almost total absence of analogous species. M. Agassiz having examined the remains of fishes, and M. Milne Edwards those of *Polypi*, which are very numerous in this deposit, have found no species analogous to recent ones. In support of these considerations, which tend to heighten the antiquity of the English crag, great stress has recently been laid on the presence, in this deposit, of the teeth of the *Mastodon*, which are also found in the faluns, an argument of which I availed myself, in favor of the contemporaneous origin of the two deposits. Upon these determinations, many English geologists have not hesitated to bring down the crag into the *middle* tertiary formation; whilst the computations of M. Dujardin would reduce the age of the faluns to a much more *recent* period; a result, the inverse of that arrived at by M. Deshayes and Mr. Lyell.

* Proceedings of the Geological Society of London, Vol. II. No. 44; address of Mr. Lyell on the progress of the Geological Society of London, in 1835.—Read on the 19th of February, 1836.

Mr. Charlesworth, who appears to have lately paid considerable attention to the examination of the crag,* and who has offered many objections to the employment of the proportional number of analogous species, in determining the ages of the tertiary strata; among others, that of the possible introduction of the fossils of one stratum, into an adjoining one, proposes, it is true, to distinguish *two* formations in the English crag, the lower, or coralline crag, and the upper, or red crag, as belonging to two different periods. But there appears to exist between them so intimate a union, that their separation does not seem to me more admissable, than that which we might also propose in the basin of the Loire, between the beds of littoral crag, composed of broken shells, and those of calcareous coral, deposited under calmer waters, and which appear generally lower.

It is, then, with the entire deposit of crag, that we must compare the deposit of the faluns. Now, to resume our argument, the following is a statement of the present state of diverging opinions with regard to this subject.

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| The faluns, according to | M. Deshayes, | contains 19 per cent. | of analogous species. |
| according to | M. Dujardin, | - 50 - | |
| The English crag, | M. Deshayes, | - 50 - - | |
| | Dr. Beck, | no analogous species. | |

Consequently, if we admit the separate results of M. Dujardin, who has not, it is true, studied the crag, and of Dr. Beck, who has not studied the faluns, but who have each based their judgment upon the examination of a great number of species of each deposit, unmixed with those of any other basin, even of basins supposed to be contemporaneous, we must conclude from them, that the faluns are as recent as the subappennine hills, and the upper stratum of Sicily; and that the crag is not only more recent than the faluns, but, by the mere application of the law of the proportional number of analogous species, will descend into the lower formation of Paris and London. I am far from admitting all these consequences, especially the last; and I do not doubt that in default of perfect identity, we ought to reckon a greater or less analogy between the fossils of different basins, and the recent species, as M. Defrance formerly proposed. It is also very possible, that if Dr. Beck had examined the fossil shells of the faluns, he would not have recognised there anything like so many analogous species as M. Dujardin; and that if the latter had studied those of the crag, he would have pointed

* Proceedings of the Geological Society, No. 41.—Edin. Phil. Jour. [Taylor's] October 1836, and January 1837.—Loudon's Mag. Nat. Hist. Nos. for Jan. and Feb. 1837.

out there, perhaps, as many analogous species as in the faluns; and from this double examination we may conclude, as I had already done, eight years since, upon a more superficial investigation, that these two deposits are contemporaneous, a mean conclusion, between two opposite results.

If I have particularly called the attention of geological conchologists to this difference of determinations, it is because it may have more important consequences than we should at first believe; and may tend to modify the opinions now admitted, in consequence of the important labours of M. Deshayes, and of many other geologists, upon the relative age of other tertiary groups of the middle of Europe, more important than those of the faluns and the crag, but of which these have been considered the representatives and contemporaries. But it is not possible to be too scrupulous in our examination, ere we admit facts or opinions, opposed to such as have in their favor, a course of study as long and as conscientious as that of M. Deshayes; and which are supported by the examination of a collection, so rich as his. To cite but one example of the indirect but positive consequences which may result from the proportional numbers of analogous species fixed by M. Dujardin, I shall call to mind that M. M. de Beaumont and Dufrénoy divide, into two large formations, the whole of the Parisian strata, the most recent of which comprehends the marine freestone of Fontainebleau, and the upper freshwater deposit. To this second group they continue, notwithstanding very strong objections, to refer, at the same time with many other deposits in the south of France, the faluns of Touraine; of which, nevertheless, they admit the incontestible superposition to the upper freshwater deposit. Now if the faluns does indeed contain 50 per cent. of species, analogous to recent ones, how can it be regarded as nearly contemporaneous with a marine formation, which does not furnish more than 3 per cent. for such is the computation adopted by M. Deshayes for the whole of the Paris basin? That is to say, how can we unite the two extremes of the tertiary period? And the lower marine deposit of Paris, is there too closely connected with the upper deposit, to allow of our perceiving between them any greater difference than between the latter and the faluns, which, at twenty leagues distance, contains hardly ten species common to the Paris basin, among more than three hundred. Must we not conclude from this, either that the law of the proportional number of analogous species is entirely inapplicable, or that the calculations obtained by M. Dujardin are inadmissible, or, finally, that we cannot arrange in one group, the faluns, and the upper Parisian formation, referred by M. M. de Beaumont and Dufrénoy to the middle tertiary period?

I might also point out, in support of my opinion, which tends to regard the faluns and the crag as contemporaneous, that this latter deposit, whether upon the eastern side of England, or upon the opposite coast of the low countries, represents there the middle tertiary formation; the seas of which, according to the contrary opinion held by M. Deshayes and Mr. Lyell, did not penetrate into this part of Europe. We follow the formation of the faluns, from the basin of the lower Loire, to the sides of the channel, into Cotentin, across central Bretagne, to Chateaubriand, Rennes, Dinan, and from the other side of the channel, to Carentan, &c. By degrees, in proportion as the deposits are more northern, we see a great part of the larger species of the faluns of the Loire and the Gironde, disappear; while there remains, notwithstanding, a great number of smaller species, common to both the faluns and the crag; so that the identity between the faluns of Carentan, and the crag of Suffolk, is almost incontestable, and is greater than with the faluns of the Loire. How then can we separate them so completely as has been proposed? Must we not, on the contrary, admit their differences to be simply topographical, in one and the same period?

But without insisting much upon this geographical argument, which is not without importance, and would be rendered more evident by a distinction of colour, upon a map of the distribution of the different tertiary formations of Europe, I shall confine myself to calling once more to this question, the scrupulous examination of those zoologists and geologists, who have particularly applied themselves to the study of the tertiary formations.

[We have been led to give the above observations of M. Desnoyers, a place in the Magazine of Natural History, from a conviction that the attention of those who may be interested in the advancement of tertiary geology, cannot be too frequently, or too forcibly, directed to the unlimited extent of error which must inevitably result from an implicit belief in the merits of the *per-centage* test of M. Deshayes and Mr. Lyell; and also, because we feel called upon to notice the circumstances under which M. Desnoyers comes forward as the expounder of the fallacies likely to arise, in forming a chronological classification of fossiliferous rocks, by "the law of the proportional number of species analogous to species now in existence."

In the original memoir, (p. 207), we find the following remark.—"M. Charlesworth, qui parait s'être beaucoup occupé, dans ces derniers temps, de l'examen du crag, et qui a présenté aussi, à ce sujet, plusieurs objections sur l'emploi du nombre proportionnel des espèces analogues, pour déterminer l'âge des terrains tertiaires, entre autres, celle du mélange possible des fossiles d'un terrain, dans le terrain adjacent." Then in a note at the bottom of the page, a reference is given to the English journals in which these objections have appeared. Now as it was clearly the intention of M.

Desnoyers, to demonstrate the difficulty of determining, by Mr. Lyell's method, the relative ages of tertiary deposits, and since he admits that many objections had been urged against the practical application of the per-centage test, by a *previous* writer, surely he might have been expected to give some further intimation of the nature of those objections, even were it merely for the purpose of strengthening his own cause. In treating upon all matters of scientific enquiry, either in recording new facts, or enlarging upon the ideas of others, it is usual for some reference to be made to the condition in which the particular subject under investigation, has been left by preceding writers. The reasons, however, which have led M. Desnoyers, in this instance, to deviate from a course so obviously consistent with just and honorable feeling, are but too plainly apparent. The "objections" spoken of by this geologist, but without any explanation as to their nature or bearing, are nothing more or less than the very same which now appear in the Bulletin of the Geological Society of France, in the form of original suggestions, by M. Desnoyers; although they have been transferred to the pages of that work, from communications which have appeared, at various times, in the scientific periodicals of this country. We would remark also, that M. Desnoyers' acquaintance, as a practical geologist, with tertiary deposits, does not appear to have furnished him with one single objection against the employment of the per-centage test; his sole ground for opposing its general introduction into the science, resting upon the opposite views entertained by different naturalists, respecting the identification of fossil with recent species. The amount of originality contained in M. Desnoyers' reflections, and the degree of assurance he must have possessed, to exclaim "Si j'ai appelé spécialement l'attention des géologues conchyliologistes sur cette divergence de déterminations," (p. 209), can only be duly estimated by presenting one or two passages from the memoirs, the contents of which he appears to have so freely consulted.

In the Magazine of Natural History for 1836, p. 537, an abstract is given of a paper, read at the previous meeting of the British Association, by the editor of the present series of this journal; the title being,—"*On some fallacies involved in the results relating to the comparative age of tertiary deposits, obtained from the application of the test recently introduced by* Mr. Lyell *and* M. Deshayes."

The following passage will be found in this article, at p. 537.

"During the author's investigation of the fossiliferous strata above the London clay, in Suffolk and Norfolk, some facts have come under his observation, which appear to him to point out sources of error to a considerable extent, in the application of the test recently proposed by M. Deshayes and Mr. Lyell, and which is now so generally made use of in the classification of tertiary formations.

"The crag has been referred, by Mr. Lyell, to his older *pliocene* period, on the authority of M. Deshayes, who identified, among the fossil *Testacea* of that deposit, 40 per cent. with existing species. The correctness of this result has been called in question by other eminent conchologists, particularly Dr. Beck, of Copenhagen, who has examined the crag fossils in the author's collection, and considers that the whole of them are extinct. In this opinion Dr. Beck is supported by Mr. G. B. Sowerby; who states that he has met with only two or three crag shells, which may, perhaps, be identified with existing species. Professor Agassiz has inspected an extensive series of ichthyological remains, collected from the crag by the author; and pronounces them all to belong to extinct genera or species: while a precisely similar result has attended Dr. Milne Edwards's examination of the corals.

"Professor Phillips, in his Introduction to Geology, has placed the crag in the *miocene* division; while Dr. Fleming, who, for more than a quarter of a century, has been an indefatigable collector of British shells, considers that the proportion of recent species, in the fossils of that formation, has been rather *under* than over rated by Deshayes; and, among the corals of the crag, he has detected a large proportion of living forms.

"The particular one of Mr. Lyell's divisions, to which a geologist will refer any given deposit, must, therefore, depend upon his own estimate of the characters which constitute specific distinctions; and which is evidently liable to the greatest possible amount of variation."

In Taylor's London and Edinburgh Philosophical Magazine, for January, 1837, p. 1, a paper is published by the same author, entitled,—"*Observations on the crag, and on the fallacies involved in the present system of classification of tertiary deposits.*"

In this subsequent memoir, the discrepancies in the opinions of different naturalists, as regards the specific identities of the crag fossils with recent species, are more fully treated of; and the following remarks, having immediate reference to that subject, occur at p. 7.

"In the annual address delivered by the President to the Fellows of the Geological Society, Mr. Lyell particularly adverts to the discordance of opinion between two such eminent naturalists as Dr. Beck and M. Deshayes, and suggests that it may probably be attributed to their difference of opinion as to the amount of variation necessary to constitute a distinct species. Thus, for instance, Dr. Beck would look upon those six or eight forms which M. Deshayes includes under the name of *Lucina divaricata*, as six or eight distinct species of the genus *Lucina*; while M. Deshayes would consider them as varieties only. Now, this explanation is only admissible upon the assumption that M. Deshayes allows the existence of as much difference between the crag fossils, and what he now regards as their living analogues, as there is between the six or eight varieties of *Lucina divaricata*. This is an important consideration; for if M. Deshayes should assert the identification to be complete, between the crag fossils and living shells, it is evident that the explanation affords no solution whatever of the difficulty.

"From these facts, the following inference may, I think, be fairly drawn: that if a series of tertiary fossils be placed before the most eminent conchologists in different countries, for the purpose of ascertaining, from the percentage of extinct species, what position, in a geological series, the formation should hold, from which these fossils had been obtained, that position might be decided to be, *eocene* in Denmark, *miocene* in England, and *pliocene* in France; and had we fifty intermediate gradations, it is very possible that no two conchologists would refer the deposit in question to the same position.

"Greatly as the discordance of these results is to be lamented, as retarding the progress of geology, it must be mainly attributed to the present imperfect condition of conchological science, and not be supposed to invalidate the general course of induction pursued by Mr. Lyell. Nevertheless, it must be admitted, that the practical application of the principle advocated by this eminent geologist, in the classification of the supracretaceous rocks, will be extremely limited in operation; for even if we suppose that conchologists universally admit the soundness of the principle upon which the present system of chronological arrangement is founded, they cannot equally make use of it as a means of obtaining numerical relations of affinity, since the characters thought by one to constitute a distinction of species, are, by another, looked upon as mere modifications of form."

The views embodied in the observations of M. Desnoyers, so precisely accord with the opinions expressed in the above extracts, that the former can hardly be looked upon in any other light than a translation of the latter;

more especially as M. Desnoyers admits his acquaintance with the articles in question, when republishing their contents, without acknowledgment.— The circumstance of connecting with these views, the deposits of the Loire, and the numerical estimate of M. Dujardin, cannot be regarded as affording, in any way, the character of originality to M. Desnoyers' remarks, since the source of error having once been pointed out, it may apply, to a greater or less extent, whenever a series of fossil species are submitted to the examination of any conchologist.

After the publication in our last number, (p. 94), of Professor Owen's letter, detailing the circumstances through which M. Coste was enabled to communicate to the French Academy, the existence of an *allantois* in the fœtal kangaroo, it is with regret that we are thus compelled to notice on the part of a continental naturalist, labouring in a different field of scientific research, a somewhat similar instance of undue appropriation. The cases are, it is true, in some respects widely different; for though the points at issue in both, are of extreme importance, still, in the present instance, the facts were so obvious, and the inferences so palpable, that no great share of credit could ever arise to the original impugner of the per-centage test, merely upon the ground of a non-agreement among conchologists, as to the determination of species. The violation of principle, however, involved in both, remains the same.

M. Desnoyers in opposing the separation of the red and coralline crag upon the ground of their intimate relation to each other, has exposed his extremely superficial acquaintance with the facts which have been published respecting the history of these two deposits; since it has been expressly shewn that the occurrence in both beds, of certain species presumed to be identical, only establishes a relation similar to that connecting the red crag, with the shelly strata now accumulating in the bed of the German ocean; for the crag species now actually in existence, are estimated by M. Deshayes at 40 or 50 per cent; consequently this large proportion is *common* to the crag, and the deposits now forming in our seas; yet no one denies the remote era to which the former belongs, when compared with the formations in progress at the present day, although there may be differences of opinion, as to its *relative* age, and its position in the tertiary series. Ed.]

## Art. II. *Meteoric Observations made in Germany, in November last.**

The observations made in Grätz on the nights of the 12th and 13th of November, respecting the often-predicted meteoric stars, have furnished some not uninteresting results, though the sky was very much overcast, and brightened up only occasionally. The night between the 12th and 13th, set in with a beautiful *Aurora borealis*, which appeared in the northern quarter of the sky, towards six in the evening. It assumed the form of an arch, and took a direction extending from N. W. to N. N. E. at an elevation of about 20° above the horizon. Its colour was rose, passing into violet. The highest point of the arch was about 15° below the constellation *Ur-*

* For this translation from the Allgemeine Zeitung of Dec. 15th, we are indebted to a correspondent signing herself Georgina Roos. Ed.

*sa minor*. After the continuance of about 50 minutes, the red colour began to grow paler, and finally disappeared in the moonlight, which occasionally penetrated through the clouds: traces of it were, however, visible till nine in the evening. The rays which usually accompany an *aurora borealis* were not observable in this. From seven till eleven, the sky was so covered with masses of feather-like clouds, which came from the east, that no observation could be made. After eleven, the clouds separated, and there were several points on the equinoctial, which became visible, together with the constellations *Orion*, *Canis major*, and *C. minor*: *Castor and Pollux*, *Cancer*, *Ursa major*, *U. minor*, and *Cassiopeia* came afterwards into view. No trace of the *aurora*, though the sky continued clear in these places till two o'clock in the morning, nor even a single falling star, was discovered, although an attentive and thorough observation of the heavens, on every side, was kept up. Under these circumstances, then, nothing of much consequence can be said to have presented itself, on the night between the 12th and 13th of November, with the exception of the *aurora borealis*. On the following night it was otherwise. Although the sky was, on this night likewise, so overcast, that no observations could successfully be made, from six to eleven, the clouds afterwards dispersed, so as to leave the region of *Orion*, *Canis major*, *C. minor*, *Gemini*, *Cancer*, *Leo major*, *L. minor*, *Ursa major*, and *Cassiopeia*, serene, from four minutes before twelve in the evening, until half past five in the morning,—that is, for a duration of five hours and a half. In the course of this time, twenty-six, for the greater part very considerable, shooting stars were observed; by far the greater number of which became visible at determinate points of the equinoctial and the ecliptic, and seemed to be there concentrated.—But ten, most of them of considerable brightness, and with luminous, rocket-like tails, appeared in the constellation of *Orion*, and its immediate neighbourhood, from 20 minutes past twelve to 23 minutes before three, a period of two hours and seventeen minutes. Six, not less considerable, some immediately in *Leo major*, others in the neighbouring constellations of *Cancer* and *Leo minor*, were seen from 6 minutes to one, to 5 minutes past three,—namely, during two hours and thirteen minutes. Four were visible in *Gemini*, from 14 minutes past one till 6 minutes to three,—viz. one hour and forty minutes. Of the remaining six, three appeared in *Ursa major*, one in *Cassiopeia*, one in *Triangulum*, and one in *Pisces*, during a period of two hours and forty-two minutes. It is worthy of remark that the falling stars, with only two exceptions, held their course in a direction which corresponded generally with the motion of the earth in its orbit, only that the motion of most of them was from east to west; some deviated a little to the north and south, but only two had a purely north or south direction.

The number of falling stars observed during these five hours and a half, was not, indeed, considerable; but when it is recollected that the sky, during that time, was only partially clear, and that even the bright spots were occasionally obscured by passing clouds, it will be admitted that the number of falling stars observed is probably only half what it would have been, had the sky been cloudless. Besides, the observations were limited to the period above mentioned, as the sky was again, at half past five in the morning, covered with clouds, and no further observations could be made. It is evident, then, from these circumstances, that the night between the 13th and 14th of November, ought to be numbered among the remarkable meteoric nights; and it now remains for us to await the accounts of other, and perhaps more favoured, observers.

In consequence of the resolution come to by several German astronomers, at a meeting of natural philosophers, held at Prague, watch was kept at Grätz, for the falling stars expected to appear on the nights from the 27th to the 30th of November. The sky, however, proved unfavourable, being thickly covered with clouds during the whole of the three nights. Nevertheless, early in the morning of the last-named day, a very strong north-west wind dispersed the clouds, and a brightening up of the north-west part of the sky ensued.—No falling star, however, was seen; but at five o'clock in the morning, a clearly defined redness was observed, which lasted forty-five minutes, increasing and decreasing at regular intervals, and which the reporter is inclined to think was the last trace of a disappearing *aurora borealis*.

*Grätz, December*, 1837.

Art. III. *On the influence of Man in modifying the Zoological Features of the Globe; with statistical accounts respecting a few of the more important species.* By W. Weissenborn, D. Ph.

*(Continued from p. 70).*

If I have at all succeeded in interesting the reader by the aphoristical view I have taken of my subject, or the arrangement I have given to materials, which, for the greater part, cannot claim the merit of novelty, I hope I may be permitted to engage his attention still farther, in considering, in a more detailed manner, how man has acted upon particular species, and what will or ought to be their ultimate condition. I shall only single out a few, as deserving particular attention, or upon which I think I have been able to collect information sufficiently interesting for publication. I shall begin with

### *The Common Wolf.*

Like ill weeds, this rapacious animal thrives in almost every climate; destroying every other creature it can master, and consuming during the year, on a moderate calculation, about thirty times its own weight of more or less valuable animal substances: though in cultivated countries the damage it does to the live stock makes its injurious character appear proportionately far greater; not to mention the dangers to which even man is exposed, from its ferocious nature.

Where the wolf is the undisturbed tenant of the wilderness, as we still find it to be in the most secluded parts of the high latitudes of North America, it hunts in packs, and, by beating up the woods, contrives to destroy great numbers of red or other deer, by driving them over precipices. Within its own societies, this animal carries the principle of gross selfishness, and the *jus fortioris*, perhaps to a greater excess than any other creature; as the aged and young individuals are invariably found lean, whilst the middle aged and strong ones are well fed. But we are here more nearly interested in its habits, when it is either acted upon by man, or acts upon him. Even in very thinly peopled countries, this animal evinces a great disposition to damage man in a direct manner. Packs of twelve or more are generally to be found at no great distance from the huts of the Esquimaux, lying in wait for the domestic dog, which they succeed in killing, if it wander so far as to be out of reach of assistance from its owners.—In one instance, in the arctic regions, two of them rushed upon a fine Newfoundland dog, belonging to Captain Lyon, in the day-time, and would have killed it, but for the timely interference of its master.

As the countries inhabited by the wolf become peopled with settlers and tame animals, and less stocked with game, the audacity with which he attacks the tame species, notwithstanding the more extensive persecution to which the animal itself is subjected, increases even more than appears in proportion to the necessity for drawing more and more upon them for subsistence; until, at last, man himself becomes the prey of the wolf. We shall see below, to what an awful extent human lives and property are, in civilized countries, exposed to the encroachments of this audacious robber, if energetic and extensive measures be not resorted to, for the purpose of keeping him down.

To crown the list of the wolf's crimes, it is, like the other canine species, subject to the primary developement of that dreadful disease, *hydrophobia;* which it has, in too many instances, communicated to man.

In return for all the evils which this animal inflicts upon man, it has only its fur to offer; for obtaining which alone, no hunter, in civilized countries, will incur the necessary expense, loss of time, and trouble. No wonder, therefore, that the same game-codes, which were, to such an unjust degree, conservative as to the wild boar, stag, &c. should have outlawed the wolf from time immemorial, as being very injurious to the herbivorous game. But the narrow-minded selfishness by which, until lately, almost all the game-laws have been dictated, did not admit of going a step farther, by encouraging the extirpation of the wolf, by premiums sufficiently high, or in proportion to the interest which the commonwealth had in getting rid of the nuisance. On the contrary, the undue protection bestowed on the herbivorous game, presented great obstacles to the natural right of man to exterminate the wolf; whereas, in every country that is fairly brought under man's control, no wolf ought to exist: a result which, in England, has been effected long ago.

With respect to Europe, it may not, at present, be found practicable to exterminate the wolf in the Pyrenean or Carpathian mountains; the adjacent countries must, therefore, remain more or less subject to the occasional inroads of this animal: but it is probable the Jura, as well as the rest of France, Lower Austria, Upper Silesia, and Poland, might be thoroughly cleared of their *resident* wolves; and it is important, in this respect, that the animal appears to lose the courage necessary to assail man, where it is but a straggler, and that it becomes the more shy, the farther it recedes from the place where it was born; so that within a certain range, it is still very dangerous to the live stock, whereas, if it stray beyond this range, it loses all confidence, and makes every shift to escape detection.

Considering all this, we cannot sufficiently applaud the decision which the 'tribunal correctionel' of La Rochelle, has just given against the Countess du Cayla. The mayors of the villages of Bouhet and Benon, in the arrondissement of that town, had summoned a number of gentlemen, to superintend a general 'battue,' which the inhabitants of those villages intended to make against the wolves, which did great damage to their cattle and flocks. The battue took place on the 27th of August, 1837, and extended over the Countess' property, in spite of the remonstrances of her game-keepers. She lodged an accusation against several of the gentlemen who had been at the chase, but was condemned in the costs of the suit, conformably to Art. v. of Pluviose 19th, An v. by which the administrative authorities are authorized to direct chases to be held, without consulting, or obtaining the consent of the proprietors, wherever wolves or deer endanger the personal security or property of the inhabitants.

In almost every department of France infested by the wolf, there is a society, called 'Société de louveterie,' the object of which is to keep that animal down; and premiums, varying in amount according to the sex and age of the animals killed, are likewise paid. The necessity for extirpating the wolf is therefore acknowledged in that country; but the facts shew that it has not yet been *sufficiently* appreciated, because the means hitherto employed, have been altogether inadequate to effect the purpose.

If, however, we wish to see *just* retaliation upon the wolves, from human law, we must observe what is going on in Prussia, a country, whose internal administration is distinguished, in so many respects, by the truly enlightened spirit in which it is conducted.

After the peace of Tilsit, by which the present province of Posen was severed from that kingdom, and incorporated with the duchy of Warsaw, the new government lowered the premiums which the Prussian government, previously to that peace, had paid to those who killed wolves, to 1 dollar for an adult animal, and half a dollar for a cub. This, as well as the great difficulty of obtaining the reward, though deserved, held out so little encouragement for their destruction, that the wolves increased at such a rapid rate, within the few years from 1807 to 1815, that in 1814, *three* grown persons and *sixteen* children were devoured by them, *in the circle of Wongrowiec alone*. As soon, however, as Prussia had again taken possession of Posen, in 1815, no time was lost by the government in getting rid of so great a public nuisance.— The rewards which had been paid previously to 1807, when Posen formed part of the province of South Prussia, were again awarded; viz. 6 dollars for an adult wolf, 3 dollars for a cub, and 1 dollar for each embryo found in a female. General battues were periodically made, and different regulations issued, with a view of poisoning the wolves with *nux vomica*.*

*It has been found that the most successful method of poisoning wolves, is to drug small sausages with *nux vomica*, and hang them on the boughs

The joint effect of these measures completely answered the intended purpose. Within the five years, from 1815 to 1819 inclusive, 4618 dollars were paid by the government, in rewards for killing wolves. The exact number killed within that period, I cannot state; but in 1817, the animal had already become sufficiently scarce, to make a considerable increase in the premiums both necessary and practicable.—These were now, 12 dollars for an adult female wolf, 10 dollars for an adult male, 8 dollars for a young wolf, 4 dollars a cub, and 1 dollar an embryo, as before. Thus the persecution of the wolves did not abate, but the animals themselves became so scarce, that notwithstanding the tempting rewards, only 1449 dollars were paid, within the quinquennial period from 1831 to 1836 inclusive, for a total number of 256 wolves destroyed during that time; although during the latter years of that period, the number of wolves had been rapidly increasing. The reason is, that the use of fire-arms having been, to a great degree, prohibited in Poland, after the revotion, the wolves are rapidly multiplying there, and make more frequent inroads into the neighbouring countries. Still no human lives have been sacrificed by the wolves, in the province of Posen; but we may judge that the destruction of men from that cause, must be very serious in Poland itself. In the absence of more positive and extensive information, I can only say, that according to the papers, four girls, of different ages, up to 16 years, were torn to pieces in August last, (1837), in the parish of Briala, district of Rawa, not far from their houses; and if such things happen in summer, what must be the audacity of the wolves in winter!

The present increase of the wolves in Poland will exemplify, in a very striking manner, how quickly the political state of a country re-acts upon its indigenous animals; and until the Russian government shall have found means to keep down the wolves in Poland, the task of destroying them in the province of Posen, will be beset with serious complications and difficulties. Though the *lives* of the Prussian subjects are not much threatened by the stray wolves of Poland, yet these commit such depredations on the live stock, that a society is now forming in the province of Posen, for the purpose of paying extra premiums, of five times the amount of those allow-

of trees, at such a height, that the wolf must leap to obtain them. Under these circumstances the animal swallows the bait at once, and has not time to find out that it contains any suspicious admixture, which it often does if the poison be applied to the carcases of horses, &c.

ed by government; so that, for instance, any one who kills an old female wolf, will receive 12 + 60 = 72 dollars. The contributions of the members will be in proportion to the value of their respective live stock; and it is to be hoped, that in consequence of that measure, the province will be kept pretty clear, even under the present unfavourable circumstances.

As to the Prussian provinces on the left bank of the Rhine, 40 wolves were killed, and 256 dollars paid in rewards there, in 1836. In that number were 7 old females, 6 old males, 1 young wolf, and 26 cubs.

I trust I am but expressing what every thinking person must feel on the subject, if I conclude for the present with saying;—*Censeo lupum funditùs esse delendum.*

(*To be continued*).

[Note on the account of the introduction of the red partridge, (*Tetrao rufus*), into Silesia, p. 70].

After my last remarks were sent to England, I obtained more certain information respecting the results of the proceedings of the joint-stock company, which was formed last year in Silesia, with a view of naturalising the *Tetrao rufus*, by introducing adult birds from the south of France. The partridges had paired and begun to lay, in the two preserves formed for the purpose, near Domatschin and Laskowitz. In the former eleven eggs were laid; but in the latter, only three, because the distribution of the newly arrived birds was delayed, and those already established did not well agree with the new comers. The fourteen eggs were hatched by two hens of the common fowl; on the *twenty-third* day of incubation, there appeared twelve healthy chickens, which, up the age of six weeks, were fed with the *pupæ* of ants, greens, or the common food of young pheasants. They had already grown to three fourths the size of the fledged bird, and nothing appeared to stand in the way of their full developement, when the *cholera morbus* broke out, with great severity, in the neighbourhood of the preserves; in consequence of which all the young, and three of the old partridges, died, up to September 17th. The *cholera*, as appears from many reports on the concomitant phenomena, published in different countries of middle Europe, is particularly injurious to the galline species, though the health of other animals has likewise been found to be more or less affected by it; and the death of these partridges cannot well be ascribed to any other cause, unless we are willing to suppose, that the birds did not find, in these preserves, some peculiar insects, or other food, on which their existence may depend, and for which even the most careful attention paid to them in other respects, cannot make up. The old red partridges with which the district of Domatschin was stocked last spring, were observed there for about two months, but probably failed in hatching young, on account of heavy rains. They afterwards left that neighbourhood, and it could not be ascertained whither they went. Twelve fresh specimens have already been procured for Domatschin, whereas there are at present six at Laskowitz, and new arrivals are expected from Bordeaux next spring; so that the experiment will be renewed in 1838, on a larger scale.

The proprietors of the estates of Zopten and Langenöls, in Silesia, have besides tried to naturalise this species last spring, by procuring eggs from the south of France, by the diligence, well packed in a box, the interstices being filled with the elastic husks of beans. This experiment has hitherto been attended with better success than the former: the eggs were hatched by hen turkeys, the young reared in the open air, and the preserve of those estates is now stocked with eighty-five well-fledged young.—W. WEISSENBORN.

[The red-legged partridge is in such bad repute with English sportsmen, that we believe a very general wish is felt, in the counties overrun by this bird, to effect its extermination, rather than to extend its range to other parts of England.—ED.]

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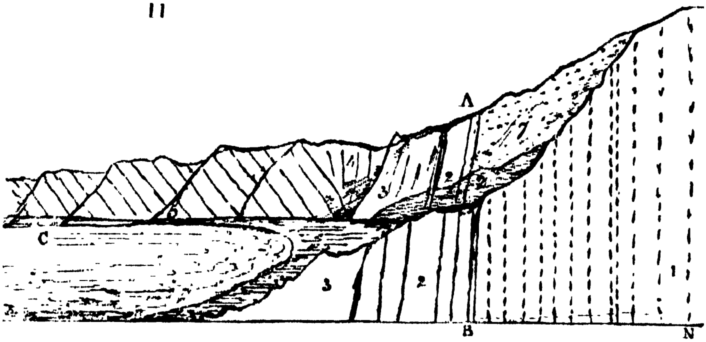
ART. IV. *Illustrations of the Geology of the South East of Dorsetshire.* By The Rev. W. B. CLARKE, M.A. F.G.S.

(*Concluded from* p. 88).

I DO not exactly comprehend Dr. Mitchell's meaning in the second and third paragraphs of p. 590. I have sufficiently explained that my sketch was intended to represent the order of the formations in one line only, from south to north; it was impossible to describe in that line the chalk and chalk marl from east to west, from Ballard Head to Punfield, because it is not seen in the line assumed; *therefore*, the chalk *does begin*, as I stated, at Ballard Head: and *literally* so, for Ballard Head is a promontory, and the allusion of Dr. M. is to the side of this promontory, and not to its transverse section, which was all I considered. But as Dr. M. alludes to this side of the promontory, I must explain the appearances he mentions, so as to clear up his mystery. "We soon began," he says, "to see lines of flint towards the top of the cliff; which, in some places, dip about 40° to the east. Towards Ballard Point, they become quite horizontal, there being still chalk without flint at the bottom." The explanation of this is very easy. The lofty ridge of chalk, of which Ballard Point is a section, slopes down on the southern side, in some places gradually, in others by stages of descent, to the shore, along which are strewed heaps of fallen masses from above, partially obscuring the gault and lower green sand, which rise close to the shore, and in one or two places form an undercliff, from 10 to 12 feet high. The lines of flint at the top, are, therefore, nothing more than the continuous summits of the vertical layers, which thus appear horizontal or inclining to the east, according to the various characters of the different portions of the slope. "The chalk without flints at the bottom," is the chalk marl, which, with its characteristic fossils, rises in its proper place, between the chalk and the gault, to the south of the former; but, owing to the slope and the debris, *appears* to be below the chalk with flints, when it is actually not below, but to the southward. The following plans, (*fig.* 11 and 12) explain this position.

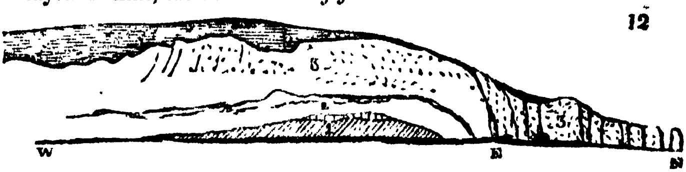
11




*Profile of the cliffs at Punfield, head of Swanwich Bay.*

, Chalk. 2, Chalk marl and upper green sand. 3, Gault and lower green sand. 4, Weald clay. 5, Hastings sands. A, Punfield. B, Ballard Point. C, Swanwich Bay. 7, *Apparently* horizontal layers of flint, the same as 3 in *fig.* 12.

12




*Chalk cliff, north side of Swanwich Bay.*

1, Gault and lower green sand. 2, Chalk marl. 3, Chalk. N, Old Harry. E, Ballard Point.

The chalk marl, in consequence of the pressure it has sustained, and the effects of the atmosphere, when seen from the end of Ballard Point obliquely, looking towards Punfield, appears *columnar;* that is to say, the fragments into which it is broken, (and it has a peculiar conchoidal fracture, breaking into lumps of nearly a regular form), assume, when partly disjointed, that peculiar appearance which characterises basalt.

Dr. Mitchell next attempts to correct Sir H. Englefield.—That writer, however, does not misname Ballard Point, Standfast Point, but he calls *the whole promontory between Studland and Swanwich Bays,* Hand-fast Point. The *misnaming* all belongs to Dr. M.

As to *fig.* 36, which is said to be "*exceedingly bad*"—and *fig.* 38 "*equally so;*" I freely confess this sentence, as it respects the latter figure, is by no means undeserved: as to the former, it is faulty, but not "exceedingly bad." But before I proceed to explain these, and a manifest error in them, and in the text relating to them, I must be allowed to quote a few words in favor of the "wood-cuts," from a high authority.—Professor Sedgwick, alluding to them in a private letter, says, "Your little plates, published in the memoir you sent me, seemed also *extremely good.* I say this without any wish to flatter you." Had it been my intention to point out how many beds of flint there are, I would have counted them; but my object was of a character more general than this, and had no reference to such minute details; for the phenomena I have tried to explain, are not affected by any consideration of the kind.

The re-examination of the whole coast, which I have made in consequence of Dr. M.'s paper, has led me to retract my assertion respecting the inclination of 19° at Old Harry, but, at the same time, to mention some circumstances not before described by any one. All my previous passages round Old Harry, had been made when the sea was too rough to approach near enough to the cliffs, to measure them by the *clinometer.* But on the last occasion, I was enabled to land at various points under the cliffs, where there are patches of shingle lodged in the hollows at the bottom. Had I ever approached, as Dr. M. did, from the south, I should have declared that the beds were horizontal;—but on coming round from the north, the *appearance* is, at a little distance, as I described, and as I thought, justly. The fact is, that the beds at Old Harry are extremely broken, and the bedding lines are not horizontal, but sometimes sloping; combined with these, the dip of the beds to the west, on the sides of Old Harry and his wife, and the other projecting masses, gave the appearance, when the offing was such as to conceal the projection, of a regular inclination, amounting to 19°. Had I followed "too implicitly" other writers, I should not have fallen into this error, for they all say the beds are horizontal; it is true the flint lines are so, but not the chalk. I wish then to recall, (and with thanks to Dr. M.), so much of my previous remarks, and the tendency of the lines to the N. in *fig.* 38, and *fig.* 36, as convey, what I now acknowledge to be, a wrong impression.* At the same time, I must, in my turn, again comment upon Dr. M.'s remarks, in introducing some new matter into this illustration of the coast. He is correct in saying that "the lines of flint descend in a curve, and soon become" nearly? "horizontal." But he is not correct in saying that "the bending lines of flint are exactly twenty-two in

* The editor will do me the justice to say, that I wished to correct the wood-cuts before the paper went to press; which I was not permitted to do.

number;"—there are *more than double that number;* (farther on he himself speaks of forty-nine horizontal layers). I tried to count them, but failed in reckoning all, as some of them are double, and subject to change in their order. I mention one fact which has escaped Dr. Mitchell, and all other observers. About the thirty-fifth "bending" line of flint, the curve, instead of being continuous, is snapped asunder, and the line re-commences a little below the former part, the lines to the top of the cliff pursuing the same course. It is, in fact, *a fault*, at that place, as if the upper beds had given way in the straining of the mass, and the northern portions had slipped away to the north; an analogous example of that phenomenon presented by the whole cliff on a larger scale. And in closely observing, there appear certain cracks, which traverse the upper parts of the curved beds, in a direction transverse to the line of *the great fault* below, and which agree with the joints before alluded to, as affecting the whole cliff, (*fig.* 37), and which are also found in the cliffs of Hastings sand, in Swanwich Bay.

There is another curious circumstance. A little distance from the great fault, the vertical beds of flint are interrupted by the insertion of a mass of *broken flintless chalk*, between two vertical bedding-lines; the flint seams being again continued to the south point of Ballard Head. Does this betoken a still greater derangement than has been yet contemplated? Of this I am sure, the local phenomena are infinitely more extraordinary than Dr. M. believes; far more so than I had an idea of before; for though I had examined very closely *this* end of the cliff, I had never so critically scrutinized it, till Dr. M. set me the example; my previous observations being directed to a *general* survey, for purposes distinctive from an analysis of the beds and their contents. There appear to have been extensive dislocations in the chalk, at a period when the mass extended farther than at present, to the east. These are betokened by the appearance of cracks parallel to the great fault, all through the cliffs, and also by the circumstances attending the insulated masses and projections that line the coast. It is very clear to me, that not only Old Harry and his wife, the square tabular rock mentioned by Dr. Mitchell, at p. 591, (3 in *fig.* 13), and that far more lofty, pointed pillar, not far from it, (4 in *fig.* 13), (the four I allude to at p. 418 above, *fig.* 39, the latter not being named by Dr. M.), but also the projection just under the signal-staff, (*fig.* 36 and *fig.* 39) which bids fair to become a separate pillar before many years, (*fig.* 14), have originated from a pre-existing crack, which traversed the whole ridge in a line parallel with the present cliff, the

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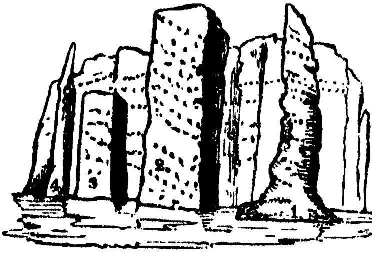
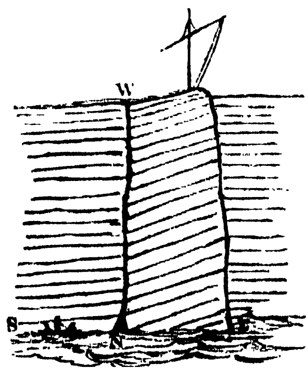



*The four Pillars off Ballard Head*, (Webster.

1, Old Harry. 2, Wife. 3, Dr. Mitchell's tabular mass. 4, Pointed rock near No. 3.

existence of which is very clear at the junction of the beds that dip to the west, with the horizontal beds immediately under the flag-staff, as represented roughly in the following figure, (*fig.* 14).

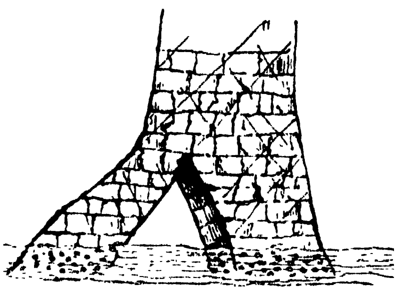
14




*Buttress of chalk dipping to the west, under the signal staff, Ballard Head.*

At the point of junction, the crack is very evident all the way down, and at the bottom there is an incipient arch, pierced by the sea. This also explains the formation of those arches and caves, existing at the foot of the cliffs, which are not round, but *rectilinear*, and shaped by the removal of the chalk blocks, according to the direction of the joints and bedding. An arch of this kind, at the foot of another buttress, a little distance from the flag-staff point, illustrates the lines of fault, the joints, and bedding, most admirably. The following is a rough outline, (*fig.* 15), which shows the structure of the pillar to be that of a coarse masonry.

15



*Arch in the chalk off Ballard Head, formed by the removal of regular fragments of chalk.*

The dotted part below the water, is pierced by myriads of limpets, which have fixed their habitation between high and low water mark, and superficially have honey-combed the whole cliff, from Old Harry to Ballard Head, in a most singular manner.

Two other points *sub judice*, are, the height of the cliffs, and the rate of decay. I have stated *the cliff at Old Harry* to be about 100 feet high; (p. 418). Dr. M. says "the boatmen ascertained *Old Harry* to be about 70 feet high, by looking at the mast of an *Indiaman*, which came very *near him*." Now Old Harry stands on a ledge, *dry at low water*, and having only a depth of 6 feet over it, at high water. Old Harry's wife has two feet water at the base, at low, and 8 feet at high, water. There is, moreover, not a depth of water equal to 4 fathoms, within half a mile; and there is generally a heavy sea running, even in moderate weather, all along the ledge that runs outside the coast, and it is dangerous, even for a boat, at low water, to navigate too close, owing to the fragments of chalk, the ruins of former cliffs, now destroyed, that form dangerous rocks below the surface. I cannot therefore imagine that the boatmen got at the height so easily, if at all, without measurement. In order, however, to make certain, (for, of my two boatmen, one said Old Harry was 70, and the other, 100 feet high), I requested Lieut. Billingsley, R. N. chief officer at Studland, to have it measured. This he accomplished by a hand-line, over the cliff, and his determination is, that Old Harry *rock* is not more than 70 feet, the *cliff* being higher;—and that Old Harry's wife is 93 feet high, the *cliff* opposite being 130 feet. The height, therefore, of 100 feet which I affixed to the *cliff at Old Harry*, is not far from the truth: it was from an old measurement, on a map made several years back, and not mere tradition. I cannot but think, that since that time the cliff has become lower at that point, owing to atmospheric agency, assisted by the waves, which have reduced the height, by throwing the cliff back, into a hollow in the surface. But the cliff immediately rises to the south of Old Harry.

Dr. M. speaks of a tabular mass, half way to Ballard Point, about 100 feet high, (3 in *fig.* 13); and says, 50 years ago, there was a connection between it and the main land. This I have heard before and since; but, if 50 years have been sufficient to separate *so far*, this pillar of "*so exceedingly hard*" chalk, the waves, assisted by rain, and frost, and fog, those mighty agents of destruction, far more insidious and powerful than old Neptune himself, with all his battering rams, will, assuredly, save me from the charge of exaggeration in my opinion, (expressed at p. 419), that "two other and larger pinnacles will not remain many years uncompleted." I have in this paper assigned a sufficient reason, viz. the existence of vertical cracks, which traverse the whole strata. Whether these cracks be true joints, or mechanical dislocations, I will not pretend to say; though I think they imply, that at the north end of the promontory, there have been upheavings and depressions, collateral with those near Ballard Point. If Dr. M. doubts my assumption of the measure of decay in these cliffs, let him compare Mr. Webster's drawing, made in 1813, with what he himself saw in 1833.

Lastly, Dr. Mitchell "endeavours to remove an error which has appeared in Sir Henry Englefield's work, and is also in that of Messrs. Coneybeare and Phillips," (p. 591). This *supposed* "error" alludes to the "shivered" flints of the Purbeck range. Now it is hardly fair to attribute such an "error" to the works in question, when they do not commit it. Mr. Webster actually says; "These flints do *not frequently fall into fragments* in the hand, *as those in the Isle of Wight*," (the charge alleged against this author being, that he says they do), "the parts being firmly imbedded in the chalk; but there is the same variety in the size of the fragments, from large pieces to the finest powder." (Englefield's I. Wight, p. 167). The fact is, there are whole flints and broken flints, all through the Purbeck chalk range; and at Corfe Castle, the fragments of flint are separated, in the same nodules, by chalk and crystallised carbonate of lime, to considerable distances, even where the casts of fossils, (such as *Galerites*, *Spatangi*, &c.) exist, the flinty mass is traversed by cracks and little faults, which have been cemented by carbonate of lime, or a siliceous paste of another colour. And oftentimes, the casts of these fossils, which, though in flint, are of carbonate of lime, are depressed and squeezed out of all shape. Such examples, however, occur out of the Purbeck range, as in the chalk-pits near Blandford, Dorset; and at Bury St. Edmunds, in Suffolk.

Mr. Webster expressly states, that the locality of the fractured flints at Hand-fast Point, (Ballard Point?) is on the *south* side, and not the *east;* (p. 166, and Outlines, p. 113): so that Dr. Mitchell's landing from the boat, and finding it "*not so,*" (p. 591) does not apply to the account he comments on.

I have now, I trust, satisfied my friend's zeal in behalf of geological truth, and shewn him that I have, (by candidly confessing my mistake in one instance), given the best guarantee for my intention to state facts in others. The chief object I had in view in alluding to the cliffs in question, was to explain the *superficial* phenomena of this district; and that done, I had accomplished my intention, with what success, it is not for *me* to suggest: but I have the opinion of a geologist of some little weight, from whom I have before quoted, and who knows the country well, to encourage me to proceed in my Illustrations of the south east of Dorsetshire. Professor Sedgwick, (whose permission I have to employ his opinion), says; "Your account of the collocation of the chalk strata at Ballard Head, is ingenious, (*fig.* 37), and, I think, nearer the truth than any yet given. I did not like Webster's; and I was dissatisfied with Conybeare's:—not for the reason you give, into which I do not enter;" (this was my objection to the denudation of the chalk in Purbeck); "but, because the hypothesis seemed to violate a *very general* rule, viz. that the *drop* of the beds is always on the *slant* side of the *fault line*. Now, according to Conybeare's reasoning, the drop must have been on the *hanging side* of that line.—Again, do not the beds on the right hand side of the figure, (*fig.* 37), look exactly as if they had been *dog-eared*, by a movement of *descent* rubbing their edges against the vertical mass,—or, (which comes to exactly the same thing), by the vertical *up-cast* of the vertical mass?"

Should Dr. Mitchell feel it worth his while to re-examine this coast, I hope he will not think it necessary to take up his abode at that "delightful habitation, the hotel at Swanwich," whilst he can find quarters with me. Should he, when the season opens for geology, have any inclination to be convinced, I shall be ready to shew him, that I have not studied this country, by "*occasional* peeps from the *tops* of the steep cliffs on shore;"—and that, "if he will keep the eyes of *his* understanding open," he *will* "be able to find such a concentration of strata," as *working labourers* in the fields of *expe-*

*rience*, (not "imaginative theorists"), have *convinced*, (not "persuaded") themselves "are there." I shall then be happy to give him an opportunity of following a candid example, by enabling him to correct his own errors, in acknowledging, as I point them out to his sight, the existence of "curved strata and breccia of Purbeck stone," at Durlstone Head;—of Hastings sands, and embedded fossils, in the cliffs of Swanwich Bay;—of green sand, &c. &c. at Punfield, and between it and Ballard Point;—and of all the other phenomena which I have stated to characterise these interesting sections.

*Stanley Green*, 5*th Dec.* 1837.

ART. V. *Some account of a peculiar Structure in the Eyes of Fishes.* By JOHN DALRYMPLE, Esq. Lecturer on Surgery at Sydenham College.

IF it be considered necessary that animals, living in atmospheric air, should possess some description of mechanism, by which the focal adjustment of the eye can be regulated for near or distant vision, it may be presumed that those which inhabit an aqueous medium, should be gifted with some apparatus for a like purpose.

Land animals have been thought to possess this power of adaptation,—1st, by an alteration of the convexity of the *cornea*, through the action of the straight muscles of the globe; a position which, though argued with considerable ingenuity by Sir E. Home, in the Croonian Lectures, has yet found, and is likely to find, but few advocates, except, perhaps, in relation to some birds.

2ndly, by an action of the ciliary processes; their extreme vascularity rendering it probable that something analogous to erectility of tissue may serve this end.

3rdly, by the action of the *iris* itself, whether it be erectile or muscular; for it is well ascertained that contraction and dilatation take place, in exact accordance with the proximity or distance of the object viewed. Persons in whom the pupil has been widely dilated by the action of *Belladonna*, are much more capable of viewing distant than near bodies distinctly. Other circumstances, connected with these states of contraction and dilatation, render it inconclusive whether the *iris* possesses the sole power in regulating the focal relations of the eye.

In birds and reptiles there is superadded a new organ, the *pecten* or *marsupium;* which, while it bears, in appearance and structure, a resemblance to the ciliary processes, yet, from its peculiar connection with the *lens*, (more or less directly varying in different tribes), may fairly be presumed to exert an immediate influence on the position of this refractive body.

In fish, however, the eye differs in many essential respects from that organ in land animals. The *cornea* is nearly flat, while the *sclerotica* is often cartilaginous, or so thick as to be but little acted on by the feeble muscles inserted into it. The *iris* possesses no appearance of fibre, (in the true fishes), and its vessels are not only less numerous, but present no trace of that remarkable arrangement, on which, in land animals, the erectility of tissue has been presumed to depend. There are no ciliary processes. The *lens* is nearly, if not altogether, spherical. There is, indeed, a new, and doubtless an important organ, superadded; this is the *choroid* gland, as it has been called: it is of considerable size, and great vascularity, but its functions are, as yet, undetermined.

In those fish which I have had an opportunity of observing in their living state, I could never detect any movement of the *iris*, in accordance with the degrees of light; although I am by no means prepared to deny the possibility of such action. Still, the absence of those organs, supposed by many to exercise an influence in determining the focal adjustment of the *lens* in land animals, viz. an active *iris*, ciliary processes, and a *marsupium*, might lead us to enquire whether any other means exist, by which the organ might be adapted to vision at different distances. The fact of the sphericity of the *lens*, would induce us to suspect that the power of adjustment, if any, would be *fine*; a very inconsiderable movement in a *lens* so shaped, making a great difference in the distinctness of the image refracted; or, in other words, making a sensible alteration in its *focus*.

Some few years back, in examining the organ of vision in a pike, (*Esox lucius*), I observed a small, roundish, grey-coloured body, about the size of a hemp-seed, attached to the circumference of the *lens*; and at that time, certainly without due consideration, I designated it a muscle, principally from the fact, that I traced a nerve running from the posterior part of the eye, to this peculiar body. The preparations then made, I exhibited to some young American gentlemen, attending the practice of the Moorfields Ophthalmic Hospital. The enquiry was prosecuted no further, until lately, when it was resumed; and its results, imperfect as they are, I now communicate, with a view of inducing attention to this point, from those whose pursuits or opportunities may lead them to extend the scanty details I can as yet furnish.

If the *cornea* of a cod-fish, pike, whiting, mackerel, &c. be removed, the eye remaining *in situ*, and the *iris* carefully stripped off, a small roundish body, slightly stained with the usual pigment, will be seen attached to one point of the circumference of the crystalline capsule, where it is surrounded by that portion of *hyaloid* membrane, analogous to the anterior layer of the canal of Petit, in *Mammalia*. The opposite extremity of this body, or its apex, for it is somewhat pear-shaped, is attached to the posterior and external margin of the *iris*, or at the junction of that membrane with the *choroid*. A delicate fibril of nerve, stained with pigment, proceeds downwards and backwards from this body, between the fissure in the *retina* of these animals, which extends from the optic nerve, to its anterior termination.

The connection of the pyriform body with the *lens* is not immediate, but by the interposition of a fine, transparent, and highly elastic ligament, possibly a portion of the *hyaloid* membrane, to which it closely adheres.

At a point immediately opposite to the implantation of this body, the circumference of the *lens* is firmly bound to the vitreous body, and intermediately to the junction of the circumference of the *iris* with the *choroid* membrane, by a highly elastic, tough, very strong and transparent membrane, capable of supporting the whole weight of the eye: it seems to be gradually shaded off on each side, into the *hyaloid* membrane investing the circumference of the crystalline capsule.

Owing to the slight convexity of the vitreous body anteriorly, the fixed circumferential points, both of the pear-shaped body, and of the elastic membrane, or ligament, opposite, are posterior to their insertions into the crystalline capsule; hence, if any action like that of contraction were to take place in this body, the *lens* would be drawn slightly backwards, and its focal relation altered. Upon a cessation of the contraction, the lens would be restored to its place, by the re-action of the elastic ligament.

The relative situation of this body may be determined in the following manner. If the gill-covers of the fish, (cod or pike), be removed, and an imaginary line, (D E, *fig.* 16), be drawn from the nostril to the superior articulation of the *branchiæ*, and another line, (F G), cutting it at right angles, drawn through the centre of the eye, this body will be found placed in the under and anterior quarter into which the eye will be thus artificially divided. In this diagram, A indicates the position of the pear-shaped body; B, the elastic ligament opposite; C, the *iris*, partially removed.

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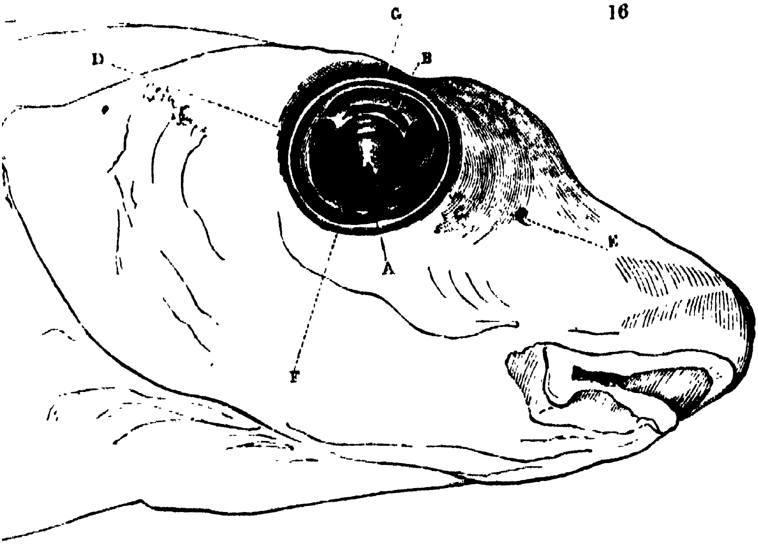


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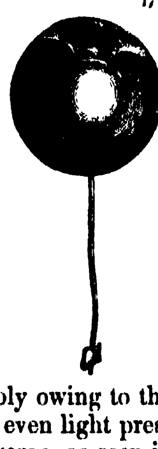

In the preparation taken from the eye of the pike, which is now in the museum of the Royal College of Surgeons, I found this body supplied by a considerable filament of nerve, which, traced to the posterior part of the eye, was found to enter the *sclerotica*, in the immediate neighbourhood of the optic nerve. The diagram, (*fig.* 17), represents this preparation.

This body, if placed between two plates of glass, and carefully expanded by pressure, exhibits, under a good microscope, a granular mass, interspersed with minute blood-vessels, capable of being coloured by a vermilion and turpentine injection. It is also threaded by filaments of nerve. I have not yet been able to trace distinct fibres, possibly owing to the softness of the mass, it being crushed under even light pressure; no marks, therefore, of the *lineæ transversæ*, as seen in ordinary muscular fibre, can be observed. This latter circumstance is no proof of its not being muscular, since although these parallel lines or furrows, when present, are tests of muscular fibre, yet they have not been discovered in those of the involuntary class, as in the heart or intestines.

The pear-shaped body is sensibly hardened by boiling, spirits of wine, and acids; and from the circumstance of its large nervous supply, I am inclined to believe it muscular, although at present, direct and incontestible proof is wanting. I may observe that in the eye of the pike, a predaceous fish, possessing remarkable quickness of vision, the pyriform body is not only relatively, but absolutely larger than in a cod fish, greatly exceeding it in weight.

That the existence of this body is as yet unknown, in England at least, is I think borne out by the fact, that the learned Professor of Comparative Anatomy at the Royal College of Surgeons, Mr. Owen; and Mr. Yarrell, so well known by his beautiful work on the ichthyology of Great Britain; were both unacquainted with the circumstance when I mentioned it to them.

In a number of the American Journal of Science and Arts, will be found a somewhat similar account of a *muscle*, discovered in the eye of the streaked bass, (*Perca nobilis* vel *Mitchellii*), by Mr. W. Clay Wallace, surgeon to the New York institution for the blind. This gentleman did me the favor to send me over, about twelve months since, his paper published in that journal. From the circumstance of my not being aware of being personally acquainted with Mr. Wallace, I cannot help suspecting that he is one of the Americans to whom the observations made by me, were imparted at the ophthalmic hospital, some years ago. I beg, however, to return him my thanks for much new and interesting matter, which has been added by him.

The following quotation from Mr. Wallace's paper, gives all that he has said relative to this body.

"At the inferior axis of the crystalline *lens*, (in the *Perca nobilis*), and attached to its capsule, is a small triangular body, having its inner surface covered with *pigmentum nigrum*. It adheres to a cord placed at the divided portion of the *retina*. It passes through a loop in the *iris*, and is inserted into the vitreous humour, behind the crystalline. When the portion, a part of which passes through the loop, is brought into action, the vitreous humour is drawn forwards, and the *lens* is pushed before it. When the other portion acts, the *lens* is drawn backwards.

"Cuvier states that 'in a great number of fishes, there is a falciform ligament which passes through a slit in the *retina*, and penetrates the vitreous humour.' 'It contains blood-vessels and nerves, and is attached to the capsule of the crystalline *lens*, at its inferior surface, sometimes by a simple elevation, or by a fold, a little more opaque; at other times by means of a grain or tubercle, transparent and harder than the vitreous humour in which it is placed.' Cuvier has ascribed no function to what is described. Jurin named it the ganglion of the crystalline. I considered it the expansion of a nerve, before closely examining its fibrous structure and connections."

I can only remark on this description of Mr. Wallace, that in no fish which I have as yet examined, do I find any *trochlea* or loop, through which the pyriform body passes: its figure and size seem to preclude the possibility of such an arrangement. I am bound however to state, that I have had no opportunity of examining the anatomy of the organ of vision in this particular fish.

As every fact relating to the perfection of the organ of vision, must needs possess considerable interest, I hope this imperfect account of a new structure, may induce some zealous comparative anatomist to give it a further examination, and favor the scientific public with a communication of the results.

8, *New Broad Street*,
*Nov.* 10*th*, 1837.

ART. VI. *A few Notes on the British species of the genus Polypodium, of Linnæus.* By EDWARD NEWMAN, Esq. F.L.S. &c.

WHEN among the Welch mountains, I have always amused myself with admiring the infinite variety of ferns that half cover the face of the country; but this autumn, for the first time in my life, a desire came over me to learn their names. With this view, I gathered hundreds of fronds, and when arrived at a quiet inn in the country, I arranged them into supposed species. I found that even on those bleak and barren mountains, where fern is cut, dried, and housed, as the only litter that can be obtained for horses, three distinct species flourished in great abundance: but where some little rill tumbled over a precipitous bank, or a ledge of rock, keeping the surface in a state of perpetual moisture, half a score species, at least, might be found: and again, where the country had yielded to some attempts at cultivation, a few others made their appearance.

To those who have never dabbled in natural history, every fern is 'a green leaf,' and nothing more; so is every insect 'a bug,' or 'black beetle.' But the naturalist, however young in his vocation, desires knowledge of a somewhat more precise and definite nature;—a name seems indispensable to him.—It was not long before I set to work with Smith, and Withering, yet,—how shall I express my disappointment!—after a most minute and really elaborate examination, I could only be certain of two species, *Pteris aquilina*, and *Polypodium vulgare*.

I hear some of my readers telling me, that this must have arisen from sheer stupidity on my part; the point I will not contest; but, as a collateral remark, I would observe, that books intended for instruction, should really afford some information to the *ardent* enquirer, although he might be stupid. I never recollect giving up an enquiry without satisfying myself: the step I therefore took was to avail myself of the knowledge of my friends, and thus get my ferns named.—When this was accomplished, I compared the specimens with the descriptions, and made them out very well.

I have now paid some attention to the specific characters, as laid down by our best authors, and I feel inclined to doubt whether the most distinctive have been seized on. It appears that the manner in which a frond is cut or divided, constitutes almost the sole ground of specific distinction. Now, as we find the majority of specimens in a state of semicultivation, that is, partaking more or less of the influence of the spade, or plough and harrow, and nourished by an infinite variety of soils and manures, this character is precisely equivalent to that of colour, in the feathers of a domestic fowl. I am inclined to think that better, that is, more stable characters, exist in the coverings of the seed, in the root, and in the extreme outline of the frond; and further, I am inclined to believe, and, being nothing of a botanist, I hazard the opinion with much diffidence, that the cutting or dividing of the frond seldom furnishes a higher distinctive character than that of a variety.

As to characters which serve for generic or specific divisions, I much fear we shall never decide which is which. I have elsewhere said, that a genus is a most artificial division. A species is a collection of similar animals or plants, descending from one common stock or parentage; a genus is a re-union of several such species. The limits of a species are marked by the natural power of reproducing its kind, but the Creator has set no mark on that collection or re-union of species, which we denominate a genus; but every writer on natural history, possesses and exercises a perfectly arbitrary power, as to the limits and contents of the genus which he describes. Thus, suppose A, B, C, and D, to represent four distinct and well-ascertained species, decidedly differing from each other, yet possessing certain characters in common; one author will insist that they constitute a natural genus; a second will point out a character before unobserved, and shew that they should be divided thus, AB—CD; a third will discover a more decisive character, and supersede, with some harsh comment, the genera proposed by the second, and insist that the species must be divided thus, A—BCD; in another year a fourth author will laugh at his predecessors, and insist that this, and this only, is a division on philosophical principles, DA—BC. Let any one refer to our orchideous plants, for a corroboration of these observations; what is the result? Every one knows the species; no one the genera.

To return to ferns:—the shape and cover of the masses of seed have always been considered valuable characters for generic distinction. But here a question arises, whether the shape of the mass, or its situation, or the presence of a cover, is the best and most available character: this will never be decided. Even adopting the circular or linear form of the seed, as a generic character, Linnæus, Withering, Smith, Galpine, and a host of other botanists, have associated, in the genus *Polypodium*, *Filix mas*, having circular masses, with *Filix fœmina*, which has linear ones; thus allowing the similarity in general habit to supersede the distinction imposed by themselves. Recent writers have, with as little hesitation, taken *Filix fœmina* from the genus *Polypodium*, and placed it in the genus *Asplenium*. Now, if genera are of any value at all, a whole tribe of closely-allied ferns, tender, fragile, deciduous, alike in figure and fructification, might be associated under a new generic name, of which genus *Filix fœmina*, the only species indigenous to Great Britain, might be considered as the type. The genus might be named *Euphorium*, on account of the exceeding abundance of its seed when in a state of maturity and vigour.

Leaving the beautiful *Filix fœmina* to occupy its present situation in the genus *Asplenium*, I will now offer a few remarks on those ferns which have the seed in nearly circular masses, and to which Linnæus gave the name *Polypodium*.

1st. They appear to be of slow growth and very long life.

2ndly. They are raised from seed; and as they approach maturity, they vary year by year, and often frond by frond, both in general appearance, and in the cutting of the frond.

3rdly. If a seedling be so situated as to lack sufficient shade, moisture, or covering to its roots, all highly essential to its arriving at perfection, then is its progress towards maturity delayed, and the period of its seedling appearance in-

4thly. But so powerful is the command, 'increase and multiply,' so innate throughout nature is the tendency to reproduce its kind, that those plants, in which the usual appearances of maturity are thus delayed, do nevertheless produce seed, which is, to all appearance, as perfect as if produced by plants which a fav le si had brought to their full maturity.

5thly. Every species produces at times fronds, and even entire plants, which pe ly barren; such barren fronds and plants differ widely from the fertile fronds and plants of the s sp es; such barren fronds and plants are found of all sizes, even larger and smaller than those which are f le; finally, such barren fronds and plants are equally abundant, whether the growth be starved or luxuriant.

When these various causes of variation are consid d, it cannot be greatly wondered at that so many varieties exist. The causes of variation are not, in the ves, new to botanists; they are allowed to exist, but yet have been disregarded.

I will now attempt to distinguish from each other, those species with which I possess any acquaintance and to assign them characters, without having recourse to the cutting of the fronds.

## *Genus POLYPODIUM*, Linnæus.

*Sorus*
- naked: frond
  - linear-lanceolate ……… root creeping … 1. *vulgare*, L.
  - triangular and single ……… root creeping … 2. *Phegopteris*, L.
  - triangular and triple ……… root creeping … 3. *Dryopteris*, L.
- with a cover
  - reniform: frond
    - lanceolate: *sori*
      - marginal: ………
        - root creeping … 4. *Thelypteris*, L.
        - root tufted …… 5. *Oreopteris*, Ehr.
      - discoidal: *pinnæ*
        - opposite ……… 6. *cristatum*, L.
        - alternate……… 7. *Filix mas*, L.
    - triangular ……… 8. *dilatatum*, Hoff.
  - circular: attached
    - by the margins and centre ……… 9. *aculeatum*, L.
    - by the margins only
      - thrown back or lost……… 10. *fragile*, L.
      - split into hairs……… 11. *Ilvense*, L.

Division A.—*Root creeping.*

1. P. *vulgare*, Linnæus.

This species is abundant in every part of the kingdom that I have visited; there is scarcely a hedge-row without it.—Generally speaking, it is but little subject to variation; it however assumes the following forms.

*α. vulgare.* Pinnatifid, lobes simple.
*β. serratum.* Pinnatifid, lobes deeply serrated.
*γ. Cambricum.* Pinnatifid, lobes deeply indented.
*δ. proliferum.* Pinnatifid, lobes broadly and deeply indented, almost twice pinnatifid.
*ε. digitatum,* (n. v.) Pinnatifid, lobes with the extremities divided.
*ζ. acutum.* Pinnatifid, lobes terminating in a sharp point.

2. P. *Phegopteris.* Frond triangular, drooping, pinnate; *pinnæ* pinnatifid, opposite, the first pair turned back; *sori* marginal.

3. P. *Dryopteris.* Frond triangular and triple, *i. e.* at its first division forming three nearly equal sub-divisions; each of these twice pinnate. *Sori* near the margin, scattered.

This beautiful and delicate little fern is found in the crevices of rocks, mostly in the neighbourhood of waterfalls, but almost invariably sheltered from their spray, by a projecting ledge. Two varieties have been named.

*α. Dryopteris.* As above.
*β. calcareum.* As above, but is said to possess larger *sori*, and to be of a darker green colour.

4. P. *Thelypteris.* Frond pinnate, *pinnæ* somewhat distant, deeply pinnatifid; *sori* regular, almost marginal, when immature separate, when mature, so crowded as to form a nearly continuous marginal line.

No varieties of this beautiful species have received names. The barren fronds differ from the fertile ones, in having their *pinnæ* and lobes broader and more crowded.

*Note.* The ferns of this division are to be instantly distinguished from those which follow, by their mode of growth; the roots send out horizontal runners, which, at certain knots, issue fresh fibres, fix themselves, and become plants. They are never fast in the earth like those which follow.

Division B.—*Root tufted.*

5. P. *Oreopteris.* Frond pinnate, *pinnæ* cleft, decreasing in size as they approach the root, until they become very short; lobes rounded, *sori* marginal; whole plant covered with glands, containing a powerfully scented liquid.

This very distinct fern covers acres of waste mountain in the neighbourhood of 'Water-break-its-neck,' Radnorshire; and takes the place of *Filix mas* in most of the hedge-rows of that county. Its varieties are un-named.

6. P. *cristatum.* Frond pinnate, *pinnæ* distant, opposite, pinnatifid, short, obtuse; *sori* discoidal.

I have not seen this species growing; the dried specimens in *herbaria* appear distinct from the following.

7. P. *Filix mas.* Frond pinnate, *pinnæ* nearer, alternate, pinnatifid, lobes obtuse, almost truncate, with serrated margins; *sori* discoidal, retaining the cover very long.

The named varieties of this abundant fern are never considered species, except the last.

*α. Filix mas.* As above.

*β. variegatum.* The same, but variegated in colour.

*γ. recurvum.* The same, *pinnæ* crisped and turned down.

*δ. spinosum.* Lobes more serrated.

*ε. rigidum.* Frond almost bi-pinnate, and having a greater length of *rachis* without *pinnæ*.

The name of *rigidum* has been variously applied by English botanists. In *herbaria* we usually find it represented by one of the varieties of *dilatatum*; and more especially by the variety *spinulosum* of these notes. Others again have attached the name to this variety of *Filix mas*. And thirdly, a still different plant, said to have been found by Mr. Bree on Ingleborough, has been called by this name. Supposing the *Polystichum rigidum* of Decandolle &c. a plant found in Switzerland, to be really a species, on which I cannot pretend to give an opinion, and supposing it ever to be found in Britain, it will occupy a station between *Filix mas* and *dilatatum*.

The varieties *variegatum* and *spinosum* are mentioned solely out of respect to those botanists who have taken the trouble to name them; other varieties are mentioned in the course of this paper, on the same principle. The variety *recurvum*, is of a different character; it is constantly and decidedly distinct, whether the frond be large or small, barren or fruitful, seedling or mature; it grows to a vast size. I found a plant of it in a thick wood, on Dinmore Hill, in Herefordshire, which had six fronds, each exceeding 5 feet in height. *Filix mas*, in its usual form, also grows to nearly the same size in the same locality.

8. P. *dilatatum.* Frond triangular.

*α. murale.* (n. v.) Frond pinnatifid, *pinnæ* dentate.

In this state the plant is much smaller than *Asplenium Ruta muraria*, but in its simply pinnatifid frond, and general habit, it more resembles a dwarf plant of *Polypodium vulgare*. It is usually supposed, by intelligent botanists, to be *Asplenium Adiantum nigrum*. This is the true seedling state of the species; and may occasionally, though very rarely, be found in the young state, especially in moss. It is found in an old state, with very tufted roots, and a scaly *rachis*, on old churches and garden walls, in company with *Grammitis Ceterach*, *Asplenium Trichomanes*, *A. Ruta muraria*, *A. Adiantum nigrum*, and *Polypodium vulgare*.

*β. riparium.* (n. v.) Frond pinnate, *pinnæ* deeply dentate.

This variety is variable in size, sometimes reaching 4 inches in height. It is not uncommon on dry sandy banks. I have seen it in some abundance on Hampstead Heath.

γ. *reflexum.* Frond pinnate, *pinnæ* pinnatifid, lobes dentate, concave; colour dark green.

δ. *dumetorum.* Frond twice pinnate, lobes pinnatifid, with terminal, sharp, prickly teeth.

ε. *sylvestre.* (n. v.) Frond thrice pinnate, perfectly triangular, elegant, drooping, bright green; lobes dentate and spined.

This plant I believe to be *P. spinulosum* of Galpine. It is found in thick woods, growing among decayed leaves, &c.

ζ. *cataractarum.* (n. v.) Frond thrice pinnate, elongate, drooping, elegant, yellow green; *pinnæ* distant.

This beautiful plant seems to be abundant about the waterfalls in Wales; I have not yet seen it in England.

η. *spinulosum.* Frond sometimes thrice pinnate at the base, but generally only twice pinnate, with the lobes pinnatifid; elongate, narrow, sides parallel as far as the fifth or sixth pair of *pinnæ*, then with the apex pointed; erect, rigid, spiny, pale sickly smoother and paler than in the other varieties.

Frequent in thick woods and on moors, growing on dying trees, &c. Certainly grows from the same root as *sylvestre* and *dilatatum.*

θ. *dilatatum.* Frond thin, pinnate; lobes separate, and often stalked; *rachis* long, stout, black, scaly, erect at first, then gracefully drooping; frond sometimes 3 feet in height.

Hedge-rows and banks. This appears to be the typical form of the species.

ι. *ferax.* (n. v.) Frond thrice pinnate; lobes separate and stalked; *sori* confluent, covering the under surface.

This variety is somewhat too widely separated from the rest; but the few dried fronds which have reached London, my friend, Mr. D. Don has seen, and considers them as belonging to the present species, and I bow to his decision. The plant is exclusively Irish, and has the habit of a very luxuriant and fruitful specimen of *Asplenium Adiantum nigrum.*

Above I have attempted to describe the striking and constant varieties of this very common fern; but I by no means wish it to be supposed that I consider the list complete.— I have examined, from different sources, a tolerable number of fronds, amounting probably to thousands, and I find a regular gradation of form, from the variety which I suppose to be the typical *dilatatum* of authors, to each of the other varieties, with the exception of *ferax*: a list, therefore, to be complete, should trace this gradation, minutely describing each intervening form. To such a list it must be objected, that excepting with a view of settling some disputed point, it would be a work of useless labour. The variety which our botanists consider of the greatest value, appears to be *spinulosum*; I have fortunately found this plant in profusion, growing completely intermixed with *sylvestre*, and from the very same root.

9. P. *Lonchitis*. There is a striking and constant character in this species. In each *pinna*, the upper portion immediately adjoining the *rachis*, is produced, and stretches forward towards the *pinna* which precedes it, beyond the *stipes* of which it frequently extends. The frond is elongate and lanceolate, and evergreen.

α. *seminalis*. (n. v.) Frond pinnatifid, dwarf, prickly.

It is perhaps necessary to say a word on the somewhat objectionable precedent of naming a seedling plant In the present instance the plant, under the described form, arrives at perfect maturity, as far as copiously producing seed can be so considered: the bulk and toughness of its roots further proves that the possession of this seedling form is no positive indication of youth.

β. *Lonchitis*. Frond pinnate, more elongate, prickly.

Locality seems to be the only ground for distinguishing this from the following, but I bow to the opinion of able botanists in considering them distinct. The present plant is found on the mountains of Scotland and the north of England.

γ. *lonchitidoides*. Frond pinnate, elongate, prickly.

Hedges and lanes in most parts of the country; common in the vicinity of London. Some writers have given this as the early state of *aculeatum*, others as the early state of *lobatum*. Both are correct. I am ignorant on what ground it has been separated from *Lonchitis*.

δ. *bifrons*. (n. v.) Frond pinnate, *pinnæ* pinnatifid.

This is equally common with the last, and exactly intermediate between it and the following.

ε. *lobatum*. Frond twice pinnate, drooping, *pinnæ* and *pinnulæ* crowded.

A common plant, uninjured by the severest cold of winter, and adorning our hedges at all seasons of the year. A variety precisely intermediate between this and the following, occurs abundantly in Herefordshire, and near Ongar, in Essex.

ζ. *aculeatum*. Frond twice pinnate, *rachis* erect near the root, but afterwards gracefully arched; *pinnæ* and *pinnulæ* more separated and distinct.

η. *angulare*. Frond twice pinnate, *pinnæ* and *pinnulæ* distinct; the latter small, the entire plant exceedingly graceful and beautiful.

These names of the two varieties have been occasionally transposed; I believe they are correct as given above.

θ. *lineare*. Frond twice pinnate, *pinnæ* and *pinnulæ* distant; the latter linear.

It will require several years of close observation to prove, by real experiment, that these varieties constitute but a single species. The seed must be collected with caution, and raised in earth in which all extraneous vegetable matter has been destroyed. I do not pretend to have done this; but not having done so, I must resort to the best evidence I can adduce. In the first place, I have collected fronds which will connect *angulare* with *seminalis*, passing through all the intermediate varieties. 2ndly, I have found fronds of *seminalis*, *lonchitidoides*, and *lobatum*, on the same root. 3rdly, I have seen immense roots of *aculeatum* and *lobatum*, having had their hold disturbed by plough or spade, actually returning, in their recent fronds, towards the *seminalis* habit, although still possessing the dried remains of the mature and fully developed fronds, which, under more favorable circumstances, had been produced the previous year. Of the variety *lineare* I am ignorant; I have been led by a figure of the plant, to place it here.

10. P. *fragile.*

I know scarcely anything of the described varieties of this delicate and truly fragile species. It occurs abundantly about the waterfalls, and on moist rocks and walls throughout Wales, throwing up its little bunch of delicate and feathery fronds, from between the clefts of rock, or the interstices of the stone.

*a. fragile.* "Frond between oblong and lance-shaped, twice pinnate; leaflets egg-shaped, pinnatifid, the lobes toothed or serrate, partial stalks bordered; *sori* crowded."

*β. dentatum.* "Frond between oblong and lance-shaped, twice pinnate; leaflets egg-shaped, obtuse, pinnatifid; the segments oblong, obtuse and toothed, partial stalks bordered."

*γ. angustatum.* "Frond oblong; leaflets lance-shaped, decurrent, pinnatifid, with linear acute segments; *sori* scattered, remaining separate."

*δ. alpinum.* "Frond tri-pinnate, ovate-lanceolate; *pinnulæ* ovate, blunt, segments linear, obtuse, toothed.

*ε. regium.* "It is distinguished from *alpinum* by its more compact frond, by its shorter, broader, and cuneiform segments, and by the still more important characters of its more copious *sori*, and of its narrower and tapering *indusium*. In *alpinum* the segments are linear, and the *sori* much fewer, being mostly solitary on the lobes, and the *indusium* broader, truncate, and not taper-pointed." *D. Don*, in Linn. Trans. xvii. p. 437. Mr. Don also informs us that he knows of no British station for *P. regium*.

*P. regium* being thus, for the present, dismissed, I confess I am not sufficient botanist to recognise the other varieties, should I ever be fortunate enough to find them.

11. P. *Ilvense.* Frond pinnate, *pinnæ* elongate, cordate, pinnatifid, scaly.

*a. Ilvense.* As above.

*β. hyperboreum.* Varies in having the *pinnæ* shorter, and the frond less scaly.

I have seen these plants growing, and should not have noticed the difference between them.

Art. VII. *Observations on "Rules for Nomenclature."* By W. Ogilby, Esq. M.A. F.R.A.S. F.L.S. F.G.S. F.Z.S. &c. &c.

In the November number of the Magazine of Natural History, (Vol. I. n. s. p. 604), I find a communication from Mr. H. E. Strickland, under the title of "Objections to the nomenclature employed by Mr. Ogilby," which my absence in Germany at the time of its publication, and other engagements since my return home, have hitherto prevented me from noticing.—As Mr. Strickland's "objections" all turn upon the nonconformity of the nomenclature in question, to certain "rules" lately published by himself and some other naturalists, it might perhaps be a sufficient answer, to remind him, that these rules make no part of zoology, that they are in their nature purely arbitrary and dogmatical, that their only *legitimate* object is convenience, and that no naturalist is bound to follow them farther than he finds them conducive to that purpose. But the courtesy which is due to a gentleman who states his objections in so fair and candid a spirit, as well as to Mr. Strickland personally, for whom I entertain the highest respect, as an accurate and original observer, demands a more detailed explanation of my views upon this subject; and if the positive mischief which I shall point out, in many cases, as having resulted from these gags upon nomenclature, these scientific thumb-screws, these verbal crucibles, in which every original name is to be melted down and re-compounded, as may best suit the fancy or the caprice of the presiding alchemist,—if this positive mischief leads me to employ strong terms in reprobating the system from which it springs, I beg leave to assure all those concerned in the matter, that my censure is directed simply against the system itself, and by no means intended to apply to its abettors or supporters. I know, indeed, that the conceit of imposing these practical fetters upon scientific nomenclature, did not originate in the present day, and that it had formerly one or two great names to support it; I grant that a few simple "rules for nomenclature," if founded upon principles so palpable and indisputable as to command the unanimous assent of naturalists, would be both convenient and useful; but it is the abuse of this wholesome principle, the arbitrary, dogmatical, unfounded and unnecessary rules lately revived or imagined, that I desire to reprobate; and I hope my censure may be understood as being directed solely against an abuse pregnant with so many evils.

It is not my intention to criticise these mischievous "rules" *seriatim*: any one who takes the trouble of reading and comparing them, will readily perceive how arbitrary and unfounded *in rerum naturâ* the generality of them are, and often how contradictory of one another; I shall confine my attention to those which bear upon the subject of Mr. Strickland's "objections," and to one other example, for the purpose of demonstrating the carelessness and utter disregard of fixed principles with which they have been drawn up.

As to the first rule cited by Mr. Strickland,—that names of families should always end in *idæ* and *adæ*,—I grant that, generally speaking, the adoption of these terminations may have some practical advantage, when they are employed to designate equivalent groups; but it should be remembered that this is merely a matter of convenience, a species of artificial memory, useful enough in its way no doubt, but of no actual *scientific* importance. Restricted within proper limits, it is unobjectionable; but, like all arbitrary rules, it is liable to be pushed too far, and thus to sacrifice the substance of the principle to the shadow of the name. The instance which Mr. Strickland censures in my nomenclature of the cheiropeds, furnishes a glaring example of this kind of mischief, arising from the inconsiderate and indiscriminate application of a purely arbitrary rule. The nomenclature in question was not adopted without due consideration, as Mr. Strickland will perceive upon referring to my memoir; (Mag. Nat. Hist. vol. i. p. 456, N S.) I employed the term *Simiæ* to denote the anthropomorphous *Quadrumana* of Asia and Africa, *simply because it was the legitimate and original* GENERIC *name by which the ancients designated the same animals*, and by which they are still known to all scholars who have any pretensions to critical accuracy; and I applied the term *Simiadæ* to the analogous group of anthropomorphous *Pedimana*, inhabiting the continent of South America, intending *by the similarity in the sound and structure of the word, to express the obvious and important relations which these animals bear to the true* Simiæ. By this means I conceive that I gained two positive advantages; first I employed an ancient classical term in ancient classical acceptation; and secondly, the new-coined term was made to express a *valuable scientific relation.*

So much for the advantages of my own nomenclature; now for those of Mr. Strickland's. Mr. Strickland would substitute the term *Simiadæ* for my *Simiæ*, and replace the former by the word *Cebidæ*. What would science gain by the change? In the first place Mr. Strickland would discard the ancient classical and highly appropriate name of the group, to replace it by a new name of his own coinage; and in the second place he would lose the expression of the important scientific relations conveyed in my nomenclature; and all this for no better reason than to comply with an arbitrary and capricious "rule." Nay, the very advantage of a "*memoria technica*," the only legitimate object of the "rule" in question, is entirely in favour of my nomenclature, and would be totally destroyed by the adoption of the very "rule" which Mr. Strickland intends should secure it. The rule would be satisfied, no doubt, but it would be satisfied at the expense of both science and criticism; a substantial scientific relation would be sacrificed to a verbal shadow; and I think Mr. Strickland himself will admit that the advantage is very incommensurate with the sacrifice.

The second rule which Mr. Strickland quotes as being violated by my nomenclature, is subject to the same contingencies, and liable to the same objections, as the first. Generally speaking, it may be a matter of convenience to form the *family* name from that of some conspicuous *genus* included in the group; but, as in the present instance, it may not be always either expedient or practicable to do so. By giving the name of *Simia* to one or other of the genera of real apes, in compliance with Mr. Strickland's "rule," I should have committed the following three cardinal sins; which, however venial they may be in the estimation of the Dracos and Solons of zoological nomenclature, are, according to my creed, worthy of utter scientific condemnation. In the first place, I should have used the word *Simia* in a new sense, different from its legitimate acceptation, and from the meaning which has been hitherto attached to it in zoology; thus at the same time burthening the science with unnecessary synonyms, and confusing their import: secondly, I should have captiously altered an established nomenclature, without any commensurate advantage, other than the very questionable one of satisfying a purely arbitrary "rule;" and, in the third place, I should have countenanced the disreputable practice, which, I regret to say, is but too prevalent both in this country and on the continent, of imposing new names upon groups, with the formation or definition of which the proposer is in no way connected, merely because the old ones do not happen to suit his individual taste, or the particular code of "rules" which he patronises, or perhaps from the contemptible vanity of having his name attached to it, and quoted by succeeding writers; thus, by a species of zoological petty larceny, filching the honest reputation of original observers, and unscrupulously appropriating it to himself.

That certain reforms in the generic nomenclature of the

*Simiæ* are both desirable and necessary, there is no doubt; but I think I have sufficiently shewn that they would not be promoted by the adoption of the alterations proposed by Mr. Strickland; and I feel convinced that Mr. Strickland himself, who has earned more substantial claims to scientific reputation, than any which can be conferred by the change of a name, will join with me in reprobating that wholesale love of innovation, that inundation of new terms and synonymes, which, breaking down all the established land-marks of science, threatens to overwhelm the *principles* of zoology in a chaos of *words*.

To demonstrate the perfectly arbitrary and dogmatical nature of these "rules," their opposition to good sense, sound criticism, and fixed principles, and the consequent carelessness, to use the mildest possible expression, with which they have been drawn up, let us take the following example.— "Names," say the legislators, "should be taken either from the Latin or Greek languages." Now, at the risk of shocking the refined taste of these fastidious *arbitri elegantiarum*, who, *more classical than the Greeks and Romans themselves*, would fetter our free choice of terms, and impose restraints upon the ancient languages which the ancients themselves repudiated, I must beg leave to differ with them *in toto:* and my reasons are, because their rule is opposed to the genius and spirit of all languages, ancient and modern, and directly contradicted by the practice of the Greeks and Romans themselves.

First, it is opposed to the genius and spirit of all language; for no language thinks it necessary to form new names from its own resources, to designate new objects with which it was originally unacquainted, but adopts the names which those objects bear in their native countries, only modifying them in such a manner as to suit them to its own peculiar harmony and orthography. All language, moreover, has an instinctive horror of compound epithets; and it is only where the simple and appropriate native names cannot be obtained, or readily adapted to the peculiar genius of its harmony and orthography, that it ever condescends to employ them. This leading principle of sound criticism, founded upon the nature and practice of all languages, whether ancient or modern, is entirely disregarded by the legislators "for scientific nomenclature," who, besides, forget that the compound epithets which they patronise so exclusively, are no more entitled to be considered as pure Greek or Latin, than the so-called barbarous adaptations. Nay, I shall presently shew, that the Greeks and Romans themselves would have rejected them, in favour of these very identical adaptations of barbarous terms so shocking to the more refined taste of our modern legislators.

In the second place, the "rule" is directly opposed to the invariable practice of the Greeks and Romans themselves.—The classical nations of antiquity imposed no such restraints upon their respective languages, as those contemplated by the rule in question; on the contrary, they were accustomed to adopt barbarous words and terms with the greatest freedom, only giving them an appropriate termination or orthography, to adapt them to the peculiar spirit of their respective tongues. Take the following examples as cases in point, and the list might be easily extended to any given length. Καμηλος and *Camelus*, from the Hebrew *Gamal*; *Bison*, *Urus*, *Alces*, and *Fiber*, from the ancient German *Wisent*, *Auerochs*, *Ælg*, and *Biber*, respectively; *Pala*,* the plantain, is still called *Bala* by the Hindoos; so also Λυκιον, *Lycium*, the barberry, is still denominated *Lukyoon* by the same people, as has been lately shewn by Professor Royle; Ἴξαλος, which occurs in Homer,† as the name of a mountain Ruminant, is still, under the form of *Isard or Ysard*, the common name of the chamois among the mountaineers of the Pyrenees; the Κεμας of Ælian‡ and other writers, which has so much puzzled some modern commentators and naturalists, is nothing more than the *Gems* and *Chamois* of the Germans and French; Κονιλος, Κουνικλος, and *Cuniculus*, are only so many adaptations of the ancient Iberian word *Coney*, still subsisting in the Welch, Irish, and other cognate languages, as well as in modern Spanish; Ταρανδος and *Tarandus*, appear to be only the native Teutonic name *ran* or *renne* with the article *te* or *the* prefixed; and even the *Pegasus* of Pliny,§ described as a wild horse of Ethiopia, with wings and horns, is probably the wild species of maned buffalo, still called *Pecasse* among the negroes. That the ancients occasionally made use of compound epithets, such as Καμηλοπαρδαλις Ἱπποποταμιος, Ἱππελαφος, &c. only proves that we may occasionally do so likewise, which I do not deny; but these instances are manifest exceptions to their general rule, and appear to have been adopted only when they were unacquainted with the native names of the animals.

Am I not, therefore, justified in reprobating the mischievous and meddling caprice, which would change *Tupaia* into *Cladobates*, or *Cavia* into *Anœma*, and reject *Tapirus*, *Manis*, and *Gazella*, out of mere compliance with an arbitrary "rule," contradicted by every principle of sound taste and cri-

* Plinii Hist. Nat. lib. xii. c. 6. † Iliad, Δ. v. 105. ‡ Lib. xiv. c. 14.
§ Hist. Nat. lib. viii. c. 21.

ticism, as well as by the practice of antiquity? But let me not be understood as hostile to such "laws of nomenclature" as are founded upon just and fixed principles. These, however, are few and simple: I conceive that they may be all reduced to EUPHONY and PROPRIETY OF APPLICATION, principles which are equally sanctioned by sound logic and the nature and practice of all languages, but which I find no where clearly developed in any of the codes of nomenclature, lately published.

But the spirit of innovation is not confined to the mere nomenclature of science; our zoological *radicals* have even condescended to undertake the reformation of the vulgar tongue; mere English terms are not sufficiently "POLUPHLOSBOIOPHANOUS"* to suit the refined taste of these fastidious legislators, and the commonest words in the language must be assayed anew, and recoined at their patent mint. Two or three ingenious gentlemen have undertaken the herculean task of correcting the vernacular names of our common British birds; and if, out of the 36,000,000 of human beings who speak our language, they can only succeed in persuading the other 35,999,997 or 8, to adopt the proposed reform, I shall be very willing to follow the example, and congratulate them on their success. Others, again, write *Mammalians*, *Reptilians*, and *Molluscans*, for the more simple terms *mammals*, *reptiles*, and *mollusks*; and I am only surprised that they have not likewise discarded such mean and vulgar words as *birds* and *fish*, in favour of the more "poluphlosboiophanous" terms, *avians* and *piscians*. Nay, the very names employed by the ancient Greeks in their own language, are not sufficiently "poluphlosboiophanous" to suit the modern taste; the word *Metaphysics* has given place to *Psychology*, and one gentleman even calls *mind* the *Psychian faculty!*

Such are a few of the results of intermeddling legislation;—confusion of terms, petty larceny, multiplication of unnecessary synonymes, murder of the Queen's English, and "poluphlosboiophony"!

But before concluding, let me briefly advert to a subject which I confess I have much at heart, because the strength and euphony of our powerful and harmonious language are both interested in the question. I allude to the kind of rivalry at present subsisting between the words *mammal* and

* As the poverty of our language does not afford a term sufficiently magniloquent to express the great quality aimed at by the reformers of nomenclature, I beg leave to introduce that here proposed, which, being formed in strict accordance with "the laws of nomenclature," will, I hope, satisfy the most fastidious of our legislators.

*mammifere*, for British naturalization. There can be no hesitation as to our choice: *mammal* and *mammals* are in every point of view preferable to *mammifere* and *mammiferes*: first because they have the priority in point of time, having been originally invented by the great Linnæus, and introduced into our language in the year 1832; (see Penny Cyclopedia, vol. i. p. 2.); secondly, because they are *simple*, and formed according to the strict analogies both of the Latin and English languages, being derived from *mamma*, a breast or udder, in the same way as animal and animals, from *anima*, a mind or spirit; thirdly, because on account of their simplicity, they are forcible; fourthly, because they are harmonious, and adapted to the genius of our language; and fifthly, because they can never lead to error, or convey a false impression.—*Mammifere* and *Mammiferes*, on the contrary, are French parvenus, which rose to notice at that wild epoch of revolutionary innovation, when every word and thing was rejected, that could not boast a French origin, and even the days of the week and the months of the year had new names imposed upon them; they were not used in English till the year 1835; they are *compound terms*, harsh and rugged in their sound and structure; totally unadapted to the spirit and analogies of our language; and imply the erroneous idea that all mammals have externally developed udders, (which is not the case in either of the extensive orders of *Marsupialia** or *Cetacea*), because *fero* is opposed to *capio* in its sense of containing, and has an external reference, as this has an internal. *Mammal, mammals; marsupial, marsupials; animal, animals;* are all simple, analogous terms, formed according to the strict philosophical principles of general grammar, and consonant with the euphony of the English language: but if we are to have *mammifere* and *mammiferes*, then in the name of consistency, let us also have the other barbarisms, *marsupifere, marsupiferes*, and *animafere, animaferes*, if it be only for the sake of that uniformity and regularity of structure, which are the soul of all cultivated languages; and which it is the great aim of "rules for nomenclature" to secure to the language of science. In this instance, we can gain this important advantage without the sacrifice of any scientific object; on the contrary, science and the English language will both be equally bene-

* I may here notice that some of our English naturalists use *marsupiata*; this is incorrect, unless as a qualifying term: *animalia marsupiata, mammalia marsupiata*, &c. are proper enough; but marsupiata should never be employed alone; it is an adjective, to which the corresponding substantive is *marsupialia*, and this term alone is admissible as the name of the order in question.

fited; but if, in spite of all these advantages, our rage for French fashions makes us doggedly persist in following this revolutionary *ignis fatuus*, as if it were the lamp of truth, we shall only be led into confusion and inconsistency. In fact, the French themselves are, of all the civilized nations of Europe, the very worst linguists, and the most careless in matters of nomenclature; in the present instance, moreover, they are grossly inconsistent, for they adopt marsupial, marsupiaux, and reject mammal, mammaux, for no other assignable reason than because the former were invented by a Frenchman and the latter by a foreigner.

The word *mammiferous* may, perhaps, be tolerated even in our own language, as a qualifying adjective; as for instance, mammiferous animals, mammiferous creatures, &c. though even here *mammated* is preferable, as being more agreeable to English analogies; but the noun-substantive mammifere, mammiferes, is a downright barbarism, and ought to be scouted out of all civilized society. There is, however, one sense in which the word *mammiferous* has been occasionally employed of late, and in which it is altogether inadmissible, viz. as a geological term, to designate such deposits as contain the bones of mammals. A very slight alteration, however, will obviate this error: if, instead of mammiferous, we say *mammaliferous* deposits, *mammaliferous* strata, &c. our phraseology will be both correct and appropriate; and this facility of composition is a powerful argument, in addition to those already enumerated, in favour of the simple and expressive term mammal, rather than the harsh compound mammifere.

## SCIENTIFIC INTELLIGENCE, NOTICES, &c.

*Discovery of the Allantois in the fœtal Kangaroo.*—Having just received the last number of the Comptes Rendus, we observe that M. Coste has written to the French Academy, requesting permission to lay before it a memoir, in reply to the statements contained in Professor Owen's letter, addressed to M. Arago; (Comptes Rendus, 1838, p. 147, and Mag. Nat. Hist. 1838, p. 94); and which memoir, he intimates, will enable the Academy to decide upon the merits of the question, as regards the discovery of the *allantois*.

We cannot sufficiently admire the boldness displayed by M. Coste, in a remark accompanying this request, in which he speaks of the point at issue between himself and Professor Owen, as appearing to be one of *words*, rather than of *things*. "Comme sur ce point la discussion paraît plutôt porter sur les mots que sur les choses." Doubtless it would be to the interest of the French embryologist, that the Academy should see the propriety of relieving him from the rather awkward position in which he is placed, by adopting this highly ingenious suggestion; but as the letter of Professor Owen to M. Arago has been published on the continent, as well as in this country, it will require no ordinary share of sagacity, on the part of M. Coste, to palm upon the French savans, a view so palpably irreconcileable with the statements made in that communication.

M. Coste's description of the *chorion*, is, that it was blended with the umbilical vesicle;—"le *chorion* etait confondu avec la vesicule ombilicale." Now, Professor Owen states, that prior to his shewing M. Coste the *fœtus*, with the appended *allantois*, he had removed the *chorion*, and that he did not exhibit this membrane to M. Coste. The real condition of the *chorion* we subsequently find thus described by Professor Owen, in the Proceedings of the Zoological Society, for August, 1837.

"The *chorion*, which enveloped and concealed the *fœtus*, was a sac of considerable capacity, exceeding probably by ten times the bulk of the *fœtus* and its immediate appendages, and adapted to the smaller cavity of the *uterus*, by innumerable folds and wrinkles. It did not adhere, at any part of its circumference, to the *uterus*, but presented a most interesting modification, not observed in the previous dissection of the kangaroo's impregnated *uterus*, viz. that it was in part organised by the extension of the omphalo-mesenteric vessels upon it, from the adherent umbilical sac."

Now no misapprehension of *terms* can be urged, as explanatory of the fact of these two statements being so completely opposed to each other, respecting the condition of the *chorion*. The possession of this membrane, and the consequent ability to produce it, presents us with an unquestionable guarantee for the correctness of the history of its relations to the *fœtus*, as recorded by Professor Owen. Hence we must attribute the description of M. Coste, to his *imagination;* and may we not assume that this faculty was called into such active operation in the *one* case, at the expense of memory in the *other*, as the only satisfactory explanation of the belief entertained by M. Coste, that instead of Professor Owen having discovered the *allantois*, and imparted the fact of its existence to his visitor, he, M. Coste, had detected the *allantois*, and communicated the discovery to Professor Owen.

*Lapse of one of the Royal Medals, for* 1837.—As the subject of the classification of fossiliferous rocks, by means of the per-centage test, is brought forward in our present number, it may not be out of place to notice the fact of there having been no paper sent in to the Royal Society, for the medal of last year, (value fifty guineas), and which, as was announced in 1835, was intended to be given to the author of the best essay, entitled. "Contributions towards a system of geological chronology, founded on an examination of fossil remains, and their attendant phenomena."

In selecting this subject for a prize essay, we conlude that the council had in prospect a more extended application of Mr. Lyell's views in the determination of the age of fossiliferous deposits; for in awarding at that time, one of the Royal medals to this eminent geologist, among other reasons particularly specified, we find,—"The new mode of investigating tertiary deposits, which his labours have greatly contributed to introduce; namely, that of determining the proportions of extinct and still existing species, with a view to discover the relative ages of distant and unconnected tertiary deposits."*

The circumstance of no geologist having attempted to carry into more extensive operation, the principle of the per-centage test, or to bring forward any other system of geological chronology, founded upon zoological facts, in consequence of which the medal for 1837 has *lapsed*, looks very like a tacit admission of the force of the objections urged against the employment of the numerical estimates of the conchologist, in determining the relative ages of supra-cretaceous deposits.

*In the last part of Mr. Gould's* work on the Australian Birds, we remark an admirably executed representation of the *Apteryx*, two excellent specimens of which, supposed to be male and female, have lately been presented, by the association for colonizing New Zealand, to the Museum of the Zoological Society. The Society has also very recently received as a donation from the Earl of Derby, the body of this most extraordinary bird, in a fit state for anatomical investigation; so that the scientific world is likely soon to be in possession of the relations exhibited by its skeleton and soft parts, to

* Believing, as we do, that incalculable mischief would have arisen to the science of geology, if no check had been given to the introduction of the per-centage test, we gladly take this opportunity of stating our conviction, that the Royal medal has, in no instance, been hitherto, and we may perhaps even venture to say, never will be again, awarded with more honorable distinction, that when given to the author of the "Principles of Geology."

the struthious genera, with which it is thought to be allied.

*Botanical Society of London.*—At the meeting of this Society held February 2nd, Mr. Daniel Cooper, the curator, reported, *that in accordance with the rules of the Society, he had distributed eleven packets of seeds from the Cape of Good Hope, presented to the Society by M. Schmidt, to those members who have the opportunity of raising them, in order that* the plants may be laid before the Society in the course of the ensuing season. He also stated that forty packets of the Society's duplicates had been distributed in the month of January. On the first and third Friday in each month, (the nights of meeting), Mr. D. Cooper will deliver a course of lectures illustrating the practical part of Botany, which members and their friends are invited to attend. These lectures will commence in March, and will be delivered one hour previously to the chair being taken, (viz. 7 o'clock). The above course, to which ladies will be admitted, is gratuitously offered for the benefit of those members who are unacquainted with the practical part of the science.

*Mr. Schloss, the Foreign Bookseller,* of Great Russell St. has just published a lithographic print of Professor Müller, of Berlin; it is decidedly one of the most faithful likenesses we have ever seen.

*It is with sincere regret* that we have to record the death of Dr. Alexander Murray, author of the 'Northern Flora,' a work noticed at some length in our last volume. He was cut off by typhus fever, after only eight days' illness, just as he had entered his 40th year.

*Mr. Samuel Woodward, of Norwich,* an old contributor to the Magazine of Natural History, and also known to naturalists by his Synoptical Table of British fossils, and a small work on the Geology of the county of Norfolk, died a few weeks since, leaving a large and young family, several of whom shew decided talents for the scientific pursuits to which their father was so ardently attached.

During the last two or three years Mr. Woodward had directed his attention to the British fossil *Echini*, and devoted some of his leisure hours to making drawings of the unfigured species, with a view, we believe, of publishing a monograph upon the family. From a hasty glance over his portfolio about a twelvemonth since, our impression is that these drawings were extremely carefully and accurately executed, and we trust that they may still prove of some service to science, although the intentions of the artist have been thus prematurely frustrated.

*The last upon our list* is Mr. Jabez Gibson, a banker, of Saffron Walden; to whose liberal contributions, and most active exertions, *we believe the interesting museum of Natural History in that town, is chiefly indebted for its formation.*

## SHORT COMMUNICATIONS.

*New locality for Polyommatus Arion.*—As a taste for the study and collection of insects becomes, (as it has of late years), more prevailing, it is not surprising that instances should occur, of insects, formerly considered to be of great rarity, being occasionally found in some abundance, in different parts of the country. Among the *Papilionidæ*, *Colias hyale*, *Argynius lathonia*, *Lycæna dispar*, *Pamphyla Paniscus*, &c. might be mentioned as instances in point.

The capture of *Lycæna* [*Polyommatus?*] *Arion*, in plenty, by Mr. Dale, has already been recorded in this Magazine, vol. vii. p. 499. The object of the present communication is to introduce to the notice of entomologists, a new locality for this splendid species, hitherto considered to be an insect of extreme rarity in Britain. My son, a very young entomologist, took nine or ten specimens of *Polyommatus Arion*, on the 14th, 15th and 16th of July last, in a rough, grassy, pasture field near Barnwell Wold, Northamptonshire. Individuals of both sexes were captured; some of them were in a rather faded condition, from which circumstance we may infer that the insect appears on the wing early in July.

Barnwell Wold is situated about a mile and a half from the village of that name, near Oundle. It is an extensive, and in some parts almost impervious wood, intersected, however, by broad grassy rides, and appears to afford a rich field for the entomologist. In the latter end of May, 1835, I saw there *Pamphila Paniscus* flying about plentifully; also *Nemeobius Lucina* in far greater abundance than I ever observed it elsewhere. I am informed likewise that *Argynius Lathonia* has been captured in the same situation.

I take this opportunity of mentioning that I have seen many specimens of *Polyommatus Acis*, (*Cimon* of Lewin), which were taken last July, on a heath on the borders of Worcestershire, no great distance from Birmingham.—*W. T. Bree.*—*Allesley Rectory, Jan. 29th*, 1838.

*Note on the Crag Beds of Suffolk and Essex.* (See Mag. Nat. Hist. vol. ii. N. S. p. 42).—In the list of crag beds "in which no traces of terrestrial *Mammalia* have yet been observed," as stated by you in the paper republished in the January number, from the sixth Report of the British Association, I observe you have enumerated the red crag beds of *Walton, Essex*, and *Felixstow, Suffolk*, and the coralline crag of *Tattingstone*, and I am sure you will pardon me for drawing your attention to the fact, that bones of *Mammalia* have been found *in all those beds*. I remember having seen enormous thigh bones, when a boy, which were found by Mr. Barnard, of Walton, and sent by him to East Bergholt, where they were exhibited in the shop of his brother, the late Mr. Benjamin Barnard, and many persons now living at Bergholt may probably remember having seen them there. I have myself found mammalian remains at Tattingstone, and several large bones were found in Mr. Cowper's pits, in Tattingstone park, in 1827 or 1828. My authority for the remains at Felixstow is 'The Beauties of England and Wales,' which says that "Roger Pettiwood, of Felixstow, Esq. had a petrified elephant's tooth, from the cliffs of Felixstow." Lambard also says, in his Dictionary, that "in Queen Elizabeth's time, bones were found at Walton, (Suffolk?), of a man whose skull would contain five pecks, and one of his teeth, as big as a man's fist, and weighed 10 oz." "These bones," he says, "had sometimes bodies, not of beasts, but of men, for the difference is manifest." Rude as this information is, I think it clear as to the fact of mammalian remains.—*W. B. Clarke.—Stanley Green, Poole, Feb. 8th*, 1838.

[Our valued correspondent appears, by the above communication, to take it for granted that bones of the elephant, shewn to him as the production of the Walton and Felixstow cliffs, must, as such, have been taken out of the crag. Now elephants' teeth have been found in abundance in the Brighton cliffs; in still greater numbers at Herne Bay; and occasionally in the Isle of Sheppy; yet, surely, Mr. Clarke would not consider himself warranted in concluding from this circumstance, that terrestrial *Mammalia* occur in the chalk and London clay. We are not aware of any circumstances, connected with the history of the fossil *Mammalia* in Suffolk and Essex, which would lead us to suppose that their geological relations differs widely from such as usually accompany similar remains in other parts of England; and certainly, in the absence of direct proof, we should not be disposed to refer the bones of the elephant to a *marine* tertiary formation, of the same age as the beds of crag alluded to by Mr. Clarke, if brought from a district in which more recent deposits were present.

The bones of pachydermatous animals, along with those of ruminants, &c. only occur at Walton and Felixstow, in common with a hundred other localities along the line of coast, from Brighton to Scarborough, the cliffs of which may present us with a section of crag, London clay, chalk, or any thing else; we find in the neighbourhood of each, an equal abundance of these remains, undoubtedly referrible to a period considerably nearer the present era, than that during which any one of the above-named formations were deposited.

In the absence of more definite information from Mr. Clarke, these observations will probably apply to the *inland* locality, Tattingstone. The bones were doubtless found in the *quarry*, but not, therefore, in the *crag*.—At this spot the red crag has been cut through, and the coralline reached; the whole being capped by a thick covering of sand and pebbles, probably of the same age as the common *diluvium* of the county, but the junction of which with the beds beneath, it is, perhaps, impossible to define; a circumstance which might readily occasion a casual visitor to suppose, that mammalian remains occurring in the upper part of the quarry, belonged to the crag, more especially if, like Mr. Clarke, he laboured under the impression that such remains are abundant in this formation.

In stating that bones of terrestrial *Mammalia* do not occur in the red and coralline crag, we simply put forward the result of some years' intimate acquaintance with the tertiary deposits of Essex and Suffolk, particularly of those localities mentioned by Mr. Clarke, a result confirmed by the experience of all geological observers in that part of the country, whose cabinets we have had the opportunity of consulting, or with whom we have had personal intercourse. Under these circumstances we feel sure that Mr. Clarke will admit the probability of his having entertained an erroneous opinion, unless he is quite satisfied, that a bone, taken by *himself* from an *undisturbed* bed of crag, has been positively identified as that of some terrestrial mammiferous animal.—*Ed.*]

*Discovery of a large pair of fossil horns in Essex.*—Though the geological features of the county of Essex may not be of that highly interesting character, exhibited by the mining districts of England; and though the facts respecting the physical history of our planet are not developed in such quick succession here, as they are found to be in some localities, owing in a great measure, to the mineral properties of our tertiary beds, not being of that quality to warrant expensive excavations; still as the constant action of the sea upon the blue clay cliffs of our coast, washes those cliffs down, and brings to our notice the fossils which they have so long concealed, or if by any of our artificial removals of soil, those relics are brought to light, the facts are as worthy of being recorded, as if the organic remains were of still higher antiquity.

I am induced to make these observations, by my having just received from a friend the two bony portions (commonly called the core, or slug of the horn), of the interior of a pair of very large horns of the ox, lately discovered at Clacton, on the Essex coast, about 10 miles south of Walton. They were found in a mass of drift sand, overlying the London clay, and in consequence of the cliffs slipping down, they were disentombed: many portions of the skull were found with them, and the *os frontis* was attached to them. By measurement, I find them to be three feet long on the outer curve, from the base to their tips; they are curved about 8 inches, and are

18 inches in circumference at the base. The diameter of each horn at the base is 6 inches in one direction, and 5 inches in the other. They have not the fluted character so conspicuous in the horn which I found three years ago, at Copford, noticed at p. 437, vol. vii. but they have the punctures so common to the bony portion of horns in general.

In both instances the remains of the elephant were found associated with those of the ox. At Copford, a vertebra and the cuneiform bone of the right fore foot of the former, were discovered, subsequently to those of the ox above-mentioned. And, with the horns recently discovered at Clacton, was found a perfect elephant's tooth, 11 inches in length, and 3 inches wide upon the grinding surface, and eight inches in depth.

As no doubt the horns themselves, (of which not the least vestige was retained), were of a proportionate thickness and length to these gigantic remains, what a formidable creature must have been the ox, or wild bull, which ranged through the ancient forests!—*John Brown.*—*Stanway, Dec.* 21, 1837.

[The fossil remains of the ox are more or less abundant throughout the whole of the county of Essex, but the dimensions of the horns recorded above, are greater than in any specimens we have had an opportunity of examining.—Ed.]

*Golden and Sea Eagle, Aquila Chrysaëtos and A. albicilla.* In the more recent works on British ornithology, there is not any notice of eyries, either of the golden or sea eagle, in England at the present time; but, from my having seen two birds of one or other of these species, (though not sufficiently near to be specifically determined), on the 13th of July, 1835, about the English lakes, they most probably breed in that quarter. One appeared near the eastern extremity of the vale of Newlands, not far from Keswick, and the other at Crummock Water. Willughby states that there was an eyrie of the sea eagle in Whinfield Park, Westmoreland; and Latham, on the authority of Dr. Heysham, remarks, that the same species bred near Keswick. It may be added that in visiting all but three of the lakes of Cumberland, Westmoreland, and Lancashire, (Lowes-Water, Ennerdale, and Wast-water) in the month of July, 1835, I saw eagles on one day only.—*Wm. Thompson. Belfast, Jan.* 1838.

*Bald Eagle, Haliaëtus leucocephalus,* Savig.—Wilson, in his American Ornithology, (vol. ii. p. 310, Jardine's ed.) observes respecting this bird,—"of the precise time of building, we have no account, but something may be deduced from the following circumstance."—Here follows the description of an ascent to a nest in a pine tree, near Great Egg Harbour, in the month of May; when it was found that the young birds must have vacated the nest some time before. It is added,—"Our guide had passed this place, early in February, at which time both the male and female were making a great noise about the nest; and from what we afterwards learned, it is highly probable it contained young, even at that early time of the season." In the Fauna Boreali-Americana, (part 2, p. 15), Dr. Richardson remarks of this eagle,—"It is known to breed as far south as Virginia, but its nests do not appear to be so common within any part of the United States, as they are in the fur countries."

In the following note there is, at the same time, proof that the bald eagle builds at the early period presumed by Wilson, and that during the season of incubation, it is found much farther to the south than is mentioned in the latter work. During a tour made by my friend, Richard Langtry Esq. (of Fort William, near Belfast), through the United States, in 1836, he, in the middle of January, observed a pair of these birds flying about a nest, which was in the top of a gigantic pitch pine, that stood a little remote from other trees, on the bank of Fish River, Mobile Bay. On the 6th of February he returned to the place, in the hope of procuring a young bird alive; but as the nest was inaccessible, recourse was had to the axe, and, with the tree, it came to the ground, together with one young bird, which was killed by the fall. The eaglet was covered with down, interspersed with a few feathers. The nest was rather flat, and composed of sticks; it contained the heads and bones of mullet, and two heads of the grey pelican. The parent birds were in great consternation during the felling of the pine, and to the last moment continued flying clamorously about the nest. Mr. Langley was informed that two or three pairs of bald eagles build here annually about Mobile Bay, and had their nests pointed out to him.—*Id.*

*Remarks on 'Viator's' proposed new name for the Infusorian Genus*, PROTEUS. (Mag. Nat. Hist. vol. ii. p. 58). —Your correspondent 'Viator' states as a well-known rule, "that not more than *one* genus in Zoology, or *one* in Botany, or *one* in any other of the like Sciences, should receive the same name." It is not very clear from the above words, whether 'Viator' objects to the employment of duplicate terms in *different* sciences, or *merely* to the repetition of a generic term in the *same* science;—or in other words, whether he has the same objection to the *double emploi* of the term *Posidonia*, (e. g.) in Botany and Zoology, which he justly has to that of *Proteus* for an Amphibian and an Infusorian. I hope and believe that the former was the intended meaning of 'Viator,' for it is now generally agreed by naturalists, that no generic term must be common both to Botany and Zoology.

The question between the two rival claimants to the title of *Proteus*, is one of considerable difficulty. The minute and despised Infusorian might plead the undoubted right of priority, its baptism being registered, as observed by 'Viator,' in 1755; whereas the Amphibian, was not drawn from its murky caverns till 1768. Moreover, it might be argued, that the term *Proteus* is peculiarly expressive of the versatile powers of the animalcule, while it is utterly inapplicable to the Amphibian, whose essential and distinguishing character is that of undergoing no metamorphosis at all. Laurenti, therefore, was guilty of a great oversight, in giving to his animal a name, which not only had already been appropriated, but which was, perhaps, the most unsuitable one that could have been chosen. On the other hand, it must be remembered, that the Amphibian has now been known by the name of *Proteus anguinus*, for 70 years, and that this name has been universally adopted by the numerous naturalists who have made this extraordinary animal their study. This question of names is therefore too knotty to be decided by an anonymous author, though our thanks are due to him for having directed our attention to it. I trust the time may arrive when a committee of nomenclature may be appointed, out of the whole republic of science, invested with power to revise the systematic terms of Zoology and Botany, and to establish their terminology on a sure foundation. But when changes in nomenclature are attempted by individuals, whose weight in the scientific world is not sufficient to ensure the universal adoption of their improvements, (admitting them to be such), the science receives more injury by the multiplication of synonymes, than benefit by these partial ameliorations.

I have only to add that 'Viator' has been unlucky in his choice of the term *Thetis* as a substitute for *Proteus*, that name having been adopted, some years since, by Mr. Sowerby, in his Mineral Conchology, vol. xvi. pl. 513, for a genus of fossil shells, and is confirmed by Brown, Lethæa Geognostica, p. 704.—*H. E. Strickland.*

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# NATURAL HISTORY

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## ART. I. *The Influence of the nature of the soil upon the distribution of Vegetables; demonstrated by the Vegetation of the Western Tyrol.* By DR. F. UNGER.*

CALLED to reside in the town of Kitzbühel, in the Tyrol, as district physician, the author has had the skill to turn to account every moment of leisure allowed by an extensive practice; and at the end of four years he has been able to place before the scientific world a complete history of the country, embracing its geology, botany, and meteorological phenomena. It so rarely happens that we are presented with a work in which nature is displayed as a whole,—in which the several departments of science, like the links of a chain, are treated of in connection, and in which, along with the description of a plant, is that of the soil in which it grows, of the air it breathes, and the different degrees of temperature to which it is exposed,—that we deem it right to give such a detailed analysis of the one before us, as will cause the richness of its materials and the extent of philosophical knowledge which distinguish it, to be fully appreciated.

The territory of Kitzbühel presents a surface of nineteen square German miles; it is bounded on the east, south, and north-east, by the country of Salzbourg; and on the north by Bavaria; while on the west it extends to the river Inn, in a line parallel with the course of the Wiedau. The town itself is situated in latitude 47° 27′, and longitude 30° 4′ From l'Ile de Fer to an elevation of 2350 feet above the level of the

* "Ueber den Einfluss des Bodens auf die Vertheilung der Gewaechse, nachgewiesen in der Vegetation des nordœstlichen Tyrols, &c. &c.' 1 vol. 8vo. Vienna, 1836. For this abstract of the work, we are indebted to the friendship of Dr. Martins."—*Ed. Annales des Sci. Nat. August*, 1837.

sea, the whole country is thickly set with mountains, some of which terminate in sharp ridges; but the greater number are depressed at their summits, and rise gradually, forming a series of rounded eminences. None of these attain the height of 7500 feet, and consequently do not approach the limits of perpetual snow; which, in the central chain, are found at 8200 feet: the greater part, however, have an altitude of more than 5000 feet, and the remainder at least above 3500 feet.— The country is watered by three rapid streams; while coolness and humidity are everywhere supported by springs, which are more considerable, but of less frequent occurrence, in the calcareous than in the primitive rocks.

The temperature of springs being in general equal to the mean temperature of the year, the author has given a table of all those which have come under his notice. These temperatures are the mean results of many observations, and are accompanied by notices of the height of the springs, and the nature of the rocks through which they flow. As a total, their temperature varies between 2,9° and 7,1° R. These figures may be taken as representing the mean atmospheric temperature, the law being confirmed by the author's observations in the town of Kitzbühel itself; for the mean temperature of all the springs in that town is 6,1° R. and the mean atmospheric temperature of the year 6,2° R. Besides these springs, the country contains many pieces of water, one of which, called Walchsee, is more than a league in circumference.

Placed between the primitive formations of the central chain, and the secondary beds of the alpine limestone, the territory of Kitzbühel belongs almost entirely to the transition rocks. We cannot here enter upon the purely geological reflections of the author; numerous sections are designed to give an exact idea of the geognostic constitution of the country, and of the different modes of superposition of the beds. We speak only to botanists, and the nature of the *surface* of the soil is all that possesses an interest for them.

The argillaceous schist occupies about two thirds of the country, but it is traversed from east to west by bands of schistose grauwacke, of freestone, (*Uebergangs-Sandstein*), and of mountain limestone; the latter forming, almost exclusively, the northern part of the district.

The argillaceous schist is coarse and of an ashy colour, and encloses pebbles of quartz. It is frequently found alternating with schistose grauwacke. The limestone is in grains not so fine as those of the primitive limestone; its angles are less acute; its colour is white, yellowish, or greyish; and it contains a small portion of oxide of iron. It is this which forms the group of Rettenstein. The argillaceous schist contains copper ore. The sandstone is of two sorts; that which is in contact with the grauwacke, (the old red sandstone of England), is of a deep red or grey; its texture is uniform and schistose, and it often encloses beds of gypsum. The new red sandstone, (*todt liegende*), is hard, of a pale red, often greenish or whitish, variegated, fine-grained, abounding in mica, and sometimes schistose. The limestone forms mountains, some of which rise to the height of from 5000 to 7300 feet; the mountain variety belongs to the limestone of the recent transition series; sometimes it is replaced by conglomerates. Erratic boulders, the composition of which is different from that of all the rocks found in the country, present themselves to the notice of the observer on every side; many display marks of friction upon their surfaces, which may throw some light on the manner of their transportation. They resist all atmospheric influence, and present only here and there some traces of lichens, which have succeeded in fixing themselves through the decomposition of the feldspar, a rock more readily acted upon by external agents than the others.

The atmospheric influences, which, in conjunction with those of the sun and of the latitude, determine or modify the vegetation of a country, are, 1st, the weight of the air, and its variations; 2ndly, the annual and diurnal changes of temperature; 3rdly, the hygrometrical and electrical state of the air; 4thly, rain, snow, hail, &c.; 5thly, the winds; 6thly, the changes in the chemical composition of the atmosphere. All these influences united constitute what we term climate.

The barometrical observations were made three times a day for a year; and give for the mean height of the barometer, at Kitzbühel, 697,04 millemetres. Nevertheless as, during the whole of the year 1834, the barometer stood unusually high, we ought perhaps to make a correction, the quota for which may be furnished by the barometer at Inspruck; this, reduced to 0°, has for its mean height, deduced from fifty years' observation, 708,31, whilst the mean of 1834 is 710,56; from which we may conclude that the mean height of the barometer at Kitzbühel is 694,78 millemetres. Taking the mean height of the barometer at the seacoast, and supposing it, according to Schouw, to be 760,90, the height of Kitzbühel above the sea is 2347,8 feet. For the height of Inspruck, we arrive at a scarcely different result. According to geodesical and trigonometrical measurement, this town is situated 1791,2 feet above the level of the sea; and Kitzbühel, according to the corresponding barometrical observations, is 558,6 feet above Inspruck, which gives 2349,8 for the absolute height.—

The annual barometrical variations at Kitzbühel are comprised between 693,33 and 715,08.

The thermometrical observations were continued for three years,—from 1831 to 1834: and were made three times every day,—at 7, 12, and 5 o'clock. The mean temperature of each month was,—January, —2,69; February, —0,21; March, +2,21; April, +6,80; May, +11,49; June, +13,28; July, +14,99; August, +14,77; September, +11,25; October, +6,98; November, +1,72; December, —1,05. The mean temperature of the year is 6,21; whilst at Inspruck it is 7,21. This result perfectly agrees with the law established by Schübler, according to which this mean temperature diminishes a degree of Reaumur for every 533 feet up to the height of 3000 feet. The maximum of temperature at Kitzbühel was on the 11th of July, 1832, when the thermometer stood at 22,0; and the minimum on the 3rd, 19th, and 22nd of January, in the same year, when it stood at —12,0; which gives an interval of 34°.

The climate of Kitzbühel is humid, for we find 125 rainy days. In winter the country is covered with snow, from four to six feet deep; which does not entirely disappear until the month of May. Storms are frequent, and the winds very violent; that from the south sometimes overthrowing houses and tearing up trees. Ten tables are appended to the meteorological portion of the work, which we have been thus rapidly analysing; they contain a multitude of observations, placed in comparison with those made at Inspruck, Trieste, and Gries.

Taking into consideration all the circumstances we have just mentioned, we shall be led to conclude that the Flora of Kitzbühel must have an alpine character. It accordingly belongs to that great system which extends from the Pyrenees to the range of the Caucasus. Along this extensive line, vegetation exhibits many common characters, but it also presents some remarkable differences. Thus, the Flora of the Pyrenees differs less from that of the Alps, than does this latter from the vegetation of the Caucasus. The Tyrol lying between the two, it follows that a host of western plants reach its limits, while those of the eastern extremity are quite foreign to us. Thus the *Petrocallis pyrenaica, Horminum pyrenaicum*, and *Potentilla nivea*, are common to it with Switzerland, Dauphigny, Provence, and the Pyrenees. Others, which grow only here and there in privileged localities, extend very far towards the east, yet without penetrating into this country; such are the *Geranium pyrenaicum, Valeriana saliunca, Papaver pyrenaicum*, and *Ornithogalum pyrenai-*

*cum.* Our territory forms, in its turn, the western limit of some species peculiar to the mountains of Austria, as the *Heracleum austriacum;* whilst the *Linum alpinum*, *Aconitum Anthora*, and *Dianthus alpinus*, extend into Liguria and Piedmont. The plants of the south side of the Alps sometimes pass their summit, and are found inhabiting the north side; thus we find upon this side, a great number of species belonging to the Flora of the Mediterranean; none of these however have ventured into the north Tyrol. Our Flora has consequently been sheltered from those invasions and mixtures, which might have altered its primordial character; nevertheless, a great number of plants which grow in the fields, must have been propagated with the cultivated vegetables, from which they are inseparable. For instance; *Scleranthus annuus*, *Agrostemma Githago*, *Saponaria officinalis*, *Papaver Rhœas*, many veronicas, *Centaurea Cyanus*, *Capsella Bursa pastoris*, *Solanum nigrum*, &c. Some few, as the *Thlaspi arvense*, *Teucrium Scorodonia*, and *Myricaria germanica*, have only been observed within the last few years, in the fields of flax which lie near Jochberg. By the intervention of the vallies of Leuk and Brixen, that of Kitzbühel has communication with countries belonging to the Scandinavo-Germanic Flora. Some of the plants which form a part of it, stop at the very foot of the mountains; such as, for instance, the *Dipsacus sylvestris*, which ceases as early as the vicinity of Reichenhalle, whilst the *Euphorbia platyphylla* ascends as high as Thunsee. The *Papaver Rhœas* is very common round Scheitzelreith, and *Staphylea pinnata* advances to Unken. Analogous examples are common in other countries; thus the *Ononis natrix* pauses in the Tyrol upon the southern slope of the Brenner, while the *Saponaria ocymoides* is found again on the other side, as well as the *Dorycnium herbaceum* and *Colutea arborescens*. Some elevated parts of the territory are occupied, on the contrary, only by northern species, which is more particularly the case with the turfy marshes of Bichlach.

The result of all that we have been saying is, that at least a third of the plants which compose the Flora of Kitzbühel belong to other regions; and that only two thirds can be considered as characterizing the vegetation of the western Tyrol. There also exists a remarkable difference between the vegetation of the north and south parts of the district. Whilst the calcareous ridges of the north lift their naked summits towards heaven, the schistose mountains on the contrary are covered with the richest vegetation. Hegetschweller remarked the contrary in Switzerland, and the author of this extract has had an opportunity of verifying his observations, upon the

Col de Fours, the mountains which form the southern boundary of the Allée blanche, and in the department of the lower Alps.

The northern part of the district is moreover covered with forests of great extent; they rise from the bottom of the vallies to a height of 4800 feet, and are chiefly composed of beeches. In the south we find the *Abies excelsa*, D. C., the larch, the *Pinus sylvestris*, and *Abies picea*; many willows, *Alnus incana*, the fowlers' service-tree, the hazel, ash, oak, *Populus nigra*, and, above all, the *Acer Pseudo-platanus*, which sometimes attains to an enormous size. When this arborescent vegetation ceases, it is replaced by another, composed of the *Pinus pumilio*, *Alnus viridis*, dwarf willows, the *Rhododendron ferrugineum*, *R. hirsutum*, *Lonicera alpigena*, *Atragene alpina*, and *Juniperus nana*. An extract from the forest-archives of the country proves that 32 per cent. of the territory is covered with wood; this report corresponds with what we find to be the case in Brésil, a region which may as yet be considered free from any attempt at cultivation.

To the forests succeed the alpine prairies, properly so called; they are composed, for the most part, of the plants which are found among the Swiss Alps. These prairies are very extensive, for they cover about half the surface of the soil.

Before we enter upon the consideration of the influence of the soil upon the vegetation of the country we are examining, we have to resolve, by way of preamble, some important questions intimately connected with our immediate subject. Let us first endeavour to determine with exactness, the part performed by the root in the nourishment of the plant. Duhamel, Senebier, and Carradori have proved that the root absorbs only by its capillary extremities; and further, Mohl has made it evident, ('De Palmarum Structurâ'), that the organization of the root differs altogether from that of the trunk, and that it is the product of a system of *gemmæ*, having their point of separation at the base of the stem. At the extremity of the roots the vessels disappear, and are replaced by cellular tissue, filled with a fluid, and sometimes with elongated crystals, which I first observed in the second cellular layer of *Lemna*. At the base of the spongiole we generally find cylindrical hairs, which are frequently recurved; they multiply in a singular manner under the influence of a humid atmosphere, and in *Streptopus amplexifolius* they form a thick felt. I think, with Carradori, and contrary to Treviranus, that these hairs perform a prominent part in the absorbing functions of plants. What proves to me the energy of their vitality, is the phenomenon of cyclosis, which, after M. Meyen, I have observed in those of the *Hydrocharis*. The roots are, besides, covered with a layer of *epidermis*, differing from the *epidermis* of the stem, in the circumstances of its cellules having no particular form, and in being destitute of *stomata*. When exposed to the contact of the air, this layer thickens, becomes tough, and covers the root with an envelope like parchment, as may be observed in the aërial roots of *Pothos* and *Epidendrum*. I have examined in the *Lemna*, a very important organ of the root, namely, the *coleorhiza*. The root of *Lemna* is covered with a double layer of *epidermis*; and so long as the root is not more than a line and a half long, the two layers are combined; but when it lengthens, the outer layer is ruptured horizontally, and remains united to the inner one only towards the point of the root. We can perceive traces of it at the base of the root, although they are very indistinct. If we cut off the extremities of such roots as are furnished with a *coleorhiza*, the plant is not destroyed; for new radicles are instantly developed, and, in about ten days, attain the same length as the first. It is certain that the *epidermis*, and even some isolated layers of the bark of the roots, are separated from the cellular tissue which they cover, and are detached, in the same manner as we frequently observe in the trunk. Some authors have even supposed that they fall like the leaves. Without adopting so decided an opinion, we will readily admit that these organs are in great part renewed.

The respiratory functions of the leaves are connected with the absorbing properties of the root; they increase and diminish together. The leaves absorb by means of their hairs, which are precisely analogous to those of the roots. The leaves of plants exposed to the sun, become either villous or tough; the plant by this means restores the equilibrium, and replaces the loss occasioned by a too rapid evaporation. This explanation is different from that of M. DeCandolle, who thinks that the hairs, in closing the openings of the *stomata*, prevent a too abundant evaporation; but the definitive result is the same. The following experiment proves that the roots, in the absence of the green parts, may supply their place.—I raised from seed a *Solanum Lycopersicum*; the cotyledons were cut off as soon as they had performed their office, and as fast as the leaves appeared, they also were cut off. Adventitious roots were soon developed at the base of the stem, which became more and more numerous; the plant lived and flowered, but produced no fruit. It is not yet well ascertained, whether plants merely assimilate the constituent principles of the air, or whether they are able, of themselves, to produce carbon. The experiments of Crell seem to prove that they do possess this power. He placed a hyacinth-bulb in a vase filled with distilled water, and hermetically sealed. The leaves grow to the length of 6 or 7 inches, and the total weight of carbon in the plant increased to 47,166 grains. Another bulb, placed in pounded quartz, presented the same phenomena. Now, these two plants vegetated in a space containing 50 cubic inches of air, and consequently only 0,08 grains of carbon; it could not then be from the atmospheric air alone that the plants imbibed this principle. In M. Braconnot's experiments, small plants of white mustard, which had germinated in sand, increased in weight in the proportion of 0,206 to 0,234, under the influence of light alone. The experiments of Gœppert, ('Nonnulla de plantarum nutritione'), give quite opposite results; the quantity of carbon did not increase: those of John lead to analogous conclusions. These contradictory experiments nevertheless agree in proving the influence of external agencies. That of water, which can by itself nourish plants, has been proved by the trials of Duhamel, Hasenfratz, De Saussure, and Crell, who raised plants in marble, pounded quartz, horse-hair, &c. by watering them with spring or river water. The experiments of Hales, Percival, Ruckert, and De Saussure, demonstrate that the carbonic acid is decomposed under the influence of light. The last physiologist has made it evident that this decomposing power is very energetic, since seven plants of periwinkle, occupying a space of half a cubic inch square, decomposed 21,75 cubic inches of carbonic acid gas in six days. The experiments of Link also prove that it is not sufficient for the plant to receive carbonic acid, by the intervention of water penetrating through its roots, in order that all the stages of its vegetation and fructification may be accomplished; but it is further necessary that it should decompose that of the atmospheric air: it even appears, according to the observations of M. Ad. Brongniart, that this mode of nutrition preponderated over the other, in antediluvian plants, which appears to indicate that the composition of the atmosphere was different then to what it is in the present day.

We might have concluded from the preceding remarks, that the nature of the soil could have no influence on the nutrition of plants, carbonic acid appearing to be their only aliment; but we also find in their tissues, metals, alkalies, and salts, which prove the influence of the soil in which they grow.—Wahlenberg, however, founding his opinion upon facts published by Vanhelmont, Boyle, Duhamel, Kraft, Bonnet, &c. maintained that they were produced by the action of water upon the tissues of the plant.

Others have thought that plants themselves gave birth to these foreign bodies. Schrader, having sown grains of barley and wheat in washed flowers of sulphur, and watered them with water containing only carbonic acid, found in the plants which sprung from them, silex, lime, oxide of iron, and manganese. Moreover, he found in them more silex than in the wheat which had grown in the open fields. Braconnot discovered silex, and carbonate and phosphate both of lime and iron, in the ashes of *Sinapis alba*, whether they had germinated in powdered oxide of lead, or sulphur, or between grains of lead, and had been watered with distilled water.

John, in analysing some lichens, (*Ramalina fraxinea*, and *Borrera ciliaris*), which had grown at the top of a fir tree, standing in earth in which no traces of iron could be found, discovered in them a great quantity of this metal. Nevertheless, in his finished memoir upon the nutrition of plants, he proves that all the metals which exist in vegetables, have penetrated into them in a soluble state; iron, in the form of sulphate; manganese, under that of carbonate or nitrate: and he has established the fact, that nitrate of potash, which is found in so many plants, disappears the moment they are placed in earth where this salt does not exist. The beautiful experiment of M. Lassaigne is in perfect accordance with these last-mentioned facts; it shews that the silex and the salts which we find in a plant reared in sulphur, excluded from the air, and watered with distilled water, previously existed in the seeds from which they sprung. Peschier has also observed that cresses, watered with water containing sulphate of lime in a state of solution, produced, when analysed, much more sulphate of potash than those which had been supplied with pure water: which proves that plants can modify, but not produce the chemical substances existing in their tissues.

The last researches on this subject we owe to M. Ch. Daubeny. He has raised plants in pulverised sulphate of strontian; others he watered with a solution of nitrate of strontian; and he has found traces of this salt only in the root, never in the parts exposed to the air. On the contrary, they contained lime and silex, and these in more perceptible quantities when they had grown in pulverised Carrara marble, than when they had vegetated in quartzose sand. The existence of excretions from the roots, already pointed out by Murray, Hales, John, Mirbel and Brugmans, has been apparently placed beyond doubt by M. Macaire. He plunged different plants in water, after having carefully washed them, and found that the roots of the *Cichoraceæ* secreted a juice analogous to *thridace*, (*lactucarium*); those of the *Euphorbiaceæ*, a gum-resinous substance; those of leguminous plants, a gum; those of gramineous plants, a gummy substance containing salts. Upon plunging one of the roots of a *Mercurialis* in acetate of lead, whilst the other was steeped in distilled water, he very soon discovered in the latter, manifest traces of the presence of this salt of lead. These experiments are however subject to two very strong objections:—1st, it is impossible that in freeing the roots from the earth which surrounded them, some entangled filaments should not have been broken; in which case the juices contained in the vessels themselves would have escaped, and it is not surprising that the writer should have found them: 2ndly, the transmission of the acetate of lead through the roots, is easily explained by the mere capillary action of the root itself. To provide against these inconveniences, I have selected plants whose roots do not adhere to the soil, as, for example, *Lemna minor*. Three grains of acetate of lead were dissolved in four ounces of pure water, and about forty small plants of the *Lemna* placed in the solution: on the eighth day many of them had become yellow. These were separated from the others, and frequently washed in pure water, and afterwards in distilled water, until the latter ceased to indicate the presence of the acetate of lead. They were then placed in a glass containing two ounces of distilled water, but the water did not give the least sign of the presence of the salt; nevertheless, it had penetrated the tissue of the plants, for when hydrosulphate of ammonia was applied to them, they became entirely black. A microscopic examination farther shewed, that this blackness was communicated even to the membrane of the cellules; besides which, it had coloured all the cells of the lower surface, while those of the upper one were only partially affected; which leads me to suppose that even the frond of the plant had absorbed the poison, by the surface in contact with it.

Wishing to make a contrary experiment, I placed some plants of *Lemna* in a solution of hydrosulphate of ammonia, and then removed them into water containing acetate of lead in solution; the liquid was not at all disturbed by the process: and here my experiments terminated. Those of M. Daubeny made with different substances, have led to analogous results. It follows from these experiments that plants do, to a certain degree, select the substances with which they find themselves in contact; but that those substances which are absorbed, are so, simply in the direct ratio of their quantity. Thus we must admit that water, air, and earth, exercise a real and sensible influence upon the character of vegetable life. Hence arises the presence of certain species in localities whence others are excluded; and hence, in particular, the existence of marine, fluviatile, and lacustrine plants; hence also the analogy subsisting between the vegetation of salt marshes and that of the sea shore.

It cannot be denied that calcareous strata possess a Flora very different from that of all others. Zuccarini and Sieber observed this fact, upon the south side of the Alps; in the Carpathian mountains, Wahlenberg counted forty-three plants which belong only to a calcareous soil; and he made the same observation in Sweden. On the new continent, Martius was struck with the same facts, in the neighbourhood of the river San Francisco, where the chalk begins; he there perceived vegetation to assume a peculiar character, remarkable for the predominance of certain forms, as those of the *Terebinthaceæ*, *Malvaceæ*, *Solaneæ*, *Ficoideæ*, mimosas, and cassias. There are plants peculiar to gypsum, as many of the *Gypsophilæ*, the *Gymnostomum curvirostrum*, *Urceolaria gypsacea*, *Sarcosyphus gypsophilus*, Wall. The vegetation belonging to quartz, chalk, and clay, is never entirely different, because these substances do not occur pure, but are always accompanied by others, and covered with soil which is everywhere the same. The plants peculiar to quartz, for example, are *Arundo arenaria*, *Plantago arenaria*, *Jasione montana*, *Statice Armeria*, *Gnaphalium arenarium*, &c. In the argillaceous strata we find, on the contrary, *Tussilago Farfara*, *T. Petasites*, *Arctium Lappa*, *Sonchus arvensis*, *Inula dysenterica*, *Thlaspi campestre*, &c. But these influences operate only when the formation occupies a very large surface; it is thus that I found upon the lignite in the vicinity of Haering, in the Tyrol, only *Funaria hygrometrica*, as peculiar to it; the other plants were the same as in the environs, and had invaded the little plot of lignite. The turfy strata likewise have a vegetation peculiar to themselves, and their influence is such that we may recognise the same species upon the turf beds of different parts of Europe; as if the influence of the soil preponderated over that of the climate itself. The vegetation of the province of Minas-Geraes, according to Martius, is the most distinctly characterised of that of the Campos, and is never observed upon calcareous or granitic strata.

Nevertheless, observations have been made which appear to invalidate the correctness of the preceding. Wahlenberg observed on the Carpathian mountains, thirty-nine plants considered to belong exclusively to the calcareous formations; of these thirty-nine plants he afterwards met with twenty-two on the granite in Switzerland and Lapland. Schouw, traversing the whole of Switzerland and the Apennines, with a geological map in his hand, observed no botanical differences connected with the strata. M. DeCandolle, in his numerous agricultural journeys through France, has established as a fact, that plants grow indifferently upon all strata; he was struck, however, in Limousin, by perceiving that the chesnut appeared only upon the bands of sandstone which cross that province; and this observation has been repeated in many localities.

Zahlbruckner, who, in describing a part of Austria, placed in opposition to each other the vegetation of the calcareous and the primitive strata, points out important differences.—Lachmann, in his 'Flore de Brunswick,' finds variations, if not in species, at least in their number and developement, upon each of the secondary or tertiary formations of that country.

To return to the territory of Kitzbühel;—we will divide the plants which cover it, into three sections, determined by their affinity, and their constancy to the same strata. We will call the first *Bodenstete Pflanzen*, which signifies plants never found but on the same formation; *Bodenholde Pflanzen*, or those which are found more on one formation than another, without being exclusively confined to either; and lastly, *Bodenwage Pflanzen*, those which inhabit all soils indifferently. These last are the most numerous, and the most common everywhere; so much so, that in characterising a stratum, we should have some difficulty in selecting the plants there met with in the greatest abundance. It is true, it may happen that the characteristic plants have nearly exterminated the others; thus, the *Rhododendron hirsutum*, *R. Chamæcistus*, *Globularia cordifolia*, *Biscutella lævigata*, and *Erica carnea*, frequently cover the calcareous strata which they characterise; whilst the *Rhododendron ferrugineum*, *Azalea procumbens*, *Chrysanthemum alpinum*, *Sesleria disticha*, and *Juncus trifidus*, indicate the presence of granite. If we include those of the turf-beds, the plants characteristic of our country form about a fifth part of the whole number. This number would be still greater, if the strata themselves did not offer numerous varieties in the same formation. Those called secondary and tertiary being often nothing more than ancient rocks, modified by fire, water, or air, there results a want of homogeneousness which must influence vegetation. It is upon elevated summits, where the layer of soil is least considerable, and cultivation has not been able to reach, that the natural formation exercises the most powerful influence in determining the existence of certain plants. I have observed that the phanerogamous plants, which we may consider as the most characteristic of the calcareous strata in the north Tyrol, are the following:—

*Carex mucronata*
*C. tenuis*
*C. firma*
*Streptopus amplexifolius*
*Allium victoriale*
*Orchis erubescens*
*Ophrys myodes*
*Cephalanthera ensifolia*
*Epipactis atrorubens*
*Cypripedium Calceolus*
*Pinus pumilio*
*Juniperus nana*
*Salix Wulfeniana*
*Fagus sylvatica*
*Valeriana saxatilis*
*Centaurea montana*
*Achillea Clavennæ*
*Arnica scorpioides*
*Buphthalmum salicifolium*
*Crepis alpestris*, Rb.
*Hieracium succisæfolium*
*H. villosum*
*H. flexuosum*
*Tussilago nivea*
*Carduus defloratus*
*Carlina acaulis*
*Plantago montana*
*Teucrium montanum*
*Thymus alpinus*
*Polygala Chamæbuxus*
*Pedicularis Jacquini*
*Pedicularis foliosa*
*Globularia nudicaulis*
*G. cordifolia*
*Erica herbacea*
*Pyrola rotundifolia*
*Arctystaphylos alpina*
*Rhododendron hirsutum*
*R. Chamæcistus*
*Laserpitium latifolium*
*Astragalus glycyphyllos*
*Anthyllis vulneraria*
*Hippocrepis comosa*
*Saxifraga aphylla*
*S. cæsia*
*S. Burseriana*
*Potentilla caulescens*
*P. minima*
*Dryas octopetala*
*Rubus saxatilis*
*Pyrus Aria*
*Mespilus Cotoneaster*
*Biscutella lævigata*
*Iberis rotundifolia*
*Kernera saxatilis*
*Helianthemum vulgare*
*H. alpestre*
*Ranunculus hybridus*
*Hepatica triloba*
*Aquilegia atrata*
*Euphorbia Cyparissias*
*Gypsophila repens*

There are others which are most frequently met with upon the chalk, although they also occur on other strata; these are, for example:—

*Tozzia alpina*
*Gentiana ciliata*
*G. acaulis*
*Daphne Mezereum*
*Astrantia major*
*Anemone narcissiflora*
*Thalictrum aquilegifolium*
*Aconitum cammarum*
*Alchemilla alpina*
*Rosa alpina*, &c.

The differences which may exist between the vegetation of the different kinds of calcareous strata, are still less distinguishable; I have however endeavoured to arrange a table of the species which more particularly inhabit each of these formations.

Thus there exist plants peculiar to the alpine limestone, the metalliferous limestone, the limestone of Rettenstein, and the primitive limestone, or that of Brennthal, the veins of which traverse our argillaceous schist.

Many of the saxifrages which are found upon the calcareous soil, present exudations of carbonate of lime, analogous to those of the *Chara*. These exudations appear under three different forms. Upon the *Saxifraga Aizoon*, and upon the analogous species, we find, all along the edge of the leaves, little cavities filled with carbonate of lime; upon *S. cæsia* are small holes placed on the upper surface of the leaf, in which the salt is deposited in successive layers, from the bottom to the top; the under surface is pierced with numerous *stomata*, which, from their number, seem designed to supply the imperfect evaporation of the upper surface.

The plants peculiar to the argillaceous schist, are less numerous than those of the calcareous strata; this may be attributed to the slight affinity of plants for *alumina*, which is never found in them except in infinitely minute quantities.—We may admit the following:—

*Blechnum boreale*
*Sesleria disticha*
*Juncus trifidus*
*Hieracium grandiflorum*
*H. intybaceum*
*Phyteuma hemisphæricum*
*Veronica bellidioides*
*Rhododendron ferrugineum*
*Sibbaldia procumbens*
*Phaca astragalina*
*P. australis*

Upon the grauwacke and red sandstone we notice plants from both the calcareous and argillaceous beds; their number depending upon the manner in which the former formations may have been modified by being in contact with the latter. If upon the granite or gneiss, we sometimes by chance meet with plants belonging to the calcareous strata, a careful examination of the rock will explain their occurrence; it was in this manner that, having observed the *Sesleria cærulea* upon the hornblende, and *Gpysophila repens* upon granite, I ascertained that these rocks were in a state of decomposition, owing to the presence of acids. I ought, however, to confess, that I have sometimes found the *Dryas octopetala*, *Saxifraga oppositifolia*, *Hieracium villosum*, and the beech, upon the same strata, without being at all able to account for their developement, except in calling to mind that Hugi, Wahlenberg, and myself, have observed plutonic rocks covered with a light calcareous bed, which time had caused to disappear after the developement of the plant. If it be incontestible that the nature of the soil influences the principles which are found in vegetables, we have reason to suspect that it may also have an influence upon the forms of plants. I here give lists of some varieties, which I consider the simple consequences of the different nature of the subjacent strata.

| LIMESTONE. | ARGILLACEOUS SCHIST. |
|---|---|
| *Luzula glabrata*, Desv. | *Luzula spadicea*, DC. |
| *Juncus monanthos*, Jacq. | *Juncus trifidus*, L. |
| *Primula pubescens*, Jacq. | *Primula hirsuta*, Willd. |
| *Phyteuma orbiculare*, L. | *Phyteuma fistulosum*, Rb. |
| *Lepidium alpinum*, L. | *Lepidium brevicaule*, Hoppe. |
| *Anemone grandiflora*, Hoppe. | *Anemone alpina*, L. |
| *Ribes alpinum*, L. | *Ribes petræum*, Wulf. |
| *Gentiana bavarica*, L. | *Gentiana imbricata*, Frœhl. |
| *Dianthus alpinus*, L. | *Dianthus glacialis*, Hæncke. |

We also sometimes see species acting, upon one formation, the part that analogous species perform upon others; so that under different latitudes, genera and even species reciprocally replace each other.

| LIMESTONE. | ARGILLACEOUS SCHIST. |
|---|---|
| *Sesleria cærulea* | *Sesleria disticha* |
| *Luzula maxima* | *Luzula spicata* |
| *Carex mucronata* | *Carex frigida* |
| *Chrysanthemum atratum* | *Chrysanthemum alpinum* |
| *Erigeron alpinum* | *Erigeron uniflorum* |
| *Arnica scorpioides* | *Arnica Doronicum* |
| *Phyteuma orbiculare* | *Phyteuma hemisphæricum* |
| *Campanula alpina* | *Campanula thyrsoidea* |
| *Rhododendron hirsutum* | *Rhododendron ferrugineum* |
| *Saxifraga aphylla* | *Saxifraga muscoides* |
| *Astragalus glycyphyllos* | *Phaca astragalina* |
| *Biscutella lævigata* | *Erysimum lanceolatum* |

The altitudinal limits of vegetation in this country are as follow. The walnut rises to 2700 feet; the cereal plants, sometimes as high as 3764 feet; the beech to 4000, and in a stunted state as high as 4800; the fir to 5200. The region of alpine shrubs is between 5000 and 7000 feet; these are, the two species of *Rhododendron*, the *Betula viridis*, and the small willows. *Pinus pumilio* is still vigorous at 5903. We will not follow the author in the comparisons which he establishes between these heights, and those observed by Zahlbruckner in lower Austria; Hegetschweller, Leopold de Buch and General de Welden in Switzerland and Piedmont; trees and cultivated fields rise higher in these latter countries, as it was easy to foresee in considering the difference of latitude. In the Tyrol we observe also that certain specific forms of the plain are modified by ascending to a greater height, to such a degree as to have been taken by some authors for new species. Such are, *Polygala alpestris*, Rb. *Biscutella alpestris*, Kit., *Rhinanthus alpestris*, Wahl., *Chrysanthemum atratum*, Jacq., *Euphrasia minima*, Schleicher, *Juniperus nana*, Will., and many others. All are distinguished from their primitive form, by being less high, and by having corollas relatively larger, more simple leaves, and fewer ramifications.

The time of flowering of each plant is important, because it characterises the climate, and may serve as an index to agricultural experiments. The author has taken the means of four years, after having noted the exact time when a species is in full flower. The following are some of the results.

| | |
|---|---|
| *Alnus incana*, March 15th | *Primula elatior*, April 15th |
| *Corylus Avellana*, March 17th | *Prunus avium*, May 7th |
| *Daphne Mezereum*, April 2nd | *Fragaria vesca*, May 8th |
| *Hepatica triloba*, April 6th | *Ribes Grossularia*, May 9th |
| *Crocus vernus*, April 8th | *Pyrus Malus*, May 21st |
| *Leucojum vernum*, April 15th | *Berberis vulgaris*, May 25th |
| *Viola odorata*, April 16th | *Secale cereale*, June 24th |
| *Chrysosplenium alternifolium*, April 20th | *Solidago Virgaurea*, August 28th |

The work is terminated by a complete enumeration of the cryptogamous and phanerogamous plants of the territory of Kitzbühel, arranged in natural families. To each plant is attached an index to other countries where it has been observed. It is embellished with three beautiful plates, one giving a view of Kitzbühel; the second a geological map of the country, pointing out, by means of figures, the localities in which the plants characteristic of the different strata are found; and the third exhibits several geological sections, and some details of vegetable anatomy.

Our brief analysis has, we hope, shewn how rich the volume is in interesting facts and new observations. It proves the very varied knowledge of the author, joined to that enthusiasm which only could make him forget the fatigue and privations inseparable from journeys into the high Alps, and arm the naturalist with the perseverence necessary for accomplishing an undertaking, including such a diversity of objects.

## *Note from* Professor Owen, *to the Editor.*

College of Surgeons, March 20th, 1838.

Sir,

As you have done me the honour to insert in your Magazine, my letter (of the 21st of January) to the Secretary of the Academy of Sciences, of Paris, relating to M. Coste's description of my preparation of the *Allantois* of the Kangaroo, I beg leave to forward to you my Reply to the Memoir which M. Coste has subsequently addressed to the Academy, on the subject of my letter; and which Memoir he has printed, and privately circulated.

Should you deem the Manuscript herewith sent to contain such remarks on the Physiology of the *Marsupialia*, as may render it at all interesting to your readers, and be worthy of occupying a few pages in your periodical, I shall be gratified and obliged.

I remain, Sir,
With much respect,
Your obedient Servant,
RICHARD OWEN.

*To the Editor of the Magazine of Natural History.*

ART. II. *A Reply to the Communication addressed by* M. COSTE *to the French Academy of Sciences, entitled* "Memoire en Reponse a la lettre de M. R. Owen:"—*in a Letter addressed to* M. ARAGO, *Perpetual Secretary to the Academy.* By RICHARD OWEN, Esq. F.R.S. &c.

SIR,

It gives me sincere regret to find that M. Coste, in his communications to the Academy,* instead of acknowledging, as he ought to have done, the mistaken impressions under which he had examined, while in London, my preparation of the *allantois* of the kangaroo, should have persisted in his endeavours to appropriate to himself, and to deprive me of the credit of the discovery of that additional fact in the history of marsupial developement. It is with still greater regret that I perceive in his Memoir to the Academy, allegations, which compel me again to appeal to the honourable members of that learned body, in the maintenance of whose good opinion I am much concerned. At the same time, in this appeal, I shall restrain the expression of feelings which the treatment I have received from M. Coste naturally excites, and endeavour to blend with my statements such physiological observations, as may render my communication not altogether a barren controversy for individual rights.

M. Coste commences his Memoir to the Academy in reply to my letter, by stating what is his view of the subject of controversy between us. He says it relates "au sujet d'un fœtus utérin de kangaroo, qu'il, (M. Owen), désigne sous le nom de fœtus et ses vésicules appendiculaires, et que nous considérons, nous, comme un œuf." In this assertion M. Coste would

* *Letter* published in the 'Comptes Rendus Hebdomadaires,' February 3rd, 1838; and *Memoir* subsequently printed.

have the Academy to believe, that the difference between us is one of words, and not of things. I am much mistaken, however, if any one of the learned Academicians, how different soever his studies may be from the subject of animal physiology, will need to be informed that an *ovum* is something more than a *fœtus* and its vesicular appendages, and that it is a great deal more than an uterine *fœtus* alone.

The marsupial *embryo*, like every other *embryo*, is developed within a *chorion*, which incloses and conceals it, so far as observation has yet extended, at every stage of its developement. I found it necessary to lay open this exterior sac, in order to expose the *fœtus*, when I discovered, in 1834, its first-developed appendage; namely, the umbilical sac. I found it equally necessary to lay open the *chorion*, in order to expose its contents, when I discovered, in June, 1837, the second-developed vesicular appendage of the *fœtus*, namely, the *allantois*. The embryologist must pardon me, if, in reply to M. Coste's assertion, that I am contending for words instead of things,* I make the trite observation, that the *chorion* is no part of the *embryo*, that it is not developed by or from the *embryo*, but that it pre-exists to the first rudiments of the *embryo*, and, together with the *embryo* and its vesicular appendages, forms an essential constituent of the *ovum*.

It is of importance only to M. Coste, that it should be believed that an *ovum* in general is as complete without a *chorion* as with one; and that in the kangaroo in particular, if a *chorion* can be said to exist at all in the *ovum*, it exists in a state of fusion with the umbilical vesicle, or that the two membranes are confounded together;—a proposition which is essential to his claim of having discovered the *allantois*, since the only opportunity which he ever enjoyed of seeing the *allantois* of the kangaroo, was after it had been exposed by the removal of the *chorion*, and when the true *ovum* had been reduced, by previous dissection, to the condition of *a fœtus and its vesicular appendages*. This I hope to prove to the satisfaction of the Academy, and of the commission appointed to report upon the merits of M. Coste's Memoir, by

* In reference to my letter which M. Coste states to relate "au sujet d'un produit utérin de kangaroo, qu'il désigne sous le nom de *fœtus* et ses appendices vésiculeux, et que j'ai considéré comme un œuf," M. Coste observes in his note printed in the 'Comptes Rendus de l'Académie,' "Comme sur ce point la discussion paraît porter plutôt sur les mots que sur les choses, et comme d'ailleurs je suis parfaitement en mesure de répondre à toutes les assertions de M. Owen, je demande à l'Académie la permission de soumettre à son jugement le Mémoire ci-joint, dans lequel elle trouvera, j'espère, les moyens de décider la question, et dans le fond, et dans la forme."

M. Coste's own assertions, and by the evidence of the artist which he adduces to support those assertions.

But before noticing these assertions, and that evidence, I must offer a few remarks on the general dissertation on marsupial developement, with which M. Coste involves the immediate question, because although this dissertation is set forth with higher pretensions, it in fact consists, in all its essential points, of a mere paraphrase of an imperfect translation of my first Memoir of 1834. M. Coste says, "Nous soumettons au jugement de l'Academie, une dissertation, qui sera à la fois la réfutation de la lettre de M. R. Owen, et qui, en même temps, contiendra toute l'histoire connue de l'ovologie du kangaroo." Memoire, p. 3. The learning he deems requisite for this history, is restricted however to a mere repetition of the names of the authors whose works are quoted in my Memoir. But in that Memoir I did not pretend to enter into the whole known history of the ovology of the kangaroo; my aim was restricted to the elucidation of certain doubtful points in the history of marsupial developement; otherwise I should have furnished M. Coste with more names of authors of originality, than those which appear in his dissertation. It is not, however, my business here to occupy the time of the Academy, by demonstrating the poverty of M. Coste's critical acquirements on the subject he proposes to teach. But I may observe, en passant, that if the recent admirable descriptions of RENGGER had been known to him, he would have been in possession of evidence relating to the condition of the marsupial *ovum*, in the multiparous species, of which he appears to be in ignorance; and I may add that if he knew the writings of COLLIE, otherwise than by the extracts which are introduced into my Memoir of 1834, he would be acquainted with phenomena which are very essential to the man who, elevated by the addition of one new fact to his small stock of ideas on the subject, undertakes to teach the whole known history of the oology of the kangaroo;—"toute l'histoire connue de l'ovologie du kangaroo."

Yet even in the easy task of superficially paraphrasing a statement of facts which he had no share in accumulating, M. Coste cannot avoid falling into the errors which usually betray a hasty compilation. And first, with reference to M. Coste's description of the female organs of the kangaroo, I may observe, that there exist two interesting modifications of these organs of the marsupials, one of which relates to *multiparity*, the other to *uniparity*. In those marsupials where *ova* are simultaneously developed in both *uteri*, the median cul-de-sac is equally divided by a longitudinal *septum*, and each *uterus* opens into a separate compartment of the sac; and thus is obviated the evil that would have ensued from the simultaneous entry of two tender embryos into one common contractile cavity. But in those species of marsupials in which but one *ovum* is developed at one pregnancy, two distinct cul-de-sacs are unnecessary, and the *uteri* open into one common cœcal cavity. Now this latter is precisely the condition of the female organs in the kangaroos, to which M. Coste attributes the multiparous type of structure, in describing the median cul-de-sac as being divided by a 'cloison intermédiaire.' I suspect that here again M. Coste has deceived himself, by a hasty glance at my plate vi. in which an imperfect or rudimental *septum*, such as usually exists in the kangaroo, is represented. M. Coste would have escaped the double error of adducing what forms the distinctive peculiarity of the female organs of the multiparous marsupials, as the type of those parts in the whole order, and,—what makes the error an absurdity,—the ascription of this peculiarity to the uniparous kangaroo; and he would also have been acquainted with what I conceive to be an interesting physiological relation, had he ever perused in the original, my Memoir of 1834.*

It may be said that the subject of the structure of the generative organs of the kangaroo, has little reference to the question of the discovery of the *allantois* in this species: I admit it. But it must be remembered that the irrelevant introduction of this subject into the present discussion did not originate with me; and I now allude to it only to shew what are the qualifications of the man who proposes, in his refutation of my claims to the discovery in question, to teach *the whole known history of the ovology of the kangaroo.*

Among the numerous topics with which the question of the discovery of the *allantois* is involved by M. Coste, in this history, are some corrections of my nomenclature of the constituents of the *ovum;* and he taunts me for retaining certain opinions, as, for example, regarding the analogy and organized nature of the *chorion*, which he considers to be obsolete. Thus he conceives himself to have exploded from oology the term *chorion*, as applied to the most exterior of the membranes of the mammiferous *ovum*, and to have degraded it to a synonyme. But M. Coste is little aware all the while, that the imperfect

* The blunder into which M. Coste falls in his first step in the general history, is the more ridiculous, as he proposes to restrict his observations to the physiological relations of the parts in question. "Mais pour ne pas donner à une question secondaire, plus de poids qu'elle n'en a réellement, nous serons succinct dans notre description, et nous la ferons plutôt sous le point de vue physiologique que sous celui de l'anatomie:" p. 4.

observations and mistaken analogy which seduced him into the error of supposing the mammiferous *chorion* to be the analogue of the vitelline membrane of the oviparous *ovum*, are fully appreciated by all of his contemporaries, whose opinions on this subject possess any value in the physiological world.

With the same taste which pervades the whole of his work on Embryogénie, M. Coste observes, (p. 288), with respect to the *chorion*, "cette membrane, que, dans ces derniers temps encore *un savant très haut placé* a été conduit, nous ne savons trop pour quelle raison, mais sans doute en l'absence de toute idée d'analogie, à considérer comme le représentant de la coque de l'œuf des ovipares," &c. In this paragraph M. Coste spoke more truths than he intended, in confessing his ignorance of the reasons which induced the distinguished savan to whom he thus pertly alludes, to regard the mammiferous *chorion* as the analogue of the cortical membrane of the *ovipara*. I shall leave M. Coste in the state of ignorance in which he confesses himself to be on this point, and merely observe that the correctness of the opinion at which he sneers, has been established by the late excellent researches of Krause, (in Müller's 'Archiven'), and of Wharton Jones, (in the Philos. Trans. for 1837). And the Academy will permit me to state that prior to the discoveries of these acute observers, I had shewn the fallacy of M. Coste's dogma, that the *chorion* of the mammiferous *ovum* is the analogue of the vitelline membrane, by demonstrating the co-existence of the *chorion* and the vitelline membrane in the *ovum* of the *Ornithorhynchus;* Philos. Trans. 1834. With the structure of this *ovum*, the *ova* of the *Batrachia* present a close analogy, being inclosed by both a vitelline membrane and an external gelatinous *chorion :* and in the *Triton*, Mr. Jones has observed, that when the *embryo* has attained a certain size, but still at an early period, the vitelline membrane is ruptured, and the *embryo*, with its *amnios*, and umbilical sac, is then immediately invested by the *chorion*. It is, I apprehend, in this curious phenomenon of the destruction of the vitelline membrane, that we have the key to the true analogies and relations of the mammiferous *chorion*.

I pass over other general questions in oology in which M. Coste conceives that I entertain erroneous opinions. My defence of those views, like the remarks I have just offered, would demonstrate how much M. Coste has to learn, before he will be able to teach all the known history of any single branch of comparative embryogeny. I beg the Academy to believe that I omit to notice these points only because I am desirous to proceed to the allegations and arguments of M. Coste, which relate more immediately to my claim to the discovery of the *allantois* of the kangaroo.

When I was first made acquainted with the attempt on the part of M. Coste, to invalidate that claim, I sought to establish the proof of my discovery on other evidence than bare reclamation; and I appealed, in my previous letter to the Academy, to the condition of the parts exhibited by me to M. Coste, and which M. Coste had asserted to be an undissected *ovum* of the kangaroo. I appealed, and I still appeal, to the extensively developed *chorion*, preserved in the Hunterian Museum of Comparative Anatomy, and demonstrating the condition of a distinct membranous sac, but which M. Coste, unluckily for himself, was induced to describe as being confounded with the umbilical vesicle. This *chorion* of the *ovum* of the kangaroo, was, in truth, adherent by only a small proportion of its internal surface to the umbilical sac, and the resistance which this adhesion offered, I found little difficulty in overcoming, (except at one point), when, in June, 1837, I first dissected the *ovum* in question.

M. Coste now confesses what he ought to have stated to the Academy and to M. Blainville in his first letter, namely, that he knew nothing of the *chorion* from actual observation, but that the description he presented to the Academy as to its condition, reposed solely on induction. . "*Lorsque nous avons annoncé qu'il, (le chorion), était confondu avec la vésicule ombilicale, nous n'avons jugé que par induction*, et nous avons cru avancer un fait que l'expérience et l'analogie nous conduisent à soutenir:"—p. 15.

Now what is the experience, and what the analogy, behind which M. Coste seeks to shelter himself from the sentiments which every honorable and impartial man of science must entertain towards him, in reference to this imaginary description and the motive which induced him to make it? His experience respecting the *chorion* of the marsupial *ovum*, was limited to the results of the dissection of a single *ovum*. In my account of this dissection, (Philos. Trans. 1834), the *chorion* is described and figured as a membrane distinct from the umbilical sac. I there state that at the part where they adhered together, the two membranes could be separated from each other with a slight effort, except at the line of the *vena terminalis* of the umbilical sac. Did this his sole experience respecting the condition and relations of the marsupial *chorion* to which M. Coste could appeal, justify him in his unworthy insinuation* with reference to the statement made by

* "Sans chercher à pénétrer les motifs qui ont pu déterminer M. R. Owen

me to the Academy, that I had removed the *chorion* in the dissection of my second marsupial *ovum*, some weeks before its exposed and naked contents were exhibited to M. Coste?

Returning, and I confess that it is more in sadness than in anger, to this subject, I ask, in the second place, what are the analogies adduced by M. Coste to induce the Academy to accept his *imaginary*, or, as he prefers to term them, *inductive* views of the condition of the *chorion*, in my second marsupial *ovum*?

M. Coste asserts that in other *Mammalia* it becomes impossible, at a certain epoch, to separate the *chorion* from the *vesicula umbilicalis*,—and he appeals to all the physiologists who have made the same researches as himself, for the truth of this assertion. "Nous savions," says he, "que chez les autres mammifères, il devient impossible, à une certaine époque, d'isoler le chorion de la vésicule ombilicale:" p. 15.

Now this statement may be understood as referring either to a partial or total fusion of the *chorion* with the umbilical sac; if to the former, it tells against M. Coste's analogical argument, because he then admits that a certain proportion, (and it is always a large one), of the *chorion* is left free for removal; but we must suppose that M. Coste is here speaking of the *chorion* in totality, in the sense in which he described to the Academy the *chorion* of the kangaroo. We can only marvel at the profundity of the recent researches which have conducted M. Coste to such a generalization. Nevertheless, we have seen that embryology is not yet reduced, even by M. Coste, to that exact science which will enable an anatomist with safety to describe a *chorion* which he never saw. M. Coste then goes on to say,—"dans l'œuf que M. R. Owen nous a remis, le dé-

à écrire cette lettre, nous dirons que ce n'est point un *fœtus* qu'il a eu l'obligeance de mettre a notre disposition, mais bien un œuf complet, c'est à dire, un *embryon*, avec son *amnios*, sa vésicule ombilicale, son allantoïde enveloppé dans les replis de cette derniere, et sa membrane vitelline, ou *chorion*. Il est vrai que M. Owen, pour prouver que ce n'était pas un œuf, affirme que dans ce qu'il nous a remis, cette derniere membrane n'existait point; et comme preuve de son negation, il annonce que quelques semaines avant lors de la dissection qu'il dit avoir faite de cet œuf, il aurait enlevé le *chorion*. Lorsqu' un homme du caractère de M. R. Owen avance un pareil fait, on doit l'en croire; *il n'est pas convenable d'elever des doutes à cet egard.*"

The motives which induced me to write the letter to the French Academy, (printed in the February number of this Magazine), require little penetration to decipher; they were simply to unmask a pretender, who sought to appropriate to himself a discovery which did not belong to him, and who supported his claims before the Academy, by boldly describing a part which he had never seen.

veloppement étant déjà assez avancé, et l'aspect général de cet œuf étant le même que celui qu'offrent les rongeurs &c. nous en avons conclu que la membrane vitelline, ou chorion, était confondue avec la vésicule ombilicale:" p.15. M. Coste will pardon me if I doubt that he drew his conclusion from the premises which he here assigns. He knows well what the general aspect, and even what the general conditions of the *ovum* of a rodent are, for he has figured the *ovum* of the rabbit in his work on Embryogeny. Now let any one compare these figures with the sketch by M. Coste of what he calls the *ovum* of the kangaroo, or the figure of the real *ovum* of the kangaroo, in which the *chorion* is truly represented, and which figure M. Coste has borrowed from me, to form the 9th plate of his treatise of Embryogeny. I cannot think so poorly of M. Coste's powers of comparison, as to suppose he could see a resemblance in *ova*, the conditions of which are so totally different.

The commission, M. Coste however adds, will judge if he has been deceived by this comparison.

If I mistake not there will be one honourable Academician to whom, in conjunction with the immortal Cuvier, science is indebted for many just and excellent observations on the *ova* of the *Mammalia*, and who will be peculiarly able to form a true judgment of the comparison suggested by M. Coste. M. Dutrochet will not require to be informed that in the *Rodentia*, there is an early and active determination of the blood and organizing forces to the exterior of the *ovum*, for the purpose of developing a large cylindrical *placenta*, and of producing an adhesion of the *ovum* to the *parietes* of the *uterus*, by an interlacement of innumerable fœtal and maternal capillaries. While, on the contrary, in the *Marsupialia*, no *placenta* is developed, and no adhesion, by interlacing capillaries or otherwise, ever takes place, so far as experience has hitherto informed us, between the exterior surface of the *ovum* and the internal surface of the womb. Now no two conditions of an *ovum* could be expected to affect more differently the relations of the *chorion* to the umbilical sac and *allantois*, that are those of the rodent and marsupial. Yet M. Coste asserts that it was his knowledge of the structure of the *ovum* of the *Rodentia* which led him to describe inductively the *chorion* of the kangaroo. Had he not made this assertion, I should certainly have thought that he had been induced to hazard his brief but comprehensive description of that part, with a view to persuade the Academy that he had dissected an *ovum* that had never been dissected before.

I have next to notice the criticisms of M. Coste on my description of the *ovum* of the kangaroo dissected in 1834;—

criticisms, which I presume he considers as an adequate return for the pains I took in making him acquainted, during his visit to England, with the additional facts I had since acquired, relating to marsupial oology. I stated to M. Coste when he first saw the *allantois* in my dissected *ovum*, as M. Gerbe rightly recollects, that I had foreseen that it would be developed, and had even predicted its degree of developement in my Memoir of 1834. I have stated in that Memoir, "it would appear, indeed, from the examination of the small mammary fœtuses of the *Kangaroo*, *Petaurus*, and *Phalangista*, that an *allantois* and umbilical arteries are developed at a later period of gestation than the uterine *fœtus* here described had arrived at;" and I added, "but it is not likely that the *allantois* would be developed farther that to serve as a receptacle of the urine secreted in the fœtal state." And from the small size and limited extent of the umbilical vein, I concluded that the umbilical or allantoid *arteries* had never been subservient to the organization of a *placenta*. (Philos. Trans. 1834, p. 342).

The sense of this paragraph is ingeniously nullified by a mistranslation on the part of M. Coste. The words of the passage in my Memoir are, " None of the above specimens, (i. e. the mammary fœtuses of the *Kangaroo*, *Petaurus*, &c.) however, presented any trace of an umbilical vein extending to the liver, and I therefore regard it as improbable that the umbilical arteries spread over the *chorion* to organize a *placenta*." In this passage the reader will see that no doubt whatever is expressed as to the ulterior developement of an *allantois*, but only as to its being made subservient, as in the ordinary *Mammalia*, to the organization of a *placenta*. Umbilical vessels are not necessarily co-existent with a *placenta:* they exist and are developed for other purposes in birds and reptiles.—Now M. Coste, in order to deprive me, in the opinion of the readers of his 'Réponse,' of the credit of my prevision, translates the passage of my Memoir above quoted, as follows. "Cependant aucun *fœtus* utérin de kangaroo, de *Petaurus*, n'a présenté de traces de veine ombilicale, ou d'artères, qui s'etendaient au *chorion* pour organiser un *placenta*." And he adds, "Or, il est généralement admis par tous les physiologistes, que le système formé par les vaisseaux ombilicaux, (allantoidiens), est porté par l'allantoïde; en signalent l'absence de ce systéme, M. R. Owen fait donc, par cela même, naitre des doutes sur l'existence de cette allantoïde." Réponse, p. 12.

Now, when I state that not only is this system of vessels described in my text, but that it is figured in the plates, and the umbilical arteries especially pointed out at *c c*, *fig.* 8, pl. vii. in a very young mammary (which M. Coste translates uterine) *fœtus* of a kangaroo, I leave the Academy to judge of the candour with which the criticisms of M. Coste have been penned.

The same spirit which dictated the criticism which I have just refuted pervades the succeeding paragraphs in M. Coste's 'Réponse,' in which he insinuates that I had overlooked the *allantois* in my first dissection, and dwells on the difficulties he had to overcome in detecting it in my second.

"Il nous a fallu dérouler les membranes afin de pouvoir distinguer les unes des autres; *nous ajouterons* que l'allantoïde était tellement comprimée et se confondait si bien avec les parois de la vésicule ombilicale, avec laquelle elle avait des rapports de contiguité, que ce n'est qu'après quelque temps d'une attention soutenue, que nous sommes parvenu à la reconnaitre, et à l'isoler sans efforts." Ibid, p. 22.

Now the truth is, that M. Coste simply déroulait membranes that had been déroulé before, and which had returned to the corrugated or pelotonné state in which they had been hardened by the alcohol, during the period of a voyage from Australia to London. And I need not state to the practical anatomist, that an animal membrane so coagulated and hardened, always retains its corrugations, unless they are artificially and forcibly obliterated. But as after my dissection of the *ovum* in question, in which I removed the *chorion* for a more detailed and microscopical investigation, I replaced the *fœtus* and its vesicular appendages in the *uterus* from which I had taken them; so when they were a second time removed to be exhibited to M. Coste, they presented the appearances described by M. Gerbe, and to which I shall presently refer. But I cannot allow M. Coste's statement, that the *allantois* was confounded with the umbilical vesicle, to have the chance of passing into the records of embryological science, without entering against it a formal negation. M. Coste's description of the adhesion of the *allantois* to the umbilical vesicle, and of the difficulties he encountered in detecting it, repose, like his description of the *chorion* of the same *ovum*, on pure induction.

Both M. Gerbe and myself have given figures of the *allantois* in question. It is not a microscopic object.—The value of its discovery does not rest upon the acute eye and rare skill which its detection demands in the anatomical observer, but upon the physiological conclusion to be deduced from it, and its application to the general analogies of embryological science.* M. Coste however is desirous that his readers should believe that the impediments which he overcame in the discovery of the *allantois* in my second *ovum*, were too great for me in the dissection of my first *ovum*; and that the *allantois* was present in that *ovum*, but overlooked by me. However, the membranes of my marsupial *ovum* of 1834, are simply stretched out in the preparation; nothing is removed save the small portions of the external membrane, which I then submitted to microscopical observations. This *ovum* M. Coste examined whilst he was in England; and I can only say that if he had found the *allantois* there, he would have made a real discovery.

M. Coste, however, again appeals to analogy in proof of his suspicions, that an *allantois* must have been present in this *ovum*, but he is not more fortunate in this, than in his preceding attempt in that line of argument. He says, "M. Owen n'ignore pas que l'apparition de l'allantoïde est antérieure à certaines phénomènes qui, chez les carnassiers, les ruminants, les rongeurs, et les oiseaux même, correspond à une époque primordiale du développement. Il sait, par exemple, qu'elle précéde de beaucoup la formation du cordon ombilical." I have here certainly to admit my ignorance of the correspondence between the carnassiers &c. and the birds, in the period of the developement of the *allantois*. So far from the *allantois* being developed at the primordial epoch of embryological developement in the bird, my researches in that class have shewn me that it does not take place until the embryo has made a certain progress in developement; until the head is well distinguished from the trunk, the eyes plainly perceptible, and the rudiments of the four extremities have begun to bud forth.. In the *Rodentia* and *Ruminantia*, and in all the placental *Mammalia*, of which the developement has hitherto been traced, the *allantois*, which is the prime agent

*In my notes to 'Hunter's Animal Economy,' to which I first consigned my discovery of the *allantois* in question, I drew the following inference from the imperfect state of its developement. "When the extremities are formed, and the uterine *fœtus* has attained about two-thirds of its size, an *allantois* is developed; the umbilical arteries co-extended with this sac, do not, however, as in the placental *Mammalia*, pass to the *chorion*, and consequently there is no adhesion of the fœtal membranes to the uterine *parietes*, and therefore, no obstruction to the escape of the *embryo* from the *uterus* into the *vagina*."

I here consider the condition of the *allantois* as one of the accessory causes of the premature birth of the marsupial *embryo*: it harmonises with many other modifications, all tending to the same result. With M. Coste the state of the developement of the *allantois* is the sole cause of the avortement of the *embryo*. See p. 24.

in the formation of the *placenta*, is developed at a much earlier period than in the birds; at an epoch to which the vague term, *primordiale*, may perhaps be applied, but which I shall more distinctly define by stating, that in the *embryo* of the rat, for example, the *allantois* makes its appearance before the head is distinguished from the body by any cervical constriction, before the complete elimination of the intestinal tube, and before the appearance of the extremities: the abdomen is also widely open. In the embryo calf, the two-horned *allantois* makes its appearance at a still earlier period.

Now the importance to physiology of examinations of the marsupial *ova* chiefly depends on the impartiality of the observer, on the independence of his mind from preconceived notions of the analogies which the marsupial *ova* ought to present to the higher mammiferous, or to any other class of *ova*. Descriptions *from induction* are above all to be scouted in reference to these rare and difficult subjects of embryological research. It is through the marsupial *ova* that we shall obtain the key to the true nature of the modifications of the *ova* of the placentally developed *Mammalia*, and these marsupial *ova*, if fairly and rightly studied, will teach us what are the oological conditions and phenomena which essentially relate to the developement of a *placenta*.

What an example of an investigator of scientific truth does M. Coste present to our eyes, when he infers that the *embryo* of the kangaroo, at a certain period of developement must have possessed an *allantois*, because the placental *embryo* at the same, or at an earlier period, manifests this appendage! An inference moreover which he had once the opportunity of confirming or rejecting, from actual observation, and which he now puts forth merely to throw discredit on the unbiassed researches of the individual who had exerted his utmost to improve M. Coste's knowledge on this branch of embryology. M. Coste, in the same spirit, makes an assertion which is not consistent with fact, and for which he has no foundation: he says that the marsupial uterine *fœtus* first described by me, was 'déjà parfaitement developpé,' and that 'l'evasement abdominal avoit complétement disparu." Now the specimen itself, which M. Coste saw, and my description and figures thereof, equally contradict these assertions. I have particularly noticed at p. 37, of my Memoir of 1834, that the abdominal *parietes* were not completed, and that a loop of intestine was out of the abdomen, and contained in the short umbilical chord; and I have figured this condition of the uterine *fœtus* at *fig*. 3, pl. vii.

I moreover took the pains, after having ascertained the condition of my first marsupial *ovum*, and after having found it to differ from the *ova* of the placental *Mammalia* in the absence of the *allantois*, to trace the developement of the bird up to the period when the *allantois* first buds out, and I introduced a figure of the *embryo* of the goose at this period, in order to contrast its advanced condition of developement, as compared with the placental mammiferous *embryo* at the corresponding stage of the developement of the *allantois*, and to shew the degree of correspondence which thus existed between the oviparous and marsupial *embryo*.

I come lastly to consider the evidence which M. Coste has adduced to prove that the uterine product of the kangaroo submitted to him by me, was an entire *ovum*, which had not previously undergone dissection. I have already asserted that this *ovum* had been dissected by me,—so far as the exposure and discovery of the *allantois* and umbilical vesicle were concerned, some weeks before M. Coste saw these parts.

M. Gerbe, in his letter to the Academy, states that I spoke of the preparation in question to M. Coste, as "un produit utérin de kangaroo, qu'il n'avait point encore eu le temps d'examiner." I assert that I informed M. Coste distinctly, with reference to the preparation in question, that I had not then had time to give a description of it.

I comprehend perfectly the delicate position in which the commission is placed by these contradictory statements.

I could not have made a more explicit statement, even had it been possible for me to have entertained the idea that the preparation I was about to exhibit to M. Coste, could ever have been mistaken for an undissected *ovum*.

M. Coste however adduces M. Gerbe's description of the state of the *ovum*, when it was first submitted to their view. This part of M. Gerbe's testimony I accept; the truth of his description I acknowledge. I am willing that my case should rest upon it,—upon this evidence adduced by M. Coste. And now the commission and every impartial physiologist possess ground for forming their judgment as to the truth of M. Coste's assertion, that he was the first who dissected the *ovum* in question, independently of speculations as to the value of his or my word.

M. Gerbe's description is as follows. "Ce que j'ai vu, et ce que je puis affirmer en toute assurance, c'est que rien n'indiquait que cet œuf eut été disséqué." This would have been an unfortunate statement for me, if he had omitted to describe what he did see. But he proceeds to say;—"Le *fœtus* seulement était isolé de ses membranes, mais celle-ci étaient excessivement pelotonnées ensemble. L'amnios même était trespeu flottant : il formait une sorte d'entonnoir, dont le sommet, attenant au cordon ombilical, regardait le *fœtus*, et dont la base embrassait les membranes de la vésicule ombilicale. Un des dessins que M. Coste a déjà eu l'honneur de mettre sous les yeux de l'Académie, traduit cet état. Je n'eusse pas rapporté ce fait, s'il ne démontrait combien peu cet œuf *devait avoir subi de dissection*." The last-quoted italics are M. Gerbe's. That a *fœtus* should be exposed and isolated from its membranes, without the *ovum* having undergone any dissection, may be a belief possible to an individual possessing the embryological attainments of M. Gerbe. I attribute no bad faith to this gentleman, on account of the conclusions which his zeal for his friend and patron, M. Coste, renders him eager to draw. I am, on the contrary, much indebted to him for the accuracy of his description: he reminds me of what I might have added to my first letter to the Academy, namely, not only that I had removed the *chorion*, but had also exposed the *fœtus* immediately to view, by laying open the amniotic sac, and reflecting it from the *fœtus*, upon the vesicular appendages of the umbilical chord. This I well remember to have done in my first dissection in June, 1837, in order to compare the developement of the extremities in the *embryo* in question, with those in my first-described *embryo* of 1834.

M. Gerbe refers to the sketch of the preparation which he made before M. Coste began his examination. That sketch is doubtless now before the commission: if it be as accurate as its author's description, it will exhibit the *fœtus* uncovered, and the *amnios* reflected from it in the form of a funnel, whose apex reaches the umbilical chord, and its base is spread over the vesicular appendages of the *fœtus*.

We have seen that the exposed state of the *fœtus* and its appended sacs presented no difficulties to M. Coste, while representing himself to the Academy as the dissector of a previously undissected *ovum*: the *chorion*,—the external enveloping membrane,—was summarily disposed of: but by what accident will M. Coste now explain the condition of the *amnios*, as described by M. Gerbe,—this naturally closed sac,—laid open and reflected from the *embryo* upon the umbilical chord and its appendages?

The commission, in their report on this part of M. Coste's evidence, on which I am willing to rest my case, will doubtless point out to the Academy with how much truth this description by M. Gerbe represents an *ovum* which presented no indications of having been dissected.

As my claim to the discovery of the *allantois* rests upon the fact of my having dissected the *ovum* in question, and detected the *allantois* some weeks before M. Coste's arrival in England, I needed only to have cited M. Gerbe's description of the state of the parts when submitted to M. Coste in proof of my claim, and in refutation of M. Coste's assertion than an intact and undissected *ovum* had been submitted to him.

I can assure the Academy that the importance given to M. Coste's Memoir, by the formation of a commission to examine its merits, has been my only inducement to notice any other point in it than the one which Mr. Gerbe's description has afforded me. As, however, I have entered upon the refutation of as many parts of M. Coste's memoir, as it seemed to me the commission would deem worthy of their attention, I shall, before concluding, notice two other points in the letter of M. Gerbe. He goes on to state, "Presque immédiatement après mon arrivée dans le cabinet ou l'examen se faisait, M. R. Owen nous quitta, et s'est en son absence que l'allantoïde a été isolée des parties qui l'environnoient. Nous n'étions que M. Coste et moi, lorsque cette découverte a eu lieu."

I left M. Coste to examine the *allantois* and the other contents of the *ovum* which I had laid bare in my previous dissection, because I had already satisfied my own curiosity as to their nature. M. Coste must feel the utter futility of his attempt to persuade any physiologist that I, than whom no one could feel more interested in the dissection of a marsupial *ovum*, would have absented myself at the instant the exposure of its contents was about to take place,—at the very moment of projection. I am much mistaken if the factitious nature of M. Coste's first announcement of the discovery of the *allantois* to the Academy, was not suspected by all his hearers to whom I have the honour of being known, were it only from the theatrical disposition of my exits and entrances, so convenient, and indeed so essential, to M. Coste's undivided claims to the discovery of the *allantois*. I have already stated that M. Coste had but to unfold with the forceps the corrugations of the vesicular appendages before him to bring them into view; and that his description of the attachments of the *allantois* is as inductive as that of the *chorion*.

When I returned I found M. Coste and his artist gazing with an air of surprise at the part before them, which, as it respected M. Coste, somewhat surprised me, seeing that I had already informed him of what he was about to witness. But deeming his surprise to arise from his not having conceived the possibility of an *allantois* being developed in the marsupial *ovum*, I stated to him that its discovery had been no surprise to me, seeing that it was "à peu près ce que j'avais supposé dans ma prémiere mémoire."

M Coste having on a subsequent visit expressed doubts as to my determination of the two sacs being continued from the umbilical chord of the *embryo;* I then, as M. Gerbe truly describes, proceeded to dissipate these doubts by laying open the chord and demonstrating the connexions of the two sacs and their vessels. "Je ne duis pas oublier d'avouer que M. R. Owen, d'après la priére de M. Coste, a fait une incision longitudinale sur le cordon ombilical de manière à mettre à découverte les viscères abdominaux, l'ouraque, et la vessie." This, in fact was the only part of the dissection of the *ovum* in question, which M. Coste witnessed: for, as his artist truly describes, the contents alone of the *chorion* were placed before him,—that exterior membrane of the *ovum* having been previously removed; and the *amnios* having also been laid open and reflected from the *fœtus*, which was thus immediately brought into view. The next stage of the dissection was that which M. Gerbe describes, and truly attributes to me. But the commission will observe that M. Coste has by no means thought it necessary to avow this fact. The only share which he assigns to me in this matter, is to make me walk out of the laboratory the moment the dissection began, and re-enter at the conclusion of it.

I have the honour to be, Sir,
Your very obedient humble Servant,
RICHARD OWEN.

*March* 20*th*, 1838.

ART. III. *Reply to Mr. Ogilby's "Observations on Rules for Nomenclature."* By HUGH E. STRICKLAND, Esq. F.G.S. &c.

HAVING read Mr. Ogilby's remarks in the last number of this Magazine, I hope I may be allowed the privilege of a reply. I must first observe, that respecting as I do the talents of Mr. Ogilby, and valuing his friendship, I shall do my utmost to preserve a temperate tone in the discussion; though some there are, among *former* correspondents at least of this Magazine, who, if they or their writings were lashed with equal severity, would not, I think be equally patient. I cannot, however withold my opinion, that Mr. Ogilby has been too sweeping in his censure of the humble attempts which have been made to introduce something like regularity into the vast chaos of the nomenclature of Natural History. To deprecate all laws, and to expect that the thousands of persons now employed in advancing our knowledge of Zoology, can work out anything like an harmonious system by their unguided and independant exertions, is a proceeding of quite as *radical* a tendency as to establish new laws and to amend old ones. Mr. Ogilby, therefore, has surely committed an error in nomenclature, when he applies the term "zoological radicals," not to those who would put down law,and establish anarchy, but to those who are labouring to bring back Zoology from its present state of anarchy, to one of order and good government. Not that such persons are Carlists,—they do not sigh for the antiquated yet happy despotism of Carolus Linnæus, but merely wish that a well digested constitution should be established, suited to the present advanced and diffused state of zoological knowledge. The only effectual step towards this happy consummation, would be (as I have before remarked, Mag. Nat. Hist. N.S. vol. i. p. 128, and vol. ii. p. 166), to form a congress, or in humbler phrase, a committee of naturalists from all parts of the scientific world, to draw up a code of zoological laws, not indeed to be like those of the Medes and Persians, yet to be adhered to for the sake of order and convenience, till a good reason for changing them should become apparent. Such a committee, if carefully constituted, might confer a lasting benefit on Zoology, by consigning to oblivion the vast mass of dross which now encumbers the science, and by refining, analyzing and coining the precious metals;—in plainer terms, by drawing up a general outline of the animal kingdom,—by preparing catalogues of zoological works, distinguishing the degree of authority which attaches to each,—by defining rules for nomenclature,—by deciding the claims of rival generic and specific terms, &c. &c. The laws established by this means would of course have no other sanction than that of opinion, yet if based on common sense, and on truth, there would be no fear of their not being generally adopted. Then should we see all museums arranged on the same system, and all naturalists speaking the same language. But such a plan would fail of its effects unless placed on a truly cosmopolitan basis, and unless the narrow prejudices caused by a few miles of salt water, or by an imaginary boundary line were *pro tanto* laid aside. Such a plan is well worthy the attention of the British Association, though from the prevalence of international prejudices, the time is probably far distant when it may be brought into advantageous operation. What then is to be done in the mean time? Shall we go on accumulating the riches of nature in our vast warehouses, each man describing, naming, re-naming, classifying, and "improving" according to any preconceived crotchet, or according to no crotchet at all,—without making an *attempt* to preserve order and regularity in the science? Is it not better that a few plain rules should be submitted to the consideration of naturalists, and followed, if for no better reason, for convenience sake,—than that we should suffer the immense *in*convenience of having no rules whatever to guide us?

With a view of contributing my mite to the preservation of order, I communicated to this Magazine (vol. i. N.S. p. 173,) a few miscellaneous propositions, which were submitted to naturalists,—not as an *act* for their guidance, but as a *bill* for their approval. These rules had no pretensions to originality, but were selected from various sources, especially from the works of Mr. Swainson. Yet, so far am I from being a "zoological radical" that I then introduced a principle of a decidedly *conservative* character, namely, that the rules there proposed should not be retrospective, but should merely serve as guides in the naming of *new* genera and species, and consequently that the names of genera and species originally imposed by their founders, should, (with very few exceptions), be retained. Therefore it is clear that I am innocent of the charge of manufacturing "verbal crucibles in which every original name is to be melted down and recompounded as may best suit the fancy or the caprice of the presiding alchemists." Indeed I fully agree with Mr. Ogilby in resisting the *retrospective* operation of these rules, witness vol. i. N.S. p. 173. "Names which have been long adopted and established require a different set of rules from those which are given for the first time." And hence I regret to see in Mr. Swainson's useful Classification of Birds, so large a list of "generic terms not adopted;" and if I were writing on that subject, I should have no hesitation in re-adopting all such as possessed the claim of priority. All that I think can be effected by drawing up rules, such as we are speaking of, is to make naturalists, *in future*, more careful than they have hitherto been, in imposing new names on their discoveries, for the more they, in so doing, conform to such rules as are adopted by the majority of naturalists, the more probability is there that those names will be permanently retained. But if a naturalist *now*, when he ought to know better, persists in naming a new genus or species by a term which is erroneous, or too long, or unclassical, or *comparative*, or otherwise objectionable, he cannot expect to be treated with the same lenity which is extended to the fathers of science, whose nomenclature is sanctioned by long usage.

I now proceed to notice some of the minor points of Mr. Ogilby's paper. There is perhaps no one of the proposed zoological "rules" which is less open to objection than that which recommends that *families* should be named after their most prominent genus, with the termination *idæ* or *adæ*. It introduces no new terms to the science or the memory, but, selecting from the existing stock such as are in general the most familiarly known, it forms, by a slight change in the termination, a new set of names which express the exact station and relations of the groups to which they are applied. This application of words ending in *idæ* is moreover perfectly conformable to classical usage. The term *Alcmæonidæ*, for instance, was applied to the house or family which included *Alcmæon* himself and his immediate relations. Therefore Mr. Ogilby, who professes great respect for classical usage, ought in consistency to apply the term *Simiadæ* to the anthropoid *Quadrumana* of the old world, thus including both those species known to the ancients as *Simiæ*, and the other species and genera which are allied to them. But when Mr. O. applies the term to the American species in order "to express the obvious and important relations which these animals bear to the true *Simiæ*," he seems to be infringing both modern and ancient "rules for nomenclature," for the termination *idæ* implies,—not the *resemblance* of one group to another,—but the *inclusion* in a larger group of the smaller one from which the named is derived. In order to express the relations of the American group to the true *Simiæ*, Mr. O. should rather have termed them *Simioidæ*. In the same way Mr. Ogilby's term *Gliridæ* on being placed before a naturalist for the first time would immediately suggest the idea,—not of a group *resembling* or *analogous* to the dormice,—but of a group *containing* the dormice.

Mr. O. enquires "What would science gain by the change" from the term *Simiadæ* to *Cebidæ*, as applied to the American species? I answer, it would gain a term implying that the family contains the genus *Cebus* (which it does) instead of one implying that it contains the genus *Simia* (which it does not). Mr. O. further writes "The very advantage of a '*memoria technica*' is *entirely* in favour of my nomenclature, and would be *totally* destroyed by the adoption of the very rule which Mr. S. intends should secure it." This is, I think, rather too unqualified. All candid persons will admit that when the term *Cebidæ* is used to express the family which contains the genus *Cebus*, the advantages of a *memoria technica* are not *totally* destroyed.

In the communication to which Mr. O.'s paper refers, I remarked, that "when the name of a genus has once become well established, it should never be dropped, whatever be the subdivisions into which it may become necessary to break up that genus." This proposition is founded in justice; for when a person has defined and named a group, it is unjust to blot out his original name, merely because that group may require further subdivision. It is also founded in convenience; for it is much more convenient to retain an established term, even though its meaning may require from time to time to be modified and confined within narrower limits, than to discard it altogether, and adopt a new one every time that a limitation in its extent becomes necessary. This rule is now so generally acted upon, that of the Linnean generic terms, there are very few which have been wholly laid aside, though almost the whole of them are now used in a much more limited sense than was applied to them by Linnæus himself. It was in conformity with this principle that I recommended the term *Simia* to be retained for the ourang outangs, in lieu of Geoffroy's term *Pithecus*, a proceeding which, according to Mr. Ogilby, involves the commission of three cardinal sins. "First," says Mr. O. "the word *Simia* would have been used in a new sense, different from its legitimate acceptation and from the sense which has hitherto attached to it in Zoology." Now if I had proposed to give the name *Simia* to a genus of *Ruminantia*, then indeed it might be said that I was using it in a *new sense*, but I submit, that in applying the term to the ourang outangs, it is not used in a *new*, but only in a *more limited* sense than that applied to it by Linnæus and the ancients. Now with regard to Linnæus I have shewn above that almost every one of his generic names is now in the same predicament, and therefore that if this be a cardinal sin, it is at least a very prevalent one. And as for the ancients, their zoological knowledge was so vague and imperfect, that few naturalists think it necessary to be very exact in applying their names with precision, for the plain reason that it is rarely possible to ascertain the precise species to which these names anciently referred. Of this laxity Mr. O. himself has given us an instance in the terms *Cebus* and *Callithrix*, both of which names were used by the ancients for African monkeys, but which Mr. O. admits for American genera. Mr. Ogilby's second cardinal sin is that of "captiously altering an established nomenclature without any commensurate advantage." This, I admit, *is* a great zoological sin, but it was Geoffroy Saint Hilaire, not I, who committed it; for not only had Linnæus applied to the monkeys the generic term *Simia*, which Geoffroy ought therefore to have retained for this, the most remarkable and conspicuous group of them, but Erxleben as long ago as 1777, had defined the ourangs as a genus under this very name of *Simia*. In substituting *Simia* for *Pithecus*, therefore, I was merely restoring the original nomenclature of Linnæus and Erxleben, which Geoffroy had thought proper to abandon. This explanation will equally serve to acquit me from Mr. Ogilby's third cardinal sin, that of "imposing *new* names upon groups with the definition or formation of which the proposer is in no way concerned, merely because," &c., and I beg to say that I fully concur in the severity with which he has animadverted upon the practice.

I must however again protest against the unqualified censure which Mr. O. pours out upon the whole code of rules which have been proposed; accusing them of being "arbitrary and dogmatical," of "opposition to good sense, sound criticism, and fixed principles," &c. That some indeed of these propositions may be open to criticism is very probable; but inasmuch as they were the result of much study, conducted with a view of substituting justice, order, and common sense for anarchy and chaos, it is I think unfair to infer from one or two examples, that the whole are equally deserving of censure.

With regard to the introduction of foreign or barbarous names into science, I do not individually object to them, yet as many naturalists do, I think it will be more prudent not to employ them for new groups *in future*. But Mr. O. will see (vol. i. N. S. p. 175, rule 10), that this rule is not made retrospective, and that an exception is introduced in favour of *species* called by their native names.

Mr. O. says that euphony and propriety of application are principles which he finds *no where* clearly developed *in any* of the codes of nomenclature lately published. Now on turning to vol. i. N. S. p. 175, he will find that euphony is provided for by rule 13, and that rules 11, 12, 14, 15, 18, 20, and 21, are all intended to ensure propriety of application. So that the phrase "*no where* clearly developed *in any of* the codes" is another instance of the rather free use of superlatives in which Mr. O. has indulged.

After these strictures on Mr. Ogilby's paper, I am happy, in conclusion, to express my entire concurrence in his censures of those persons who attempt the reformation of vernacular names. On this subject I need not enlarge, having already explained my views in this Magazine, vol. i. N. S. p. 130, and Analyst, vol. ii. p. 317. I cannot however withold the expression of my regret that Mr. Swainson, after deprecating, in 1836, the extension of English names to foreign ornithology, should, in 1837, have committed this very error, by introducing this unscientific and worse than useless English nomenclature into his Birds of Western Africa.

If in this paper I have seen reasons for persisting in my objections to some of the terms employed by Mr. Ogilby for the families of *Cheiropoda*, I can assure him that I am by no means blind to the very great merits of his paper on the relations of those animals, which I think all naturalists will agree in pronouncing one of the most valuable and important memoirs ever communicated to this Magazine.

*Cracombe House,*
*Eversham, March* 19, 1838.

Art. IV. *Remarks upon Mr. Ogilby's Views of Zoological Nomenclature.* By J. O. Westwood, Esq. F.L.S. Secretary to the Entomological Society.

Having devoted considerable attention to the modern nomenclature of Natural History, especially with a view to render it, in some degree, more in accordance with the vast improvements which have resulted from the enlarged views of modern naturalists, my attention has been, of course, attracted by Mr. Ogilby's two papers, published in preceding numbers of the Mag. Nat. Hist., and Mr. Strickland's comments on the first of them. I am not disposed to quarrel with the tone of Mr. Ogilby's last-published article;—I would only be allowed to suggest, that in my experience of scientific discussions, I have generally observed that those who resorted to raillery and ridicule, were almost sure to come off second-best at last.—Neither am I inclined to enter into any discussion as to the propriety of regarding the Greeks and Romans as sound naturalists, and as such entitled to weight in matters of nomenclature. It is sufficient to know that Mr. Ogilby, in the second of these articles, sets up the old classical names, discarding, as mischievous and arbitrary, the family terminations of names, which, for nearly thirty years, have been adopted by almost every naturalist of eminence in this country, and which are also, to some extent, now employed on the continent. It will be seen that in his nomenclature, the family of the anthropomorphous *Quadrumana* of the old world, are termed, as a group, *Simiæ*, because it was the name by which the ancients designated the same animals; and that the *analogous* anthropomorphous *Quadrumana* of South America are termed *Simiadæ*, in order thereby to express the relation which these animals bear to the true *Simiæ*. In taking these steps, I maintain that Mr. Ogilby has himself set the rules of *classical* nomenclature at nought. I will not here enlarge upon the advantages of adopting an uniform termination for groups of equivalent value. In my humble opinion, this uniformity has far greater merits than that of being "merely a matter of convenience," as Mr. Ogilby admits it to be. I will take Mr. Ogilby's own example; and I trust I shall be able to shew that even here, instead of Mr. Strickland's suggestions being "a glaring example of the mischief arising from the inconsiderate and indiscriminate application of a purely arbitrary rule," Mr. Ogilby himself has acted in defiance of his cherished "ancient classical" lore. First; Mr. Ogilby will not, I presume, quarrel with the application of the classical patronymic termination, *idæ* or *adæ*, to designate a tribe of animals instead of a race of men. If this be admitted,—and I can bring forward the authority of zoologists, whose classical attainments nobody ever thought of doubting, in its support,—the application of the term *Simiadæ* or *Simiidæ* to the old *Simiæ*,—the number of which has greatly increased as a tribe of species, since the days when the name was first applied,—is not unclassical. Secondly; the application of the classical patronymic name, Simi*adæ*, as used by M. Ogilby for the South American *Quadrumana*, must be unclassical, because the group so named does not include the *Simiæ*. Thirdly; the term *Simiadæ*, as employed by Mr. Ogilby, does not, unless a person were actually informed thereof, give any idea of a relation of the animals included therein, (not being *Simiæ*), to the true *Simiæ*. To express this analogical relation, another termination ought *classically* to have been added to the name of the genus with which the resemblance is supposed to exist. Hitherto *oides*, added to a Greek word, or *formis* or *formes* to a Latin one, have been employed to indicate the relation suggested by Mr. Ogilby. Why should he therefore object to use these terminations, and unclassically adopt another, which has been *classically* used in a different and legitimate acceptation by so many naturalists? Fourthly; *Cebus*, being considered as the typical genus of the South American anthropomorphous *Quadrumana*, it is classically correct to give to the tribe of animals which it represents, the family patronymic name of *Cebidæ*.

Art. V. *On the occurrence of the Teredo navalis and Limnoria terebrans, in Plymouth Harbour.* By E. Moore, M.D. F.L.S. Secretary to the Plymouth Institution.

In a paper "on burrowing and boring animals," by Mr. Osler, in the 4th part of the Philosophical Transactions for 1826, it is stated that "the *Teredo navalis* is probably quite extinct as a British animal, as it is no longer to be found in Falmouth or Plymouth Harbours; and that he was shewn, in the royal dock-yard at Devonport, specimens of wood bored by the *Teredo*, treasured as a curiosity, being assured by Mr. Churchill, the builder, that the animal was no longer to be met with."

It must not, however, be considered from this observation, that the *Teredo* has become extinct, as I shall presently shew the contrary; and it should have been mentioned that the cause of its apparent disappearance was owing to the outer piles of timber in the dock-yard jetties, having been coated with broad-headed iron nails, which is a good remedy against the attacks of this animal. It is well known by residents, that the *Teredo* has always been existing here, and might at any time have been observed by examining fixed timber in other parts of the harbour, which had not been protected.—I possess specimens of wood taken from an embankment here, which are tenanted by the *Teredo*, and to which I shall afterwards allude; the officers of the dock-yard also can testify, that the precautions taken have not been entirely effectual, as the wood work of the jetties is constantly requiring renewal, its destruction being caused, in a great measure, though not entirely, by the *Teredo*. Mr. Churchward, the inspector of the carpenters, possesses specimens of the animal, which he obtained two years since; and I have within these few days obtained, through the kindness of Mr. Walker, a piece of oak plank, 2 feet long and 7 inches wide, just taken from the piers at Froward Point, in Plymouth yard, which contains eleven perforations of these animals, many of which are now contained in the specimen.

Mr. Osler, considering it an imported animal, states that it is not likely to become naturalized, because, from being an inhabitant of warm climates, and always residing near the surface, in situations left dry by the ebb tide, it could not withstand a severe winter. On the contrary, I seldom find the *Teredo* above low water mark; its ravages being mostly committed under that point: and it will be found that where it has penetrated higher within the timber, the perforation by which it entered is generally below it.

I have now, however, to announce that our harbour is exposed to the attacks of a much more formidable enemy, the

*Limnoria terebrans*, or gribble. I may state as preliminary to my observations, that the harbour of Plymouth is formed by the junction of two Rivers, the Plym and the Tamar; the mouth of the Plym on the east constitutes the harbour of Catwater, about one mile long, which is occupied by merchant ships; the mouth of the Tamar, on the westward, forms the harbour of Hamoaze, about 2½ miles long, which is devoted chiefly to the Royal navy; the confluence of the waters of these two rivers, forms the Sound, another harbour of large extent, about three miles square, which is defended from the open ocean by the breakwater. In this large space there are many places favourable for the existence of the *Teredo* and *Limnoria*, the latter of which is known to be most abundant between high and low water mark.

Within the harbour of Catwater, a large portion of land was enclosed, about 20 years ago, by an embankment, about one mile in length, for the purpose of forming a more direct road to Plymouth; and as it was necessary to make provision for occasionally letting out the rain water, which might accumulate within, tunnels were made at different points through the bank, which were closed by wooden doors, about 2 feet square, opening outwards so as to prevent the ingress of the sea during high water. In the course of a few years these valves began to leak, so that in many instances the land was overflowed by the sea; on examination it was found that the wood had become as it was thought rotten, and it was therefore renewed when necessary; at length the constant dread of inundation, and the injury sustained by so frequently opening the bank, induced the proprietors to cause iron doors to be substituted for wood; about six months ago, I happened to be present when one of the wooden doors, (one third of which was destroyed) was taken out, and instantly discovered that the wood which was called rotten, had been in fact eaten by the *Limnoria*, thousands of which were at that moment to be seen, and among them were four specimens of the *Teredo;* this wood is still in my possession. Thus it appears that in two years, which is the time that this door had been put in the bank, a piece of elm, 2 feet square and 2 inches thick, had been nearly one third destroyed by these animals; and I have not the least doubt but that the previous destruction of the valves had been effected in the same manner, as I know that elm may be kept much longer than two years under salt water without manifesting any indications of decay.

The next instance which presents itself of the appearance of the *Limnoria*, was at the mouth of Catwater, where "the Busy," revenue cruiser, has for several years occupied the mooring ground. This vessel lately required repairs, and was for that purpose grounded, when it was found that although the copper of the bottom of the vessel had been extended to the sides of the keel, yet the under part, which was unprotected, was eaten out from end to end, to the depth of 6 or 8 inches by this animal; the portion of keel may now be seen in possession of Mr. W. Moore, of Plymouth, who executed the repairs; this gentleman also informs me that several years ago he lost a piece of oak plank in Catwater, which was discovered three years afterwards, at a very low tide, sticking in the mud, and which in the mean time had been nearly eaten out by the gribble.

Proceeding to the western part of the harbour, we again meet with the *Limnoria*, and upon making inquiries of Mr. Roberts, the builder, and the other officers of the dock yard, I find that both species of animals, known to them as the auger worm and gribble, have for the last 30 or 40 years been found occupying the underwater woodwork all round the yard, where unprotected by iron nails, or copper sheathing. The inner piles of the jetties not being protected, exhibit marks of the destructive effects of the *Limnoria;* large beams of timber 18 inches square have been entirely eaten through. About twelve months since the south jetty was observed to be sinking, which was found to arise from the same cause, and the jetty was taken down and a new sea wall erected. The old piles are now lying in the yard, where the ravages of the *Limnoria* may easily be examined. The animal occupies nearly all the substance of the piles under water, even to several inches below the surface of the mud; the repairs of the different jetties are still going on, and every day presents some fresh instances of the destructive efforts of this diminutive animal.

This day (December 12), accompanied by Mr. Churchward, I made an examination of the whole of the building slips, jetties and piles, round the dock-yard, and found that the south building slip, which was floored 23 years ago, under Mr. C.'s superintendance, with four inch oak plank, is now entirely honeycombed, between high and low water mark, by the *Limnoria*, the sensation on walking over it being like that of treading on wet sponge; the piles of the south, north, and pitch-house jetties are also all occupied by it, and are now about to undergo repair. Mr. Churchward informs me that the woodwork of the outer wall of the mast-pond, where there is the deepest water, is chiefly occupied by the *Teredo;* and he states, that from the operation of both causes, even the piles protected with iron or copper, require renewal about every 9 or 10 years, the animals having insinuated themselves under the bottom of the piers. While going round, I saw some of the mooring buoys from the Sound, which were then being hoisted in for repair, and although they had not been down more than 2 or 3 years, their under surfaces were so eaten, as to render them waterlogged; from this circumstance, as well as in that of the Busy cutter, it appears that the *Limnoria* is disposed to attack floating timber as well as that which is fixed.

Having thus shown that the *Limnoria* at present occupies every part of Plymouth Harbour, it would be an interesting question to ascertain whether it be an indigenous animal, or as some consider, an imported one. I am inclined to believe that it is an indigenous animal, as from the mode of its operations, the timber might easily be supposed to be decayed, and the animal overlooked; for althogh its identity was not pointed out until it was discovered by Mr. Stevenson at the Bell Rock in 1807, who sent it to Dr. Leach (see Lin. Trans. vol, ii. p. 370), yet I am assured by Mr. Roberts and others, that its effects have been observed in this dock-yard, for these forty years. Again on referring to two excellent papers on this subject, one by Dr. Coldstream, who gives a drawing and history of the animal, in vol. xvi. of Jameson's Edinburgh new Philosophical Journal, it will be seen that after being first pointed out at the Bell Rock, it was found at the Crinan Canal; Trinity Pier, Leith Fort, and recently in Torbay, besides being noticed by Mr. Stevenson on the coasts of France and the Netherlands. The other paper by Mr. Thompson, in vol. xviii. of the same Journal, shews that it has been found, together with the *Teredo*, at Portpatrick in Ayr; at Belfast; Donaghadee; Youghall; Dunmore; and Kingston Harbour (Dublin). It is also known in Bridlington Harbour, and by a notice at the late meeting of the British Association at Liverpool, it appears to be existing at Southampton. From all these observations I think it a fair inference, that both these animals have long existed on the coasts of our island; and that if at any time they might have been considered as freshly imported, they are now so fully established as to have become entirely naturalized as British.

It is a matter of the greatest importance to discover the best preservative against the attacks of these formidable animals, as the expenses annually incurred even in this dock-yard, in copper, iron and labour of repairs, are sometimes enormous. The use of stone, though most effectual, is not always applicable, as in the dock-yard jetties, which require to be built on numerous piles of timber, in order to have the effect of breaking the force of the water in high winds, thereby enabling the ships to lie alongside at all times without impeding their repairs. It appears from Mr. Stevenson's experiments, that the *Limnoria* attacks every kind of wood which he employed, except teak; where this cannot be obtained, the wood may be coppered or coated with iron nails, in which case it is necessary to extend the coating, at least six inches under the surface of the ground, as it has been sometimes found that the protected piles have been attacked by the animals obtaining access below the last row of nails. Common tar and sulphur mixed have been found ineffectual by Mr. Stephen at Donaghadee, but paint seemed to succeed; gas-tar and pitch are effectual for a time, but all of these are liable sooner or later to be washed off, in exposed situations, by the violence of the sea. Impregnation with some poisonous materials, as Kyan's patent solution, promises to be of service, as it is understood to protect the wood for a certain distance from the surface, which is the point at which the *Limnoria* begins its operations; I have recently submitted Kyanized wood to this test, and in a few months I shall probably be able to state the results of the experiment; in the mean time the best defence seems to be the employment of teak entirely, or sheathing the piers with it, or in default of that, I should recommend the more exposed timbers to be coated with iron nails, and the others to be carefully painted.

*Plymouth, January,* 1838.

ART. VI. *Remarks on the Affinities of Lythraceæ and Vochyaceæ.*—By Sir E. F. BROMHEAD, Bart. F.R.S. L. and E.

THE formation of botanical alliances has placed the question of affinity on a new footing, and affords tests unknown before. It is not now sufficient to derive relations from a comparison of the extreme deviations in two families; their normal structure must be compared; and above all, the joint-affinity must be estimated from the normal structure of the particular alliance in which the family must be placed under the supposed affinity.

*Lythraceæ* offer a fair example of the principle. The older botanists compared them with the labiate plants, on account of their mere aspect; but the character of the *Lamiales*, (as to the limits of which I quite agree with Dr. Lindley), will at once settle the question:—

*LAMIALES.* *Stems* round or tetragonal, with perfect nodes, not lactescent; *stipules* 0. *Inflorescence* not gyrate. *Calyx* persistent, odd calycine division superior. *Corolla* monopetalous, not plaited; more or less irregular, hypogynous, deciduous. *Stamens* not exceeding 5, 2 or 4, or rarely 5, (some *Myoporaceæ*), fertile, stamens (above 2) not of the same length, (exc. some *Verbenaceæ*), adherent to the corolla, alternating with the coralline divisions. *Carpels* 2, forming independent cells, free from the calyx, connate with each other in the bud, carpellary midrib facing the odd sepal. *Style* 1, *stigma* of not more than 2 divisions. *Fruit* dry, nucamentaceous. *Ovules* erect or pendulous, not more than 2 in each cell. *Embryo* straight, *cotyledons* foliaceous.

Here the petals are connate; the stamens never exceed 5, and they are free from the *calyx;* the fruit is not capsular, but nucamentaceous; the ovules are erect or pendulous, and not more than 2 to each carpel. This is sufficient, without reference to other points in which the *nixus* is different.

Others have compared *Lythraceæ* with *Malvaceæ*, but the characters of the *Malvales*, (as to the limits of which I otherwise agree with Dr. Lindley), rebut the affinity :—

*MALVALES*. *Branches* round; hairs, (if present), usually stellate; *leaves* alternate, petioled, simple; *stipules* very rarely absent, free. *Calyx* valvate in the bud, or ruptile, or irregular. *Petals*, (when present), as many as the calycine divisions, alternating, hypogynous, twisted or convolute in the bud. *Stamens* hypogynous, a multiple of the petals or indefinite, monadelphous or within a long tubular calyx. *Carpels* forming independent cells, verticillate or connate in the bud, (exc. perhaps *Christiania*, *Malope*, *Sterculia*, *Erythropsis*), free from the *calyx*. *Ovules* at the inner angle.

Here there are round branches, alternate leaves seldom entire, stipules, petals twisted or convolute, stamens not fewer than the petals, and hypogynous, albumen often present, &c. The perigynous insertion has unquestionably been abused as a character, but it is nevertheless of great value, and ought to be cautiously violated. The *Malvales* seem uniformly hypogynous, even in *Elæocarpaceæ*. The adherence to the *calyx* on the other hand, is normal and uniform through a series of alliances, *Haloragales*, *Œnotherales*, *Myrtales*, and *Rosales*. The failure of the important character of adherence, usually indicates an approach to the apetalous or sympetalous structures, or to alliances where the germen is sub-adherent to the *calex;* Agardh observes, "*Perigyna et epigyna omnino confluunt*".

Linnæus placed *Glaux* next to *Lythrum*, which does not require remark.

*Lythraceæ* were placed near *Tamaricaceæ*, when the stamens of the latter family were not fully examined. The place of *Tamaricaceæ* is ambiguous, but it can lie only with *Cistales*, or *Violales*, or *Portulacales;* and with none of these can we well place *Lythraceæ*, though the *Portulacales* are least objectionable. Bartling and Shultz place *Lythraceæ* with *Elatinaceæ*, one of the *Cistales;* Shultz also places *Ly-*

*thraceæ* and *Montinieæ* near *Portulacaceæ;* Von Martius places them with *Frankeniaceæ* as *Maræananthæ.* It is remarkable that these writers should have adopted the stations selected by others for *Tamaricaceæ.*

Botanists, almost with one voice, have placed the *Lythraceæ* next some family in the series of perigynous alliances before mentioned; we there find them with *Ceratophylleæ, Œnotheraceæ, Rhizophoraceæ, Combretaceæ, Melastomaceæ, Myrtaceæ,* and *Rosaceæ,* a somewhat decisive evidence of joint affinity. The character suits well with *Œnotherales,* among which I have placed both *Lythraceæ* and *Vochyaceæ;*

*ŒNOTHERALES.* Not lactescent; *leaves* simple, penni-nerved, undivided. *Sepals* more or less connate, valvate in the bud, or rarely somewhat open, (some *Lythraceæ*), or irregular, (*Vochyaceæ*), odd sepal superior. *Petals,* (when present), inserted on the calyx; not exceeding the number of the calycine lobes, alternating. *Stamens* not more than four times the number of calycine lobes, adherent to the *calyx,* not adelphous. *Carpels* 1—4, not exceeding the number of calycine lobes, forming independent cells, connate with each other, adherent to the *calyx* or enclosed. *Style* 1, slender. *Ovules* indefinite and central, or definite and then pendulous or erect. *Albumen* 0, (exc. *Montinia*); *embryo* straight.

Dr. Lindley does not here adopt the same limits for his alliance as Bartling, whose limits I have somewhat qualified. The valvate *calyx* has been overlooked, and through an ambiguity of expression, applicable only to the *corolla,* it seems even to be negatived; it is however a very striking analogy among perigynous families, to the *Malvales* among hypogynous families, and subjected merely to exceptions analogous to *Bombaceæ* and *Dipterocarpaceæ.* Dr. Lindley has, with Agardh, leant upon the quaternary structure, which is doubtless remarkable hereabouts, and probably connected with the fact, that the carpels are limited to 4, through the sequence of *Piperales, Haloragales,* and *Œnotherales.* If stress be laid upon the unsupported resemblances to *Hibiscus* and *Napæa,* we may produce *Antherylium* and *Cassipourea.*

*Lythraceæ* have also been compared with *Adenaria* in *Celastraceæ,* but no one has ventured to place them among the *Euphorbiales,* though it might be done without great violence to the general structure of that alliance. Such solitary unsupported resemblances of extreme cases, are of little weight.

*Vochyaceæ* have been compared with *Clusiaceæ* and *Marcgraaviaceæ,* two families of the *Hypericales,* and therefore that alliance should be examined:—

*HYPERICALES.* *Leaves* simple; *stipules* 0. *Flowers* regular. *Sepals* 2—7, in a broken series, imbricated. *Corolla* hypogynous, of 4—10 divisions. *Stamens* hypogynous, not fewer than the corolline divisions.—*Carpellary* leaves more or less turned inwards at the edges, free from the *calyx,* connate with each other. *Albumen* 0 or very small.

Here we find stipules 0, flowers regular, corolla hypogynous, stamens hypogynons, and not fewer than the corolline divisions; carpels free from the *calyx*. The hypogynous stamens are also normal and without exception, through the sequence *Æsculales*, *Hypericales*, and *Aurantiales*.

An unsupported resemblance to *Violaceæ* has been claimed for *Vochyaceæ*, but it is rebutted by the characters of the *Violales*, in which, among other points, the ovules are many, and albumen rarely absent. The coincidences with *Violales* lie almost wholly with the deviations of the different families from the normal structure of that alliance.

Were we to suppose the *Violaceæ* in affinity with the *Polygalaceæ*, the case for a joint affinity towards *Vochyaceæ* might be stronger, but this seems now to be surrendered.— The affinity of *Polygalaceæ* to *Violaceæ* is however much closer than the supposed affinity to *Sapindaceæ* among the *Æsculales*. Von Martius, in the artificial arrangement of his Conspectus, places *Vochyaceæ* near *Sapindaceæ* and other families among the *Æsculales* and *Euphorbiales*:—

*ÆSCULALES*. *Leaves* petioled; *stipules* rarely present, and then small, (some *Malpighiaceæ*). *Sepals* in a broken series, imbricate, odd sepal superior. *Torus* discoid. *Petals*, (if present), issuing from the edge of the disk, not connate with each other, deciduous. *Stamens* hypogynous, filaments subulate or flat, (*Millingtonieæ*), in a single or double row; *anthers* introrse, bilocular, cells parallel, not opening by pores. *Carpels* 2, or 3, or 4, forming independent cells, free from the *calyx*, connate with each other. *Stigmas* not sessile. *Trophosperms* central; *ovules* definite. *Albumen* 0, or extremely thin, (*Millingtonieæ*); *radicle* next the *hilum*.

*Polygalaceæ* cannot be there; and I at last agree with Agardh's "*Nullibi alias collocandæ*," in placing this most anomalous family near the *Brassicales*. The affinity to *Resedaceæ* seems to be admitted; neither can I throw *Tremandriaceæ* to the *Rhamnales*, which are *Micranths*, nor overlook their passage to *Capparideæ*. With all these *Vochyaceæ* has no relation, nor does it shew any tendency to parietal or subparietal placentation. The alliance of *Polygalaceæ* not being definitely fixed, the test so far fails; but in *Polygalaceæ* there are no stipules; the stamens are adelphous, hypogynous, and not facing the petals; ovary free from the *calyx*; ovules pendulous; albumen usually present.

Whatever may ultimately be the place of *Vochyaceæ*, it will be nearest to its recognised relations, if stationed among *Œnotherales*, not far from *Œnotheraceæ*, (*Lopezia*), *Rhizophoraceæ*, *Combretaceæ*, and *Memecylaceæ*, to which Reichenbach adds *Chrysobalanaceæ*. To these we may also add *Lythraceæ*, which thus give mutual support to each other; there is the same tendency to tetragonal branches; *Cuphea* has the spur of *Vochyaceæ*, a structure apparently connected here with the disappearance of a carpel, and indicating in *Vochyaceæ*, a departure by suppression from a quaternary state of the germen.

Art. VII. *Notes on the Red Band-Fish, Cepola rubescens,* Linn.— By Wm. Thompson, Esq. Vice President of the Natural History Society, of Belfast.

A remarkably fine specimen of this fish, which, as British, was, until last year,* known only to the southern shores of England, was found on the beach near Ballantrae, on the coast of Ayrshire, on the 29th of November, 1837, after a severe storm.

It was taken to Dr. Wylie, of the village, who, on learning from the fishermen that the species was unknown to them, most liberally transmitted it to me.† In consequence of its size, and its being received in a perfectly recent state, I here transcribe some of my notes, made on comparing the specimen with the descriptions of various authors, before it was transferred to spirits.

The largest English *Cepola* on record, is described by Mr. Couch in the Linnean Transactions, (vol. xiv. p. 76), to have been 15 inches in length. Cuvier and Valenciennes observe, (Hist. des Poiss. t. x. p. 398), that their specimens were a foot long; but add, that the species has been found a foot and a half in length. The present specimen, although broken off near the tail, is 19½ inches long; and as the body, when perfect, tapers to a point, and that of the individual under consideration is 2 lines deep at the fracture, I should consider, judging from the gradual diminution of its depth before this part, that it must have been from about 2 to 3 inches longer. The depth of the head is 1 inch and ½ a line; the greatest depth of the body, (just behind the gill covers), is 11 lines, or

* When the above was written I had overlooked the following note, which appeared in the Magazine of Zoology and Botany, for June, 1837, (vol. ii. p. 93).—"*Cepola rubescens*, Linn.—Mr. P. W. Maclagan informs us, that he has lately procured a specimen of this fish, which was caught off Dunure, seven miles south of Ayr, on a whiting-line, baited with a mussell. Its length is 15½ inches. The fisherman who brought it had seen another about six weeks ago.—March 20th, 1837."

† This specimen afforded an illustration of the correct application of *Tænioideæ*, or 'Poissons en ruban,' to the family in which it ranks, in a point of view that, in all probability, was *overlooked* by Cuvier. Although 19½ inches long, it was folded up like a riband, and forwarded through the post office, under cover of a franked letter, of ordinary size and legal weight.

1½ line less than the depth of the head, and thence it tapers gradually towards the tail. Its thickness close to the head, is 4½ lines, at the centre 1½ line, and at the extremity ½ a line. Its weight is scarcely 1 oz.

The species has been generally described as destitute of scales. Mr. Yarrell however states, that a specimen sent to him by Mr. Couch, "exhibits, here and there, an occasional thin, oval semitransparent scale." (Br. F. v. i. p. 197). It is remarked by Cuv. and Val.—"Les écailles de la Cépole sont extrêmement petites, ovales, lisses, entières, insensibles au tact, ne s'imbriquent point, et se présentent à la loupe comme autant de petits pores enfoncés et disposés en quinconce serré; ce n'est qu'en raclent la peau, qu'on en détache et qu'on peut les voir séparément: la tete et les nageoires n'en ont aucunes." (t. x. p. 397). My specimen entirely coincides with this description, but it may be further observed that its scales increase gradually in size from the head towards the tail, and that in approximating the latter, they are apparent to the naked eye: from being more sunk in the skin, in addition to their smaller size, they are not thus visible on the anterior part of the fish—with a low magnifying power the longitudinal *striæ* of the scales on the posterior portion are conspicuous.

The *Cepola rubescens* and *C. tænia* are described by authors who hold them to be distinct, the former, as possessing one, and the latter, two, rows of teeth in the lower jaw. Donovan, (British Fishes, No. 105), and Yarrell,* have considered that this difference may be owing to the age or size of the individual. Risso in his 'Histoire,' (ed. 1826, tome 3, p. 294), in which the *C. rubescens* and *C tænia* are brought together, though in his 'Ichthyologie' they were regarded as distinct, attributes 14 teeth to the upper and 16 to the lower jaw. Cuvier and Valenciennes enumerate 17 or 18 teeth on each side of the upper jaw, and ten on each side of the under, behind which 2 appear, and add that they vary a little in individuals. My specimen, considerably exceeding in magnitude the *Cepolæ* examined by these authors, exhibits 41 teeth in the upper jaw, (cavities denote that many are wanting), and 25 in the lower, of which latter, 17 are in a tolerably regular row, inside of which is 1 tooth, and outside it 7, which are equal in length to the largest in the row, but not so much hooked. The tongue is smooth.

The lateral line is apparent only on close examination, being a mere faint-coloured line, sloping downwards for a short

* In a specimen 7½ inches long, this author found one tooth in the line of the second row; and in an individual 13 inches in length, six teeth constituted this row. Br. Fishes, vol. i. p. 197.

distance from its origin, and thence extending in a straight direction towards the tail, about equidistant from the dorsal and ventral profile. From the upper point of the *pre-operculum*, a row of bone-like processes slopes upwards to the base of the dorsal fin, and thence continues throughout the entire length of the fish, giving it a carinated appearance; along the base of the anal fin a similar carination extends.

In the dorsal fin the three first rays only are inarticulated and simple, but they are as flexible as the rest; the fourth ray, and those which follow, are both articulated and branched. All the rays of the anal fin are articulated; the first is simple; the second and succeeding ones are branched. The fin-rays are in number,—D. 71. A. 63. P. 17. V. 1+5.*—Branch. mem. 6 rays.

The upper portion of the head and body is a deep rose colour, shading gradually downwards to a paler hue; posterior part of the body of a uniform deep rose colour; base of the lower jaw carmine; space before and above the ventrals and *pre-operculum* bright silver; *irides* silvery, tinged with rose colour, pupils blueish black; membrane uniting the outer extremity of the inter-maxillary with the maxillary, dusky, or clouded with black, which latter colour it is described to be by Cuv. and Val. The extreme anterior portion of the dorsal and anal fins dark and pale rose colour, irregularly disposed, and bordered with a narrow line of reddish lilac, which gradually increases in breadth posteriorly, forming a beautiful termination to the greater portion of these fins: in both the anal and dorsal, the rays are of a deep carmine hue, the connecting membrane is either generally of an orange yellow, or reddish lilac, at the base, the centre carmine, and the border reddish lilac, which colour is separated from the orange yellow by a narrow line of deep carmine. The pectorals have a slight tinge of deep rose colour; the ventrals are pure white. There is not the least indication of any transverse bands, as are figured by Montagu,* (Linn. Trans. vol. vii. pl. 17), and described by Risso. The latter author mentions a reddish spot at the origin of the dorsal fin,—at 1½ inch from the commence-

* The ordinary number of rays thus appearing in the D. and A. fins, (70 being commonly attributed to the former, and from 60 to 63 to the latter—Donovan describing 69 in the A. fin of his specimen, which was 11 inches in length), may seem against the presumption that the specimen was from two to three inches longer than at present, as the depth of the broken extremity denotes; but in the fins of fishes generally, having many rays, I have found the number to differ very much in individuals of the same species.

† The two coloured figures of English specimens, (Montagu's and Donovan's), in which these fins are expanded, give no idea of this marginated appearance, nor indeed, from the same reason, do any figures I have seen.

ment of this fin in the present specimen, a somewhat oval spot, of a deeper red than the surrounding parts, originates, and extends for the space of half an inch.

The term 'Riband Fish,' applies equally well to the colour as to the form of this *Cepola;* as the much darker hue imparted by the carmine-coloured rays of the dorsal and anal fins, when lying close to the rose-coloured body,—throughout the entire length of which they are continued,—gives it strikingly the appearance of a bordered riband; and may indeed, when so viewed, have suggested the trivial name of *marginata*, to what was considered a distinct species: vide Cuv. and Val. t. x. p. 392.

The *C. tænia*, as described by Bloch, chiefly differs from the *C. rubescens* in the carination at the base of the dorsal and anal fins; in having two rows of teeth in the lower jaw, instead of one; in having the tongue rough, rather than smooth; in wanting the silvery bands of *C. rubescens*; and in having many red spots on the sides. Of these characters, two are present, and three wanting, in this specimen. It has the double row of teeth, and a single inner tooth in addition, suggesting the idea of a third row; and likewise the carination on either side the base of the dorsal and anal fins. Not only the transverse bands, but the spots also, are absent.—The difference between the smoothness and roughness of the tongue might, I conceive, arise from the mode of preservation, for if originally smooth, the tongue would probably continue so, were the specimen preserved in spirits, although were it preserved dry, this organ might become rough. In the number of rays in the branchiostegous membrane and in the fins, there is a general agreement between Bloch's *C. tænia* and the specimen under consideration. The *C. tænia* is described to have in Branc. memb. 6. P. 15. V. 6. A. 60. C. 10. D. 66.

It seems unnecessary to extend the description any farther, or to those characters on which authors are agreed. In the 10th volume of the 'Histoire Naturelle des Poissons,' of Cuvier and Valenciennes, which did not appear in time to be quoted in the excellent volumes of Mr. Yarrell, (Brit. Fishes), and Mr. Jenyns, (Man. Brit. Vert.), the *C. rubescens* is treated of in the usual full and complete manner characteristic of that great work. The subject occupies thirteen pages, in which the *C. rubescens* is set forth as the only species of its genus yet discovered in the European seas, the *C. tænia*, *C. marginata*, &c. being rejected as species. I have, nevertheless, thought it might not be useless to describe the present individual, so far as I have done, in consequence of its superior size to Cuvier and Valencienne's specimens, which did not come under their observation in a recent state.

Of four Mediterranean specimens, (preserved in spirits), of *C. rubescens*, which I have examined, and which were obtained at the Ionian islands, by Robert Templeton, Esq. of the Royal Artillery, and presented, along with many other fish from the same locality, to the Natural History Society of Belfast, one is 6 inches, and the other three from 9 to 10 inches in length. The smallest is very considerably compressed, quite as much so as the largest, although an individual of about equal size, described by Mr. Couch, (Linn. Trans. vol. xiv. p. 76), was nearly round; from which some authors have inferred that this is the general form of the species in a young state. In the two larger individuals, which are in better preservation than the others, the series of bone-like processes appear on the dorsal ridge, and also on the ventral, though less conspicuously. In all, the tongue is smooth. In none of them are there any teeth, either inside or outside the row on the lower jaw, and in both jaws the teeth are much fewer in number than in the large specimen which is the subject of this communication.

*Belfast, February*, 1838.

ART. VIII. *Remarks on certain Beds in the neighbourhood of London, containing peculiar Flints.* By JAMES MITCHELL, LL.D. F.G.S.

ON Blackheath, and over a considerable district in the county of Kent, and a small portion of Surrey, there are most extensive and deep beds of a peculiar kind of flint, which it is now proposed to describe. The designation of Blackheath flint is proposed for it as involving no theoretical opinion.

Beginning at Croydon, on the east side of the town, Park hill and the Addington hills are covered with millions of these flints. The continuity is then interrupted by the vale which extends from Lewisham to beyond Kenton, but on the east side of this vale all Hayes Common is covered with flints of a similar character as far south as Farnborough.

There is an equal abundance in the country about Bromley, and over the whole of Chiselhurst common and Blackheath. The same may be said of Bexley Heath and the hills from Plumstead to Erith, with the country about Erith: the hills near Farnborough, Meopham, Shorne and Gadshill. In fact most of the higher grounds and heaths present myriads of myriads, and in the other parts of the country they are scattered, but not so plentifully. In the deep vales of the Cray and Darent they are wanting.

There is one spot beyond the boundaries above described, where such flints are exceedingly abundant, which is the hill immediately above the firestone quarries, a mile north from Godstone Green.

The best place near London where these flints may be seen to advantage, is at the top of Blackheath hill, immediately in front of the Green Man hotel. One single view of such a collection as is there will give a better idea than any description.

As to size, many of the Blackheath flints are not larger than *pease* and *beans*, and by such designation they are known to builders and plasterers. The greater part are however larger, from a pigeon's egg to a hen's egg, and a small proportion of them are even as large as a swan's egg, only rather flattened. The colour on the exterior is sometimes blue, but it is generally of a brownish or rusty appearance.

The form of Blackheath flints is uniformly a flattened ellipsoid. The perfect sameness of form is perhaps the most remarkable circumstance about them, and suggests the idea of their having acquired it by means of gentle agitation whilst yet in only a soft state.

When broken by the hammer the fracture is not like that of chalk flints, being not nearly so much conchoidal. The appearance is most frequently horny or waxy, with frequently white spots, but it is sometimes reddish, though comparatively seldom.

Blackheath flints are seldom at all affected by long exposure to the air. Countless multitudes of them may be seen on the surface, and near to it in many places within the country where they are found, and have been so exposed for a period to which we can set no limit: yet they have not acquired a white crust nor even any white film making any approach to it. However on the south side of the Addington hills, the sun has produced an effect, and whitened to a small degree the flints exposed to his rays.

Blackheath flints may be burnt in the fire, without their exploding, which is seldom the case with other flints. This has been attributed to their containing less water than other flints, and it may possibly be so.

After being burnt in the fire the fracture is very rough and uneven, and often appears as if blistered. The colour is a dirty white with a considerable mixture of red produced by the presence of iron. The adhesion of the flint after being burnt is much less than is the case in chalk flints.

Blackheath flints have never been used by the gun-flint makers. No doubt it is possible to make gun-flints from the larger specimens, but it would be with greater labour than from the finer sorts of chalk flints, and the gun-flints so obtained would be more brittle and less durable.

The Blackheath flints are totally unfit for the porcelain manufacture. If there were no other objection, there is frequently, indeed generally, a portion of oxide of iron on the exterior, which would spoil the colour, and generally oxide of iron is present in the interior also.

The powder also obtained by burning and grinding Blackheath flints, would not be so fine. By burning a few specimens in a common fire, and pounding them in a mortar, and then comparing them with chalk flints, treated in a similar way, the difference will appear most obvious.

The Blackheath flints are admirably adapted from their size, for the purpose of the patent building, after being washed and put in moulds, with lime freshed slacked with hot water, then a solid body is produced of appearance like Portland stone in front, and said to answer exceedingly well.

The small flints called *pease* and *beans* are used by plasterers as an ornament to their work. The only other use to which they are applied is that of materials for the roads.

Fossil remains are seldom discovered in the Blackheath flints, if we except certain snail-shaped or leech-shaped bodies, found also in the chalk flints of some districts, supposed to be *Alcyonites*. I have broken thousands upon thousands in search of other fossils, and until this year without success. On Plumstead common I broke open a flint in which was an impression of a spine; and I broke open another with a very fine impression of a spine at Chiselhurst. Mr. John Alfred Burgon, F.G.S. has found two *Echini* and a *Pecten* in flint on Blackheath. Still as compared with the flints of other districts, fossil remains are very rare.

The cause of this very great rarity of fossils in these flints is not very obvious. Most of them are indeed too small to envelope shells or even fragments of shells, but it is far from being the case with them all. It is also obvious that although a large number of small flints, agitated by the waters, would destroy and reduce to powder any shells which might be near them, yet some might notwithstanding escape, and be enveloped in the larger flints, as in the districts in which clay flints abound, as Warley and St. Ann's hill; and it is not unlikely that there was diffused through the water something unfavourable to the support of animal life, so that at the time when the siliceous matter was deposited in this district, there were few or no shells around which it might aggregate. It is perhaps this matter mixed up with the silex, to which the Blackheath flints owe their peculiar character.

The existence of beds of sand frequently discovered below the Blackheath districts, proves the previous great agitation of the waters, and that also must have contributed to diminish the number of shells, but from their very great rarity some destructive mixture seems to have been the most likely cause.

In breaking open some of the Blackheath flints, masses of red coloured gravel are found enclosed, and where there is no possible opening by which gravel might have penetrated into any hollow part left in the flint at its formation. The flint has aggregated around the gravel, precisely in the same way as in the chalk the flint is often found to have aggregated round a mass of chalk, and to have enclosed it on all sides. Specimens of this sort have been met with at Erith, more frequently than at any other place; but they may be found in other localities also.

## ART. IX. *Upon the Identity of Hunter's Delphinus bidentatus, Baussard's Hyperoodon Honfloriensis, and Dale's Bottle Head Whale.* By WILLIAM THOMPSON, Esq.

BELL in his late work upon the British Quadrupeds and *Cetacea*, mentions in his preface that further information is required on many points of great interest in the history of the latter, and he instances " the relation of the Hyperoodon of Dale to that of Hunter," and Sir W. Jardine in his volume upon *Cetacea*, pages 194 to 197, canvasses the question of the identity of Hunter's and Baussard's *Cetacean*, leaving the matter as it appears to me in greater doubt than ever. Where doctors differ I should have thought it the height of presumption to have introduced my humble opinion, were it not that I have an opportunity of forming a judgment not afforded to either of the eminent naturalists in question. Let me at once then state that I conceive there is not a doubt of the identity of Hunter's and Baussard's specimens, both of which were females, and that I conceive Dale's specimen to be the male of the same species; for though from the figure given on page 493 of Bell's work, it appears to differ from the others in form, being thicker in the shoulder, yet I conceive it does not differ more than the bull does from the cow, or the male lion from the lioness: as regards this last point of mine, however, I confess I have nothing beyond surmise; but the possible difference in figure of the male and female does not seem to have occurred to either Bell or Jardine. But as far as regards the identity of Hunter's *Delphinus bidentatus*, and Baussard's *Hyperoodon Honfloriensis*, my opinion is founded on a specimen of a *Cetacean* stranded just below the town of Hull last year, which was exhibited for many days here, and the skeleton of which forms now part of the Museum of the Hull Literary and Philosophical Society.

The animal in question before dissection was carefully examined by myself and many others, and due attention paid to the mouth, and before the flesh was removed, every one declared it had *no teeth*, in this respect it quite agreed with Baussard's specimen of a mother and cub stranded at Honfleur, of which Jardine says, p. 195, " The circumstances on which the claim of these specimens to be considered generic rest, are *the total want of teeth in either jaw*."

Upon the skeleton of the Hull specimen being prepared, however, on removing the gums " two strong and robust teeth were discovered to exist at the extremity of the lower jaw," though previously covered and entirely concealed by the gums.

Here then we have an animal in its perfect state, agreeing with the creature which Baussard described in a similar state, and also agreeing in its skeleton state, with the skeleton in the Hunterian Museum, described by Hunter; thus, though both are describing the same animal, yet one having seen it in the recent, the other in the skeleton state, each gives a different account as to its teeth, like the far-famed travellers' dispute about the camelion's colour.

In figure the Hull specimen was a fac simile of Jardine's *Hyperoodon Honfloriensis*, figured plate 13 of his volume, with the exception that the engraver of that plate has inserted two lateral teeth in the upper jaw of the figure; I say the engraver, for I conceive that Sir W. Jardine never authorized their being inserted after describing the generic character of the animal to consist "in its *total want of teeth in either jaw*." These supposititious teeth in the upper jaw should be immediately erased from Sir W. Jardine's plate, before any more impressions are struck off. The plate in Bell's work p. 492, is also a good resemblance of the Hull whale, though perhaps not so striking a portrait of it as Jardine's, with the exception of the lateral teeth, which do not occur in Bell's plate, rendering it more correct than Jardine's, and less likely to create doubts in the mind of young naturalists.

Speaking of Baussard's whales, (mother and cub), Sir W. Jardine says " Bounaterre in describing the individuals examined by him, most *unaccountably* assigned to them two teeth in the lower jaw." Now I think it is well accounted for thus; Bonnaterre described the skeletons; Baussard the animals with their flesh on; this very circumstance agreeing with the one I have described at Hull, shews that the Honfleur specimens were identical in species with the Hull one; and since the Hull one in its skeleton state, quite corresponds with the Hunterian specimen, it follows that Hunter's and Baussard's specimens are also of the same species,—in short, that Baussard's specimen, Hunter's specimen, and the Hull specimen, are all specimens of *Hyperoodon honfloriensis.*

The skull of the Hull specimen corresponds in its general form, with the one figured in Bell's work, although the rise in the back part of the head is larger in proportion to the anterior rise, than that figured by Bell, as the following measurement will shew, viz:

| | ft. | in. |
|---|---|---|
| From the snout to the base of the front rise of the skull ......... | 0 | 9 |
| From the base of the front rise, across that rise to the base of the second rise. .... | 1 | 0 |
| From the base of second rise across that rise to its base next the neck ........ | 1 | 11 |

The total length of the animal skeleton, from snout to tail, 17 ft. 6 in. the lower jaw extending two inches further. When alive however it was considerably longer, owing to its fleshy tail extending beyond the last of the caudal *vertebræ* and owing to the loss of much intervertebral matter.

*Vertebræ* 39, viz. 2 cervical, 9 dorsal, with dorsal processes and ribs attached, 20 dorsal, without ribs, but with dorsal processes, 8 caudal, without any dorsal processes.

| | |
|---|---|
| The *scapula* extends ........................................ | 10 inches |
| The *humerus* ........................................ | 8 |
| The *ulna* and *radius* ........................................ | 7 |
| The hand to the tip of the longest finger................. | 8 |

Should these observations at all assist in elucidating the point Mr. Bell states to require elucidation, I shall be very glad. At all events if my own remarks prove useless, the information where another specimen may be examined by able naturalists must have some utility.

*Hull, February 22nd,* 1838.

Art. X. *Letter from* The Rev. W. B. Clarke, *in reference to the alleged occurrence of the bones of terrestrial Mammalia in the red and coralline Crag of Suffolk.*

My dear Sir,

Had I more carefully recollected the object of your paper, which I alluded to in my 'Note on the Crag Beds' in the last number, (p. 162), I should not have given you the trouble of stating your views, in which I fully concur.—But noticing the list of "*beds in which no traces of terrestrial Mammalia occur*," I overlooked the preceding observations respecting the distinction you have drawn between the *Mammaliferous shell-beds of Norfolk*, and the *true* crag of Suffolk. Now you are not unacquainted with my views on the subject of the distinction between *Suffolk diluvium* and the crag; for they are stated fully in my paper on the Geology of Suffolk, &c. read in 1837 before the Geological Society; and an abstract of which is given in the Society's Proceedings, vol. ii. p. 528. I have there shewn, that the *diluvium* and *crag* are not, as Mr. Lyell has supposed, *of the same age*.* I have also mentioned the fact, that mammalian remains are found where I have mentioned, at Walton, Felixstow, and Tattingstone; but I have never assumed that they are of the *same age* as the *shells* of the crag. I have merely supposed, that whilst the crag yet lay beneath the waters, before the up-heaving of that formation, remains of land animals, drift wood, gravel, &c. may have been washed into the then sea, and upon the sand and shell banks, which I assume to have been then formed, as now they are, along our coasts, by the action of currents, &c. I have also pointed out that diluvial gravel has been washed, in one instance, (at Stratford St. Mary), into fissures of the crag, and there, *apparently*, been stratified with it. Such I conceive to have been the case with the bones I alluded to. Now, at Tattingstone, I have taken pebbles of red sandstone, (which I still have in my collection), covered with *Balani*, from the true crag, and which, there is no doubt, are *drift of the crag age*:—and *near them* I found, in the pits I mentioned, remains of what I imagine belonged to a *Mastodon*. How they came there, I cannot say;—whether fallen from the superficial beds of drift,—or drifted into a hollow in the crag before the crag was upheaved,—which I imagine lay

* The above observation of Mr. Clarke's appears to us calculated to convey a wrong impression of the opinion Mr. Lyell has advanced upon this subject; for although he may have referred certain beds to the tertiary epoch, which more properly belong to the diluvial, yet we think there is no ground whatever for assuming that Mr. Lyell has considered, in an extended sense, the *diluvium* of Suffolk and Norfolk to be of the same age as the crag. Ed.

under the waters during the *diluvial clay* epoch; but I certainly do not suppose, that the *Mammalia* and crag mollusks were contemporaneous, though their remains are occasionally found together. In this point we both meet. The explanation thus brought out will do no harm,—it enables facts to be quoted, which might have remained unnoticed. As to the occurrence of bones of land animals in other lower supra-cretaceous deposits, they also might fall under the head of *drift*. At Walton Naze, 800 or 900 yards from the village, and several rods from the shore, there was found an elephant's tusk, 8 feet in length; the chord of the arc was 7 ft. 3 in., and the circumference was, at the largest end, 18 inches. It was found in the London clay, sticking upright, just above the low water level. It was evidently a drift tusk, and had probably been washed from above, at an ancient period, and exposed from the effects of denudation, by the wear of the sea on that ruinous coast. Bones similar to those I have mentioned from the crag at Walton, have been also found in true surface-drift near Flatford Bridge, in East Bergholt; and a bone of great size was taken thence in 1829, and when I left Suffolk in 1831, was, I think, in the possession of Abram Constable, Esq. of Flatford Mill. That the the crag was not upheaved till after the irruption of the drift or *diluvium* of Suffolk and Norfolk, I hope I have sufficiently established in the paper I before alluded to; admit this, and there can be no difficulty as to the question, how the remains of land animals of the diluvial epoch may have been drifted upon or into the crag, or London clay, before the upheaving of the crag occurred; for I imagine that causes similar to those now in action, were in being both before and after the great convulsion which covered parts of East Anglia with from 300 to 400 feet of drift clay and gravel;—and that land floods and rivers bore down, as now, to the sea, whatever they found capable of transportation.

My knowledge of the conchological history of the crag is very limited, and on this point I must confess your acquirements such as to make you an authority which I ought not to dispute. Yet so far as the *superficial* Geology of Suffolk goes, I venture to suppose you will allow I have a claim to offer an opinion; and I think we do not differ therein.

*Stanley Green,*
*March* 1*st*, 1838.

Yours faithfully,
W. B. CLARKE.

*Editor of the Magazine of Natural History.*

ART. XI. *Remarks on Hydrophobia occurring among the Foxes, in Germany, especially in the Kingdom of Wurtemberg.* By W. WEISSENBORN, D. Ph.

SINCE 1833, there has been observed among the foxes all over Germany, as well as the neighbouring countries, different symptoms of disease, which have a tendency to degenerate into *hydrophobia*, so as to make the latter disorder assume an epidemic character. It is curious that these phenomena nearly coincide with the appearance of the *cholera*, and considering that the liver appears to be the primary seat of the disease, it is perhaps not too speculative to suppose that the peculiar unhealthy state of the foxes, owes its origin to the same telluric and atmospheric influences, which predispose the human organism for the *cholera*. However, unsupported as this opinion stands by a closer investigation of the subject, I should not have ventured upon emitting it, were the Etiology given by writers on the subject, or the opinions of foresters, whom I have consulted, at all calculated to throw much light on the question. Most of them adduce the scarcity of mice; and indeed the *fœces* of the foxes were found in several districts, where the disease prevailed to a high degree, to be mostly composed of the remains of cockchafers, &c. But here, no doubt, a symptom is mistaken for the cause, as the fox is probably compelled, by a depraved appetite, or the weakness to which it is reduced, to subsist chiefly on a description of food, which in general forms only a supplementary part of its diet. Quitting this speculative part of the subject, I shall now first communicate a few observations, which were made in the principality of Saxe-Eisenach, about the time when the disease first appeared, and then report on its present state in the kingdom of Würtemberg; observing that during the intermediate period, the foxes seem to have been throughout affected with the same ailment, more or less, over all Germany and Switzerland, the disease appearing in one district, when it had ceased in another.*

* I may here mention a little work, which was published in 1835, at Zurich; "Ueber die in unsern Zeiten unter den Füchsen herrschende Krankheit" (On the disease prevalent among the foxes in our time), by Dr. Joh. Rud, *Koechlin*, in which the author draws the following conclusions: 1. The disease is a peculiar kind of typhus, to which, in its primary state, probably only the canine species are subject, but which may be communicated to man, and other animals, by means of contagion. 2. This typhus, in its different stages, as well as in different individuals, presents more or less numerous and different phenomena, both during life and after death. 3. It is often accompanied by that rabid *delirium* or *typhomania*, which impels the animal to bite. 4. The animal affected with it often dies, or is killed, before the disorder has become contagious, or completed its deve-

During the summer of 1833, it was observed about Eisenach, that foxes were less afraid of man than usually, and subsequently several were killed in or near human habitations. I shall detail the circumstances of a few cases.

In July, 1833, when the gardener who was on duty for the night-watch, in the grand-ducal garden of Wilhelmsthal, entered the watch-hut, and had made a little fire, he was roused by a violent snarling, proceeding from under the bench on which he was sitting, when he discovered a fox which showed no disposition to give up the position it had taken up. He went for a gun, and the fox was shot. It was strong, but without any particle of fat. No notice was taken of its sex, but all the rest, which, in the neighbourhood of Eisenach, were killed last year under similar circumstances, were males.

In November, 1833, a blood-hound belonging to Mr. C. Hanff, of Wilhelmsthal, made a great noise late in the evening, and broke loose from its chain. Her master descended to the yard, tried to calm her, and having fastened her again to the chain, retired to the house; but scarcely had he entered it, when the same noise began again. This time Mr. H. discovered the cause of the uproar, for when searching the dog's hut, he perceived a fox, which he shot. It being well fed and furred, nobody then thought of the possibility of its being mad. However, the hound went mad five weeks after, and was killed, as the symptoms of rabies could not be mistaken.

Soon after, a fox descended at nightfall from a mountain near Alchenbach, and began to play with a young dog belonging to a labourer, whose cottage is at some distance from the village. It was scared away, but returned the day after.—This time the fox made a violent attack on the little dog, worrying it till its master came to its assistance, and beat off the fox. The animal made its escape, and did not return, but the dog went mad, and bit several other dogs, which were directly shot, and a little boy of the schoolmaster. The boy was subjected to proper and timely treatment, and recovered his health.

Some time after a labourer killed a fox that had entered a cow-house at Wilhelmsthall; and at the same place a gamekeeper shot a fox in the yard of the inn. The animal was walking there fearlessly, in broad day-light. It was very mea-

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lopement. In such cases the bite of the animal is not dangerous. 5. However, as it is not always possible to decide that point, the treatment must always be conducted as if the animal had been really mad. 6. To effect a preservative cure in persons that have been bitten by mad foxes, an issue should be formed upon the wounded place, with mild diet and diaphoretics; this has been found fully competent.

ger, but well furred, and in its stomach was found nothing but a little bit of cloth.

Besides, many foxes were killed in the same district, by wood-cutters and peasants, either in the woods or villages, many of which were affected with the mange.

The disease has committed such ravages in the principality of Eisenach, that ever since 1833, the whole number of fox-skins obtained, is only one-seventh of what it was before.

On the more recent state of the disease in the kingdom of Würtemberg, I find a very interesting account in the July number of Behlen's 'Allgemeine Forst und Jagelzeitung,' communicated by His Grace the Duke Henry of Würtemberg, dated 'Ulm, May, 1837.' Already last summer, mad foxes made their appearance here and there, and near Rothenburgh on the Neckar, a girl, bitten by one, died of *hydrophobia*, the symptoms of which shewed themselves nine or ten days after the wound had been inflicted. In the beginning of December, 1836, at a shooting party held near Ulm, several diseased foxes were killed with sticks. The foxes were scarce, upon the whole, for the season, and did not behave with their accustomed caution, as they would approach within a few yards of the hunters, even when in full view and with the wind unfavorable. Moreover, the fur, though good, was, in a few specimens, of a peculiar colour, and the hair somewhat bristly. They were found to be exceedingly lean, and the internal parts of a deep yellow colour. These symptoms of an epidemic among the foxes became more evident as the season advanced. Many were found dead, or killed with sticks; and two village dogs, bitten by foxes, went mad about ten days after. Similar events took place in other localities, and in one village forty-three dogs were destroyed as a measure of precaution, because a few had been bitten by mad foxes. A horse was assailed by a mad fox, and its nose lacerated in a frightful manner; but the fox escaped, as the people present were so frightened, that they took to their heels. The horse was apparently healed by a veterinarian It remained well, and was frequently ridden, for seven weeks, it then suddenly became depressed, and at length fell into perfect listlessness, and died in dreadful convulsions. On dissection, it was found that the lungs and liver were completely disorganised, a general effusion of deep yellow bile had taken place, and the viscera were, upon the whole, in a very advanced state of decomposition.

The government of Würtemberg caused several specimens of the diseased foxes to be dissected by medical men, and the result served, in a great measure, to confirm the opinion, that *hydrophobia* is a bilious complaint of high intensity: for the gall-bladder was found quite empty, and its contents had penetrated into every tissue. The liver, though of the usual size, was, like the other viscera, of a deep yellow colour.—The spleen, pancreas, and *plexus solaris*, were inflamed, and the *nervus sympathicus* presented every appearance of high inflammation. The clotted blood in the *aorta* and *vena cava* was yellowish black, and the *serum* yellow. In a few specimens, where death had taken place before the stage of *rabies* had been well developed, the inflammatory symptoms were less striking: but in every case the effusion of all the bile had taken place, and the stomach was either empty, or contained only foreign substances, such as earth, stones, leather, moss, and in one case even an iron nail.

ART. XII. *Observations on the Long-tailed Trogon.* By CHARLES LUCIEN BONAPARTE, Prince of Musignano.*

CONSIDERABLE interest being taken in the history of this species, I have thought proper to offer some details respecting it, which became known to myself before it had excited the attention of naturalists generally.

The Quezalt, celebrated among the Indians of Guatemala, one of the most magnificent productions of nature, and worthy of being called the bird of paradise of America, was long sought after to enrich our collections, but rarely met the eye of any experienced naturalist. Having heard the very animated description given of it by M. Gonzales, Minister of the United States of central America, at Washington, M. Rebello, who represented the Brazilian government in that city, while I was there, succeeded, through the exertions of the former gentleman, in obtaining from the Indians, two beautiful specimens, in the best possible state of preservation. To these two gentlemen I am indebted for the little I can say of the habits of this species; and I felt particularly grateful to the Brazilian diplomatist for the liberality with which he permitted me to describe and name this lovely species, which, in the year 1826, I was enabled to register in the catalogues of science, under the name of *Trogon paradiseus*, Paradise Curucui.

This bird, which is 13¼ inches in length from the point of the bill to the extremity of the tail, measures nevertheless more

* Communicated by the Author. Read before the Zoological Society.

than 31 from the bill to the tip of the longest of the upper tail coverts: the bill, which is 1½ inch in length to the gape, looks short, it is compressed, curved, entire, of a reddish yellow; the general plumage is of a most resplendent golden green, slightly tinged with blue; the feathers of the head are slender, and form a circular, erect, compressed crest, commencing at the base of the bill; the eyes are surrounded with a blackish hue, which colour pervades the whole of the feathers, with the exception of the brilliant tips. The very robust shafts of the rump feathers are white at the base; the throat and breast, which have the general golden green colour, verge a little more upon blue; the whole of the abdomen, flanks, and vent, are of a most brilliant and vivid red, which colour tinges the tip only of the feathers; those however which cover the thighs are blackish throughout; the wings, which have the third and fourth quills the longest, measure 8 inches, and when folded, reach to one third the length of the tail; the superior wing coverts are of the same colour as the back, and are more than two inches in length, acute, and curved; the inferior wing coverts are blackish, slightly variegated with green; the primaries are wholly black; the tail is 7 inches long, cuneiform, composed of twelve feathers, the three outermost of which on each side, are white, with a black shaft, the six middle feathers are entirely black.

The principal singularity of this bird consists in the upper tail coverts, which are similar in colour to the back; loose in their texture, as is the general plumage; and all of them have a tendency to prolongation, which is most conspicuous in the lowest, four of which extend beyond the tail; two of them measuring more than thrice the length of the body; the shortest pair of these lengthened plumes measures one foot, the other pair more than two. Not only the casual observer but even naturalists, would at first sight mistake these ornamental plumes for a portion of the tail. The feet are blackish, with the tarsi ¾ of an inch in length, and the toes are disposed in pairs, as in all the trogons.

The Quezalt is a rare and very shy bird; it is confined to restricted limits, being found solely in a peculiar section of the mountainous district of Vera Paz, in the province of the same name, now forming one of the five independent states which constitute the federal republic of central America. The Indians inhabiting that country celebrate every year the festival called 'Quezalt,' during which they adorn their heads with the skin and feathers of this bird, which they afterwards carefully preserve until the next anniversary, and are induced to part with them with the utmost difficulty.

A single instance is on record of this bird having been domesticated. It builds its nest in the shape of a lengthened barrel, or rather of a bag, both ends of which are left open, so that its long feathers may not be injured. These long feathers are admirably adapted, from their shape and texture, to act as a rudder or counterpoise, in the violent winds to which the country inhabited by the bird is subject.

The genus *Trogon*, of which this bird is a member, occupies, in my old arrangement, the first station of the ciliated section of the third family, *Amphibolæ*, which it connects with *Frugivoræ*; it has in fact a great affinity to the genus *Musophaga*, from which it differs chiefly by the artificial character on which it is based, and forms, in addition to the pigeons, a connecting link between the *Passeres* and *Gallinæ*. It must therefore be placed the first of the *Amphibolæ*.

After I had written the present article for one of the numerous scientific journals of America, our bird, or an allied species, dressed with the long plumes of the Quezalt, has been figured by M. Temminck, in his Pl. Col. who was not aware of its being the celebrated Quezalt of central America, which is certainly distinct from the *Trogon pavoninus* of Spix; since that bird as figured in the '*Species Novæ Avium Brasiliensium*,' in smaller, destitute of crest, and the whole of the tail feathers are black, it is also entirely devoid of the lengthened plumes. This confusion has been already cleared up by Mr. Gould, who possesses five or six species of this lovely group, to which Mr. Swainson has assigned the appropriate name of *Calurus*.

## REVIEWS.

ART. I. 1. *Die Kafer der Mark Brandenburg*; von Dr. W. F. Erichson. 1st band, 1st abtheilung. Berlin, 8vo. 384 pp. 1837.

2. *Insecta Lapponica descripta*; a I. W. Zetterstedt. Vol. 1, fasc. 1. Lipsiæ, 1838. Oblong 4to. 191 pp.

3. *The Coleopterist's Manual, containing the Lamellicorn Insects of Linnæus and Fabricius.* By the Rev. F. W Hope, F.R.S. L.S. Z.S. &c. &c. London: H. G. Bohn, 1837, 8vo. 121 pp. with 4 plates.

4. *Kurzen Abriss der Entomologie, mit besonderer rucksicht auf Deutschland Kafer.* Von Altman, Dr. M. Lipsiæ, 1837, sm. 8vo. 124 pp.

THE works enumerated in the preceding list, are a few of the many recent productions which have appeared upon the Linnæan order of Coleopterous Insects, or, as they are ordinarily termed, beetles or chaffers, (in German, kafer).—This tribe of insects at the present time, certainly reckons a far greater number of votaries than the gay and attractive tribes of butterflies, which, in the earlier days of entomological science, were so much more generally collected.—Whether we are to attribute this still extending partiality to the endless variety of form and structure presented to our contemplation by the countless species of Coleoptera, or to the facility with which, from the strong consistence of their external envelope, they are preserved, is immaterial; it is sufficient to know that throughout Europe, save only in Turkey, (for we never yet heard of a Turkish entomologist, although there are many in Hungary, whose lucubrations in the Maygar tongue are even more incomprehensible than the Russian), the taste for the collection of coleopterous insects is so extensive, that a coleopterist traveller is sure to find, in almost every provincial town, one or more persons engaged in the same pursuit, with whom an intimacy may almost at once be formed. The sketch of the travels of Victor de Motchoulsky, published in the last part of the 'Bulletin de la Société des naturalistes de Moscou,' for 1837, sufficiently proves this statement; the writer having visited almost every European country in his route.

We greatly fear, however, that like the professed conchologist, or lepidopterist, there are many of these gentry who are but amateurs, who make collections for amusement, (and a happy, healthful, amusement it is), without caring one iota for the anatomical, structural, economical, physiological, geographical, or practical views, to which an *investigation* into the objects of their pursuit, if rightly worked out, would necessarily lead them.

Moreover, the natural relations of these beings with each other, leading to a knowledge of their natural classification or system, is but rarely thought of, although, from the almost infinite numbers of anomalous forms which require dissection, it must be evident that we are in no fit state, at present, to lay down anything like a satisfactory arrangement of Coleoptera. It is true Léon Dufour has done the greatest service to the science, by his extensive series of internal anatomical observations; but his knife has operated only upon the insects of his own neighbourhood. The hundreds of strange forms from India, Brazil, and New Holland, require similar examination; whilst the knowledge of the preparatory states of these insects, which would tend so materially to clear up our views respecting their relations, although slowly extending, is yet but in its infancy.

Coleopterists, and indeed entomologists, (may we not say naturalists in general?) at the present day, occupy themselves too much with names. All that they seem to require, is the names of the species in their possession; and when these are discovered, the specimens are stored away, with the long sought for names attached, as though the ultimate object of science were gained. We have however already thrown out hints sufficient to shew that our opinion is otherwise. Names, it is undeniable, have their value, in a strictly scientific point of view, as the condensed representatives of species and their specific characters; and until the various species of any particular country are accurately defined, with their varieties, the entomologist of that country would be blameable, were he not to endeavour to clear up the points of difference between the species, so as to exhibit the fauna of his country, with reference not only to the national, natural, riches of his land, but also to the interesting enquiries of the geographical naturalist.

Hence the character of the majority of natural history works of the present day, and especially of entomological works published on the continent, is a necessary result of the little progress hitherto made towards a general *Species* or *Systema Naturæ*, or rather, we should say it is a convincing evidence of the mass of materials of which no description has hitherto been given to the public. Add to this the difficulties arising from the insufficient descriptions or the errors of previous describers, which call for correction, and it will be seen that there is yet much to be done before the actual species of insects, (or of any other tribe of animals), of our own or any continental country, can be considered as established.

The first two works on our list have for their object the ascertaining the species of beetles of two distant portions of Europe: the third is a revision of a portion of the coleopterous writings of Linnæus and Fabricius: and the last is a slight sketch of the distribution of the Coleoptera, founded upon the tarsal system of Latreille.

Dr. Erichson, (whose fame as a clear-sighted entomologist, was established by his first work, 'Genera Dyticeorum,' 1832) has in the volume at the head of this article, given descriptions of the Coleopterous insects belonging to the Cicindelidæ, Carabidæ, Gyrinidæ, Dyticidæ, Hydrophilidæ, Silphidæ, Pselaphidæ, and Aleocharideous Staphylinidæ, inhabiting the 'Mark Brandenburg;' and as the majority of the species are also inhabitants of this country, and his descriptions precise, his work will be an acceptable companion to that of Mr. Stephens. Although from the occurrence of *Omophron limbatum*, *Procrustes coriaceus*, four species of *Calosoma*, &c.

Austria, addressed to Messrs. Kollar and Von Kreigelstein, and the Canon Schmidberger; the last of whom has communicated a very considerable portion of the work, particularly that of the insects injurious to fruit-trees.

The work is divided into sections, according to the nature of the substances &c. attacked or injured, including man, cattle, grain, both in the growing and housed state, vegetables, fruit-trees, forest trees, household materials, &c. A considerable portion of the work consists of original observations on the natural history of the different insects, so that the entire work may be regarded as one of the most interesting additions which have been made to our insect biography.

ART. III. *The Annals of Natural History; or Magazine of Zoology, Botany, and Geology. (Being a Continuation of the 'Magazine of Zoology and Botany,' and Sir W. J. Hooker's 'Botanical Companion.')* Conducted by Sir W. Jardine, Bart.; P. J. Selby, Esq; Dr. Johnson; Sir W. J. Hooker, Regius Professor of Botany; and Richard Taylor, F.L.S.

THE Magazine of Zoology and Botany has received an addition to the number of its editors; the names of Sir William J. Hooker and Mr. Richard Taylor appearing in conjunction with those of its former contributors. In future it is to be published monthly, under the title of 'Annals of Natural History.' The alteration in the time of its publication we think a judicious one; the change in the title appears to us uncalled for and inexpedient.

The following notice appeared on the wrapper of the concluding number of the last volume, (February, 1838).

"WHEN this Magazine was commenced, it was published at the risk of the Conductors, and the Publisher in Edinburgh,—not as a money speculation, but as an experiment to try how far a periodical, endeavoured to be conducted on scientific principles, would succeed; and although from the results they cannot speak very highly of the encouragement which *Naturalists* have bestowed upon it, or of their anxiety to encourage scientific papers and facts unadorned and truthful, they have still had the satisfaction of being able, with the assistance of their Contributors, to carry their periodical through a second year, in a manner which they believe has been acknowledged to stand high in the estimation of those who were inclined to dip below the surface of the subjects which others pretended to study and admire; and they have the further satisfaction of now saying to their Subscribers, that this experimental commencement has been the means of enabling them to continue the work without risk to themselves, and with every prospect of a more ample and efficient scientific support."

The Contributors to the first Number of the present series, are, Dr. Drummond, Dr. Johnston, Dr. Grisebach, Mr. J. E. Gray, and Mr William Thompson.

ART. IV. *A Geographical and comparative list of the Birds of Europe and North America.* By Charles Lucien Bonaparte, Prince of Musignano. Van Voorst, London, 1838.

WE are much gratified at the appearing of this volume, small as it is, from the pen of the Prince of Musignano, not merely because it must prove of value to naturalists, who cultivate Ornithology, in a really philosophical spirit, but because we hope it may be the forerunner of a more extensive work, which its distinguished Author may be induced to place in the hands of the same able and successful publisher.

Being simply a list of all the known species inhabiting the two great Continents of Europe and America, the work does not present us with much matter for comment. It bears however ample evidence of having been drawn up with considerable care. The following is the result given by the author of a comparison of the number of species occurring in the two continents, and of such as are common to both.

| | EUROPE | | AMERICA | | |
|---|---|---|---|---|---|
| Families | 36 | —— | 34 | 32 | of which are |
| Genera | 246 | —— | 218 | 137 | common to both |
| Species | 503 | —— | 471 | 100 | Continents. |

## SHORT COMMUNICATIONS.

*Notice of a curious fact in the habits of the Viper.**—In the study of natural history, as in all other parts of science, we must be careful not to be deceived by first appearances, especially if they involve any deviation from normal structure, or we shall be likely to publish as novelties, things which do not in themselves afford any real change of formation.

A specimen of an extraordinary description was found in the neighbourhood of Lausanne, having the following character. The general appearance was that of a viper. It was about ten inches long; but at about one third of the length from the tail, there was, on the left side, a decided leg, analogous to those of saurians; and on the corresponding part of the opposite side, there was a projection, as if there were a leg, imperfectly developed, under the skin. There were also projections of a similar kind on the fore part, about one third from the head, but no mark externally. In progression, the viper did not appear to use the leg. It was languid and weak, but lived three days after it was caught, when it was killed by being thrown into spirits of wine.

* By J. C. Cox, Esq. Corresponding Member of the Zoological Society.

The real history of the phenomenon is as follows.—The viper, (the common *Coluber verus*), had seized a common lizard, (*Lacerta agilis*) of full size, and swallowed it. The viper was a young one, and the lizard nearly as long as itself. It also appears to have been very strong, and to have retained its vitality long after it descended into the stomach of its devourer. The consequence was, that it scraped with its little nails, until it made a hole through the side of the viper, and the fore leg was completely protruded. The colour and appearance of the integuments of the leg, very much resembled the colour and texture of the skin of the viper; while the aperture made by the leg so nearly fitted it, that the orifice was not perceptible, except on minute examination. There can be no doubt that lizards retain their vitality for a very long period, and under circumstances very disadvantageous to life; and the one in question must have continued to live a very considerable time after it was swallowed by the viper. I have sent a sketch of the animal; and the original is in the Musée Cantonal, at Lausanne.—*J. C. Cox.—Naples, Nov.* 1837.

*Cepola rubescens.*—There has been quite a shoal of the 'red ribbon fish' thrown on our beach. I have preserved nine, and I have been told that at least thirty were found, but I believe all have been destroyed, except my specimens.—*J. B. Harvey.*

## LITERARY INTELLIGENCE

*Works preparing for publication during the Spring.—Longman & Co.*

The Rev. L. Vernon Harcourt (son of the Archbishop of York), has in the press a work on the "Doctrine of the Deluge." His object is to vindicate the Scriptural History of the Deluge from the doubts which have been recently thrown upon it by geological speculations. This the author has endeavoured to accomplish by showing, upon the testimony of a long list of ancient and modern authors, that since the era of that catastrophe a set of religionists never ceased to exist, whose opinions and usages were founded upon a veneration of the Ark as the preserver of their race. In 2 vols. 8vo.

Mr. Westwood's "Popular Introduction to the Modern Classification of Insects," which has been so long announced for publication, is at length in the press, and will be published in Monthly Parts; the first will appear on the 1st of June. The author has for eight years been employed upon it, collecting materials from the Continental as well as British Museums. It will be illustrated with many thousand figures engraved on wood. The author has paid very minute attention to the Natural History of the Transformations of Insects, and confidently hopes that there will be found much new and interesting matter in his work. It is intended to form a sequel to the popular work of Messrs. Kirby and Spence. 1 vol. 8vo.

Essays in Natural History. By Charles Waterton, Esq. With a View of Walton Hall, and an Autobiography of the Author. 1 vol. fcap. 8vo.

# THE MAGAZINE

OF

# NATURAL HISTORY

## MAY, 1838.

Art. I. *On the Influence of Man in modifying the Zoological Features of the Globe; with Statistical Accounts respecting a few of the more important Species.* By W. Weissenborn, D. Ph.

*(Continued from Page 128).*

*The Zubr*,* (Pr. *Zhubr*), *Bos urus.*

This interesting animal, of which the former geographical range is rather uncertain, but which, no doubt, anciently inhabited the whole tract between the Baltic and Haemus, whilst the Black Sea and the steppes of Russia confined it on the east, and the cold hindered it from penetrating farther in a north-easterly direction, its original western limit being as yet not sufficiently established, is now restricted to a single habitat, the wild and swampy forest of Bialowicza, in Lithuania, where the legends of the natives place the paradise of the animals, to which, they say, all sick or decrepit individuals repair, that they may die in peace.† Thither the species

* I give the preference to this name of the animal, because it is so called in the country where it now exists, and because many of its other synonyms are subject to controversy.

† It is a curious fact, that so few carcasses of animals which have died a natural death, are found in the woods, &c.; and a Polish gentleman, with whom I lately conversed, respecting the origin of the above legend, ascribed it to what he considered a general fact, viz. that such carcasses are *never* met with, wherefore the natives of Lithuania suppose that the sick animals retire to those spots in the forest, which, to this day are quite inaccessible to man. If, however, we consider, that animal substances, exposed to the atmosphere, are speedily decomposed, and that numbers of animals of prey, birds, insects, &c. feed upon them, the scarcity of such carcasses is sufficiently explained. From my own experience I can moreover state, that I have found, in my numerous excursions, the bodies of stags, foxes, &c. the bad

now under consideration has been driven, as to its last asylum, by incessant persecution, and the thinning of the woods which it formerly haunted; and there its existence is prolonged only by preservative game laws, and the more direct care of man, who partially supplies it with food during the cold season. But even the forest of Bialowicza must, in the course of time, change its wild aspect, when, through the progress of civilization, and the increase in the numbers of the inhabitants of Lithuania, that wilderness shall have been subjected to a regular rotation of forest culture. The most severe game enactments could not prevent the last zubr in the forest of Tilsit, where that species formerly existed under much the same conditions as it does now in the forest of Bialowicza, from being killed by a poacher, as early as 1775; (see Dr. Hagen, 'Geshicte des preussischen Auers, in Beiträge zur Kunde Preussens, Königsberg, 1819, ii. 3, p. 225 *et seq.*): and the rigour of the Russian law has already relented so far, in consideration of the relative value of man and the lower animals, that he who kills a zubr without the permission of government, no longer forfeits his life, but pays 2000 rubles; or if unable to meet the penalty, he is transported to Siberia.—We may therefore anticipate that however desirous individuals may be to perpetuate the existence of the species, which, however, has already degenerated, inasmuch as it does not grow to the same bulk in its present circumscribed abode, at no very distant period it will be found only in a few museums, or be known from books or drawings.

This consideration makes it the more desirable that the history and description of the zubr should be settled in our time, with as much precision as possible. As to its osteological features, this task may be considered as having been almost fully accomplished by Bojanus, in his learned monograph, ('De Uro nostrate, ejusque Scelcto'; Vilnæ, 1825), inserted in the second part of the thirteenth volume of the 'Nova Acta Physico-Medica Acad. Cæs. Leop. Car. Nat. Cur.'; Bonnæ, 1827. The same, however, cannot be said as to the other points of its natural history.

In turning our minds seriously to this subject, we can scarcely refrain from reviewing the early history of an animal

condition of which, as well as the absence of all external injury, proved that they had died of some disease; and I remember two cases, where, in a district over-stocked with roe deer, nearly the whole of them were destroyed by *larvæ* of the *Œstrus*, bred in their nostrils; at which time carcasses were found in the woods and their outskirts.

which, until lately, has been unjustly considered as the original stock of our tame horned cattle, (*Bos taurus*). Linnæus, in accordance with that view, called it *Bos ferus*; Buffon, quite confident in the same opinion, *Bos urus*; which name has been received by most subsequent writers. The specific difference of the zubr and *Bos taurus* is now, however, sufficiently established by comparative anatomy. But a very important point is still left uncertain, namely, whether the zubr be the only native bovine animal of middle Europe, in which case it would be the legitimate owner of the synonymes, *Bison*, *Urus*, *Auerochs*, *Thur*, &c.; or whether two such aboriginal species were, within the historical times, found in that tract of country. Cuvier, in his 'Recherches sur les Ossemens Fossiles,' tome iv. p. 107, &c. had raised the opinion, that the *Bison* and *Urus* of the ancients were distinct species, to a high degree of probability; but Bojanus, in reviewing the evidence on which Cuvier had endeavoured to establish his conclusion, arrived at the contrary view, thus leaving the field open to fresh enquiry; and though I have not the presumption to think that I shall decide the point effectually, yet by attempting a new revision of the evidence already before the public, as well as of that which has escaped both Cuvier and Bojanus, I may hope that even the errors into which I may fall, may give a new impulse to others towards completing what I consider to be a most interesting and desirable task.

In reviewing the indigested mass of heterogeneous information on animals belonging to the bovine genus, as deposited in the ancient works of Greek and Latin writers, we find ourselves compelled to admit, that they are much more agreed about the characters of the *Sphinx*, *Chimæra*, sirens, *Lamiæ*, *Cerberus*, &c. than upon those of the real creatures here under consideration. The various materials there found, may, however, be arranged under three different heads. First; statements which evidently rest upon one animal having been mistaken for another: secondly; such as depend on the ancients referring the facts they observed, to false and often ridiculous causes, whereby they ascribed to the animals a great many intentions which did not exist, as well as habits or forms which led to the reception of fabulous species: thirdly; the facts which they had really observed with sufficient precision. By separating the materials of the two first classes, as well as the palpable exaggerations, from those of the third, we may hope to arrive at the truth, in cases where the distinction of the materials is possible, and the description of the animals not too defective.

To the first class belong, for example, the reports of wild carnivorous bulls, which Agatharchides, Diodorus Siculus, and Strabo mention as being found in the country to the south-west of the Red Sea. Here lions have no doubt been mistaken for zubrs. The general shape of the two animals is, indeed, much alike, and, in many points, the resemblance is striking, as in the mane, the comparative slenderness of the hind train, and in the tail, though this organ is much shorter in the zubr. This conjecture is rendered the more probable by the circumstance, that a mouth opening to the ears, and moveable horns, are ascribed to these wild oxen. Should any one doubt that the ancients were subject to such gross mistakes, I would recall to his memory the fact, that the Romans took the first elephants they saw for oxen, thinking, no doubt, that the tusks were horns; whence the Roman name of '*bos luca*'* for the elephant.

In passing over other palpable instances of one species having been mistaken for another, I shall now mention a few cases where circumstances, which have been observed by the ancients in bovine animals, have been referred to wrong causes, from which have been drawn conclusions, that have altogether perverted the descriptions of the animals under consideration, and misled others to multiply the species. The aggregate of fables, with here and there an interesting fact, which Ælian has compiled under the name of '*Περι ζωων ἰδιοτητος*,' might supply us with a few examples of this sort; but as it contains scarcely more than one or two useful hints in the many passages where bovine animals are mentioned, I feel some reluctance to quote from him, (lib. xiv. c. 11) the place where he speaks of the wild oxen of Lybia, that walk backwards, because their horns are so grown, that they cannot see before them. Everybody knows that all oxen, what-

* Pliny gives the following etymological explanation of that term.—"Elephantes Italia primùm vidit Pyrrhi regis bello, et boves lucas appellavit, in Lucanis visos."—Hist. Nat. viii. 6. Varro, 'De Ling. Rom.' vi. 3. enquires into the origin of the term '*luca*,' and gives several other conjectures, though that of Pliny appears to deserve the preference before all others. As to the term '*bos*,' as applied to the elephants, he gives the reason,—"ab eo, quòd nostri, cùm maximam quadrupedem, quam ipsi haberent, vocarent bovem, et in Lucanis Pyrrhi bello primùm vidissent apud hosteis elephantos, lucam bovem appellasse;" and he never thinks of the tusks, which the Romans, frightened as they were, might easily mistake for horns.

"Ut Lucas boves
"Olim resumpto præferoces prælio,
"Fugit juventus Romula." Seneca: Hippol. 351.

Even Conrad Gesner, the author of the 'Icones Animalium,' was not quite sure whether the elephant had horns or not. "Elephanti cornua dentes videntur." See ed. of Heidelberg, 1606, p. 29.

ever may be the direction of their horns, will occasionally walk backwards when browsing; but few persons would be found now-a-days silly enough to draw such an inference from that fact. But, as interesting us more nearly, I ought to refer to the preposterous story with which Aristotle has spoiled his description of the bonasos, (zubr), which, in other respects, is tolerably correct. "The horns," he says,* "are so turned towards each other, that the animal cannot thrust with them. When put to flight, it does not stop, until it can run no farther. It defends itself by kicking and voiding its excrements, which it throws to the distance of four fathoms, (ὀργυιας). This is a convenient defence, and it resorts to it often. These excrements burn so much, that the dogs which are hit by them lose their hair; but they have that quality only when the animal is frightened."† This passage may, in my opinion, be easily reduced to its real merits. The individual who had observed the irrelevant circumstance upon which the whole preposterous report rests, did not know that all quadrupeds and birds are apt to void their excrements, when put to flight, in consequence of the direct impression of fear upon their nervous system, which has the effect, and perhaps is the chief end, of making the animal lighter in its flight. It is constantly observed in heavy birds, when taking wing, and in other animals, especially the wolf, when flying before the dogs. The stag and roe, as well as the horse, ass, ox, &c. do the same; and the latter kick, when taking to their heels. This phenomenon has been exaggerated, by an occasional observer, into the most potent means of defence of the bonasos, and has prompted him to draw inferences as to the shape of the horns &c. We shall find man, if unassisted by science, still the same. I was only lately informed by a peasant, with whom I conversed on the bustard, that this bird was most "malicious," as he had sprung one from its nest, which contaminated its eggs on taking wing, and never returned to the nest; which the bustard never does in such cases.

In turning now to the third class of materials bearing upon our question, namely, the facts which we may suppose to have been ascertained on sufficiently good authority, we have certainly to regret the great want of system with reference to the

* Περι ζωων ιστοριας, ix. 45.

† Pliny, who appears to have known little more than this misconceived part of Aristotle's description of the *Bonasus*, or at least never thought of referring the correct part of it, which we shall see farther below, to his *Bison*, speaks of the *Bonasus* as of a different, though doubtful species; he only changes four fathoms into "*tria jugera*." He therefore allows the animal the dangerous range of more than 700 feet.

manner in which the ancients described objects of natural history. Though their senses were sound, their observations stood insulated, and though they sometimes made use of comparisons with objects more currently known, these comparisons were not founded on the unerring basis of systematic knowledge. Hence the vagueness of their information, even when true, and, as a necessary consequence, the comparative uncertainty of their nomenclature. If the former already leaves us doubtful as to the objects to which their descriptions refer, the latter may increase the difficulties to such a degree, that we must draw upon other and more general sources of information, to form an opinion which will allow us to acquiesce in its *probability*. This, I am afraid, is the extreme limit at which I shall be able to arrive in the present enquiry.

In adverting to the direct written evidence upon which the question, whether there were formerly two wild bovine animals inhabiting middle Europe, must be discussed, we have first to hear Aristotle, who knew two species of wild oxen; the one living in Arachosia, or that part of Persia which was nearest to India, and being evidently the buffalo,* does not concern us in our present enquiry; the other he calls *Bonasos*, or *Monassos*, and describes it in the following terms, after having stated that it is found in Pæonia, (the modern Bulgaria). "The general form is much like that of a bull, but it has a mane like the horse, which extends to the shoulders. The hair of the mane is however softer than in the horse; it is thick, and falls over the eyes. Its colour is between grey and russet, and it is wool-like from below, (*κατωθεν*, which can very well be construed as referring to the downy hair growing under the shaggy one). The colour of the horns is shining black. The tail, which, in other respects, is like that of an ox, is shorter in proportion to the body. Its skin cannot be easily cut through. Its flesh is excellent, and the animal is hunted for it."† If we compare this description with that of the zubr given below, we cannot in the least doubt that it is meant for that animal. Aristotle's information is, moreover, verified and rendered more complete by Pausanias, who speaks as an eye-witness of the wild oxen of Pæonia, which he calls *Bison*. "I saw Pæonian oxen, which are particularly shaggy about the chest and the lower jaw;"‡ and he describes the mode of catching them alive, in trap-holes, where they are partially tamed by hunger:§ as well as by Oppian,‖ who

* See Cuvier, 'Recherches sur les Ossemens Fossiles,' t. iv. p. 112.
† *Περι ζωων ιστοριας*, lib. ix. c. 45. ‡ Pausanias, lib. ix. c. 21. § Lib. x. c. 13.
‖ Cyneget. ii. v. 160, seq.

derives the name of *Bison* from their native country, Bistonian Thrace, and corrects the fabulous report of Aristotle, of the horns not being fit for fighting, by stating that "the sharp tips of the horns are like curved hooks of metal, and do not, as in other oxen, (at least in some of the breeds), lean obliquely towards one another, but point straight upwards.—Therefore when in running they strike either a man or a beast, they toss it into the air." This perpendicular direction, not exactly of the tips but of the middle part of the horns, is very characteristic of the zubr.* Therefore two of the legitimate names of the zubr are *Bonasus* and *Bison*, and one of its native haunts is the tract of country north of Greece, which was its southern limit. More to the north it is easy to trace it to the modern times, through Moldavia, (where it was called zimbr, about the time of Demetrius Cantemir),† Poland and Prussia, to its present place of refuge.

So far everything is pretty clear; but if we try to trace the zubr to its western limit, we shall find that in the woods of Germany and France, the *Bison* either was taken for a different animal of the same genus, or that it co-existed with one commonly called *Urus*. This word, which is first mentioned in Cæsar, (B. G. vi., 28), who never saw the animal, (he does not say that he did, at least), which was so called by the inhabitants of Gallia, and which is first mentioned in the Greek language by writers of a comparatively late period, (οὖρος), is said by Macrobius to be of Gallic origin.‡ However this may be, it is probable that Cæsar drew his description of the animal which he calls *Urus*, not from his own observation, and that he knew it from the report of some Gallian. His description runs thus. "These *Uri* are little less than elephants; their look, colour and form, are like those of a bull; they are extremely strong and swift, and spare neither man nor beast that they get sight of. They are untameable, even when caught young. The width, form, and appearance of the horns is very different from that of our oxen." Our reason for supposing that Cæsar never saw the *Urus* is, that he describes it along with other animals of the Hercynian forest, of which he could not have made such a fabulous report, if he had observ-

* Oppian further says, that these oxen have the same beautiful shape as the fierce lion, the king of beasts. He also, in describing the roughness of the tongue, (which is likewise very striking in the zubr), mentions that they lick the skin bloody with it. Herodotus, (vii. 126), reports, that Pæonia contains wild oxen, (βοες ἄγριοι), and lions. Associations like these make it very probable, I think, that Greek travellers have mistaken in Africa lions for bisons, and in the countries to the north of Greece, bisons for lions.

† See Buffon, ed. by Cuvier, tome xvii. p. 85.

‡ Saturn, iv. 4. "Urus gallica vox est, quâ feri boves significantur."—

ed them himself, when at the limit of that forest. All however that he says of the *Urus*, with the exception of the exaggerated bulk, is correct, if we refer it to the *Bison*, though we may feel somewhat surprised at the mane not being mentioned, which, however, is not a very glaring omission in so general a description.

We now arrive at the testimony of an author, who is the first that mentions both the *Bison* and the *Urus*, viz. Pliny.* "There are," he says, "two remarkable species of wild oxen, the maned *Bison* and the *Urus*, whose strength and swiftness are extraordinary, and which common people in their ignorance call *Bubali*." This is all he has to say about animals which he thinks so remarkable; but the less this natural philosopher knew of these creatures, the more convinced must we feel that he never had an opportunity of seeing either, and that one of the names came to him from Greece, and the other from Gallia. I think therefore that the testimony of Pliny has but little weight in establishing the specific difference of the *Bison* and *Urus*.†

That, however, the animal called *Urus* was well known to the Romans about the time of the elder Pliny, as far at least as it could be known from its hide, is proved by a passage in the 'Annals' of Tacitus, (lib. iv. c. 72); from which we learn that in the sixteenth year of the reign of Tiberius, (A. D. 28), the Frisians rebelled, because Olennius insisted that the hides of oxen, which they furnished to the Romans for military purposes, as a tribute, must all be the size of "*terga urorum*," or the hides of *Uri*. That in this instance the skin of the wild animal is to be understood, appears from the whole tenour of the passage.‡ We can, however, scarcely suppose,

As for the Greek *οὒρος*, it occurs in an epigram of the Emperor Hadrian, on a votive offering of the Emperor Trajan. 'Annals,' ii. p. 285. "*Και βοος οὒρου,—ἀσκητον χρυσῳ παμφανοωντι κερας.*" I found a statement that the word was already mentioned by Empedocles, 'Fragmenta de Sphaera,' but I have sought for it in vain.

* 'Hist. Nat. lib. viii. c. 15.

† In the 16th chapter Pliny gives the description of the *Bonasus*, in which he describes that animal as having the mane of the horse, and the shape of a bull, and then goes on repeating the fabulous manner of defence, which Aristotle had ascribed to the *Bonasus*, and which, no doubt, prevailed upon Pliny to mention the *Bison* under two different names.

‡ "Tributum iis Drusus jusserat modicum, pro angustiâ rerum, ut in usus militares *coria boum* penderent: non intenta cujusquam cura, quæ firmitudo, quæ mensura; donec Olennius, è primilaribus, regendis Frisiis impositus, *terga urorum* delegit, quorum ad formam accipirentur. Id aliis quoque nationibus arduum, apud Germanos difficilius tolerabatur, quis ingentium belluarum feraces saltus, *modica domi arminta* sunt," &c.

that these skins were ever sent to Rome in Pliny's time, for in that case he would have given a more detailed description of the *Urus;* and thus the knowledge which the Roman soldiers in Germany had of the animal, did not turn out profitable to the science.

We have now to consider those writers, of whom Cuvier says, that they can testify to the specific difference of the *Bison* and *Urus*, as eye-witnesses, because they had seen them in the circus. There is a passage in one of the tragedies commonly ascribed to Seneca,* the vagueness of which is fully proved by the circumstance that the *Bison* had also very large horns; wherefore we may as well suppose that the *Urus* may have had a shaggy skin, although the poet does not mention the latter character in the one animal, nor the former in the other. But the passage on which Cuvier chiefly relies, is one from Martial,† where the *Bubalus* and *Bison* are brought together, as having appeared in the arena. Yet though we have the testimony of Pliny, that the "*imperitum vulgus*" called the *Urus*, '*Bubalus*,' we also have the same authority‡ for knowing that the real *Bubalas* lived in Africa; and I think it much more probable that Martial, who was not numbered with the "*imperitum vulgus*," had in view the animal brought from Africa under the name of *Bubalus*. The same author speaks of bisons having drawn cars;§ and we have the testimony of Pausanias,|| that those of Pæonia were caught alive, and sometimes tamed by hunger; whereas the nations inhabiting the Hercynian forest, never tried or contrived to tame the *Uri*, which they had caught in pits.¶ Thus it is easily explained, why there were seen in the Roman circus animals called bisons, and none called *Uri*.

If we refer to Solinus, an author who is supposed to have lived in the third century, we find he states that the same tract which Cæsar informs us was the true breeding-ground of the *Uri*, swarmed with bisons.** We may therefore suppose that about that time, the nations of Dacia and the south of Germany, had already become accustomed to the Greek

* "Tibi dant variæ pectora tigres,
"Tibi villosi terga bisontes
"Latisque feri cornibus uri." Hippol. Act i. v. 63.

† "Illi cessit atrox bubalus atque bison." De Spect. Ep. xxiii.

‡ Plin. H. N. lib. viii. c. 15.

§ "Turpes esseda quod trahunt bisontes."—Mart. i. cv.

|| Pausanias, lib. ix. c. 13.

¶ Cæsar, B. G. lib. vi. c. 28.

** C. Jul. Solinus, c. 23, de Germania, in speaking of the Hercynian forest, says: "In hoc tractu, et in omni septentrionali plaga, bisontes frequentissimi, qui bubus feris similes, setosi colla, jubas horridi, ultra tauros pernicitate, capti assuescere manu nesciunt."

name of the animal, which, through the great migration of nations from the east to the west, about A. D. 400, spread as far westward as the animal itself. This doubt about the name of the animal, in a country where it was formerly called *Urus*, (for I now venture to speak of the *Bison* and *Urus* as identical), is most clearly shewn in the work of a monk of St. Gallen,* who describes a hunting party of Carolus Magnus, which was held in honour of the Persian ambassadors, not far from Aachen, (Aix la Chapelle), probably in the Ardennes, in order to kill *Uri* or bisons. Now although the author makes use of the particle *vel*, (*Bisontes* vel *Uri*), which may be construed in favor of either view, yet I trust no one will suppose that the Ardennes were inhabited by both the Pæonian *Bison* and the Gallic *Urus*. Besides, as only one individual was killed, the monk would no doubt have stated to which of the two species it belonged, had he thought of more than one.

From about that time, the names of *Wisen*, *Wisant*, *Visent*,† as derived from *Bison*; and *Ur*, *Our*, *Auer*, *Urochs*, *Auerochs*, &c. as derived from *Urus*, appear to have been indifferently applied, in Germany, to the wild indigenous ox of middle Europe, until the latter set of names superseded the former; and in proportion as the animal was driven farther east, they followed it through eastern Germany and Prussia, to its present abode, as the Sclavonian name of zimbr or zubr has done from a different quarter.‡ There are other Latin

*Monachus Sangallensis, 'De Gestis Car. Mag.' lib. ii. c. 11. His work is printed in Basnage Thes. Mon. Eccl. Mag.; Bouquet Script. Rer. Gal.; Duchesne Script. Hist. Franc.; Hahnii Monum. &c. It is dedicated to Carolus Crassus, and consequently written within memory of many of the hunting party which the monk of St. Gallen describes in such a detailed and matter-of-fact way, that there is no doubt he obtained the particulars from an eye-witness. We shall have occasion to return to this subject when speaking of the horns of the *Bison* and *Urus*.

† Cuvier thinks that the name of *Wisen* &c. is derived from the German *Bisam*, (musk), and that *Bison* is of German origin; ('Ossem. Foss. t. iv. p. 114). I should rather think that *Bisam* was derived from the name of the animal, in which the smell of musk forms so striking a feature.—However this may be, the word *Bison* may have originated among the barbarous nations, as Oppian knew no better derivation than from the Bistonian Thracians. Cyneg. ii. 155.

‡ I have been somewhat puzzled by a verse which occurs in our ancient epic, the 'Nibelungenlied,' the origin of which may be traced to the 9th century. The verse in question relates to the achievements of Siegfried or Sifrit, the hero of the poem, who, in a hunting party held in Burgundy, is said to have killed one wisent and four ours.

"Darnach sluͦch er schiere einen Wisent und einen Elch,
"Starcher Uͦre viere und einen grimmen Schelch."

But if we consider how many other tautologies occur in that fantastic po-authors of the early period of the middle ages, who call the wild ox of the Ardennes and the Vosgian mountains, "*Bubalus*," as Fortunatus,* whom Cuvier quotes in support of his opinion; but is there any proof or probability, that Martial has used the expression *Bubalus* in the same sense as the author of such barbarous Latin verses as those of Fortunatus? The author of the 'Martyrdom of St. Geneviève' testifies, however, that the animal called '*Bubalus*' by the writers of that period, is the one which was called '*Urus*,' (*Auer*), in Germany.

In support of the opinion that the *Urus* was a distinct animal, and the original stock of our horned cattle, Cuvier likewise states, that the latter is still called *Ur* in several parts of Switzerland. To this we might object, that within very modern times, the zubr was believed to be the species from which our tame cattle had sprung; and if the zubr was also called *Auer* or *Ur* by the nations of the Teutonic race, the above appellation of the tame ox in Switzerland is easily explained on a different principle. As little have we to think of the real *Urus*, at the expression of '*Uri*,' or '*Uri sylvestres*,' which we find in Virgil,† and which ought to be referred to common bulls, enjoying comparative liberty of pasture, or grown half wild; or if even these be not deemed wild enough, to really wild bovine animals of any species you like, as any would suit the object of the poet.

In my enquiry respecting the *characters* given by the Greek and Roman writers, of the *Bison* and *Urus*, I have also obtained quite a different result from that at which Cuvier has arrived.‡ It is a fact, that in the very few passages where ancient authors mention the real *Urus*, which we may

em, and that Sifrit slew also a *lion* on the same occasion, we may suppose that the author cared less for realities, than for words conveying proper associations, and that he was glad to find two names for the same fierce animal.

* "Ardenna, an Vosagus, cervi, capræ, helices ursi
"Cæde sagittifera silva fragore tonat,
"Seu validi bubali ferit inter cornua campum."
Lib. vi. poem 4.

† "Tempore non alio dicunt regionibus illis
"Quæsitas ad sacra boves Junonis, et *uris*
"Imparibus ductos alta ad donaria currus."
Virg. Georg. iii. 531.

"Cui, super indignas hyemes, solemque potentem,
"*Sylvestres uri* assidue capræque sequaces
"Illudunt." Id. ii. 373.

‡ 'Recherches sur les Ossem. Foss.' t. iv. p. 112. "En comparent avec soin les passages où il en est question, on voit que le bison se distinguoit par sa crinière laineuse, et l'urus par la grandeur de ses cornes."

take for granted none of them had seen, the mane, or shaggy neck of the animal is not mentioned; but as for the horns, we have as good, and perhaps better evidence that those of the *Bison* were of enormous size, as that those of the *Urus* were of large growth. Herodotus says of the Βοες άγριοι of Pæonia, "ών τα κερεα υπερμεγαθεα." Samios or Simmios, in the epigram on the skin of a wild ox, (probably a *Bison*), dedicated to Hercules by king Philip, the son of Demetrius, (see 'Brunckii Anthol.' i. p. 485), first calls the horns "όργυιαια," and then more precisely, "τεσσαρα και δεκαδωρα," (of the size of fourteen palms); and if therefore Cæsar and Solinus ascribe to the *Urus* large horns, this can only argue for the opinion that the *Bison* and *Urus* were the same animal. The monk of St. Gallen likewise says of the animal wounded by Carolus Magnus and killed by Isambardus, which he calls *Bison vel Urus*, that its horns were of an enormous size, (*immanissimis cornibus in testimonium prolatis*), and this various evidence is quite in harmony with what we may suppose the horns of the zubr to have been at an earlier period. For that animal, which has now dwindled down to the weight of 700 pounds for the largest specimens, and which formerly must have been when full grown, at least 2000 pounds, still has horns that measure, from tip to tip, round their curves and over the forehead, four French feet.* We may therefore take for granted that, at a time when the old zubrs grew to the weight of 2000 pounds and more, their horns encompassed from seven to eight feet, and must have excited the greatest wonder in the beholders. As late as the beginning of the 17th century, specimens were killed in Poland weighing 1800 pounds; and the statement of Herberstein, that about the beginning of the 16th century one was found, between whose horns three stout men could sit, is therefore not so incredible as Bojanus thinks it. Moreover, I cannot see why the origin of our tame cattle should be traced to a wild species, distinguished for the immense size of its horns. In no breed of oxen that I am acquainted with, has the bull very large horns. The uncommon size to which they often grow, is a consequence of castration, a circumstance already indicated by Democritus, as testified by Ælian, ('Περι ζωων ιδιοτητος,' lib. xii. c. 19). In Hungary it is stated† there are oxen whose horns measure six feet from tip to tip, but this I suppose to be only the effect of castration.

* Bojanus, 'De Uro nostrate,' Nova Acta Acad. Cæs. Leop. Carol. vol. xiii. pp. 451 and 452. "Spatium inter cornuum radicem, ubi angustissimum, 1 pes. Cornuum longitudo, juxta convexum eorum marginem, 1½ p

† Gemeinnützige Naturgeschichte, von Dr. H. C. Lenz, Gotha, 1835, p. 406.

In the authors of that period of the middle ages which follows the reigns of the early Frankonian kings, down to the time of the reformation, we look in vain for information which would enlighten us more on the point in question. The princes and knights had, as to the wild oxen, no higher aim than that of hunting and eating them; the minstrels cared very little for the scientific part of Natural History; and the monks faithfully copied what had been written a thousand years ago. It is scarcely credible, but nevertheless true, that the monk Aimonius, (Aimoine), who wrote his four books of French History,* about a thousand years after Cæsar, has copied verbatim what the latter says of the *Urus*, though he might have obtained much better information, had he taken the trouble to consult living authorities. But towards the middle of the 17th century, appeared an author of note, Herberstein,† who gives a decided opinion on the subject, which has influenced all subsequent writers down to the latest period. Herberstein gives descriptions and figures of two bovine animals, which he says were found in Poland at the time he visited that country. The one he calls *Bison*, Lat.; *Zubr*, Pol.; and *Bisont*, Germ.; adding, that ignorant people name it *Urus:* the other, *Urus*, Lat.; *Tur*, Pol.; and *Aurox*, Germ.; adding, that ignorant people call it *Bisons*. The description and figure of the former agree very well with the animal now found in the forest of Bialowicza; those of the latter, which Herberstein states to live only in a few preserves or parks of Muscovia, are, in every essential respect, like those of the domestic horned cattle. As Herberstein staid a considerable time at the court of king Sigismundus Augustus, we might, at first sight, believe that he had ample opportunities of observing for himself the objects of his report. But if we look more closely into his statement, we shall find much internal evidence respecting a great want of precise information about the *Tur;* and it is my conviction, that most of what he says on that animal has been palmed upon him. In addition to what Bojanus alleges,‡ as being favorable to the opinion that the turs of Masovia were a few individuals of the original wild ox, (*Bos taurus*), which had escaped death or domestication, such as, he says, are still found in a few parks of Scotland and England; or what Jarocki states§ to prove that the tur was the

* Duchesne's Script. Hist. Franc.; see Aimonius. Hist. Franc. lib. i. c. 2.
† Rerum Muscoviticarum Commentarii. Basil, 1556. ‡ Lib. c. p. 416. seq.
§ Jarocky, O Puszczy Bialowiezkiey, Warsaw, 1830. The chief argument of which this author makes use, to refute Herberstein, and to establish the identity of the tur and zubr, is, that the people in Masovia still know the plants of which the animal they called tur was most fond, and that they are

same animal as the zubr, which he thinks was called tur in Muscovia and Samogitia, and zubr in Lithuania, I shall say, in corroboration of the latter opinion, that nearly all that Herberstein knew about the tur from hearsay, is fabulous; (for instance, that it breeds with tame cows, but that the progeny does not come to perfection, "*vituli qui nascuntur non sunt vitales;*" that the turs which have mixed with tame cows, are expelled from their herd, as infamous, &c.) the report which he makes respecting the carcass of a tur, given to him by King Sigismundus Augustus, bears strong evidence of his having received a zubr, which the men who delivered it called tur, whereas he himself allows that he was absent at the time the present was received. For the specimen in question was one of those driven from the herd for the reason above stated, and it is well known that the zubrs often drive bulls from their herds, or that old bulls insulate themselves of their own accord, which solitary specimens are now called "Samowtor," or "Odyniec." In the specimen which Herberstein obtained, the scalp was wanting; and this happens to be just the part of the skin which is the centre of the musky smell in the zubr, and to which medicinal and mysterious powers were formerly ascribed. However, Herberstein forgot to ask why it was wanting,* and as on that occasion he did not even ascertain the nature of the hair of the tur, but describes this important character from a girdle of the skin of the *Urus* (or tur), sent to him at a later period, when in Austria, by Antonius Schneeberger,† we have strong reasons to suppose that he did not even see the carcass presented to him.

I must also refer to a circumstance which is not irrelevant as to the opinion that the zubr and tur are identical. In Conrad Gesner's 'Icones Animalium,' p. 30, (Heidelb. edit. 1606), is a representation of the manner in which the *Urus* was killed, which evidently owes its origin to the description from which Herberstein copies his report on the method of hunt-

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precisely the same as those which the zubr prefers, in the forest of Bialowicza. He found in the Archives of Warsaw, that the last turs in Masovia died in 1630, of a distemper communicated to them by the tame cattle, probably the typhus. This may be true of half-wild common oxen kept in parks, and wrongly called turs. As for the real turs or zubr, they were probably extirpated by poachers, as the forest of Jakturow in Masovia was not strictly preserved.

* "Quod non temere factum esse credidi, quanquam cur id fieri soleret, per incogitantiam quandam non sum percontatus."

† "Cujus *corium durius culum validumque* est; pili verò, (quod mireris), mollissimi, *instar pecoris lanæ*, densi coloris nigri, sed rufo modicè admixto, si propiùs spectes." This was no doubt a piece of skin of the part of the zubr that is not shaggy.

ing the *Bison*; (see below). The animal figured there has the form of a common ox, but the author is honest enough to confess that it was not drawn from nature; whereas at p. 31 is a very tolerable figure of the *Bison*, (zubr). From the above it appears, that the painter from whose map of Russia* Gesner obtained the figure of the *Urus*, (to which the latter gives the synonyme of *Thur*), had drawn his composition after the same information, as applied to the tur, as that which Herberstein had obtained, as applied to the zubr.

Enough has been said by Bojanus, Jarocki, &c. to shew that the subsequent authors, down to Cuvier, who have given an opinion on the tur and zubr, and were more or less swayed by Herberstein, as Gesner, Aldrovand, Jonston, Henneberger, Hartknoch, Masecovius, Cnapius, Thad. Czacki, Kluck, and even Buffon, Linnæus, Pallas, &c. have only rendered the subject more obscure.†

The result at which we have at length arrived, with a degree of probability which is perhaps allowed to be better established than that obtained by Bojanus, is, that the *Urus* and *Bison* are the same animal; and that we have for the creature now called in the system, *Bos Urus*, four sets of synonymes, viz. one probably of barbarous origin, but employed by Aristotle, *Bonasus*, *Monassus*: one, it seems also of barbarous origin, *Bison*, *Visen*, *Wisont*, *Wisant*, &c.; one

* Gesner. l. c. "Aus einer Mappa des Moscowiterlands genommen."

† I must leave it to such as live nearer the ancient habitat of the Scottish *Bison*, described by Hector Boethius as being quite white, as having a mane like a lion, but in other respects much resembling the tame oxen, to settle the doubts which still exist respecting the real nature of this interesting animal. Boethius further says that these bisons are so wild, that when a man has touched with his hand, or even breathed upon grass, trees, &c. they will avoid such places for many days; and that they will die with sadness if caught. (Descrip. Regn. Scot. fol. xi.). If nothing but this description were extant, and the same authentic, we should perhaps not hesitate to refer the animal to the *Bos urus*, (zubr). But from the time of Boethius, (16th century), to that of Buffon, these bisons, though kept in nearly the same manner in the parks of the Dukes of Hamilton and Queensberry, as the zubr is in the forest of Bialowicza, had lost their mane, if we may give credit to a letter of Forster to Buffon, (see Cuvier's edition of Buffon, t. xviii. pp. 88 and 89). This appears very strange in a rather cold climate. He also states that they were then not larger than a middling-sized ox; the males weighing 530, and the females 400 pounds. Their colour was white, except at the muzzle and ears, which were black. The description of their form, as given by Forster, is extremely imperfect, as he merely says that they had finer horns and higher legs than the domestic oxen, which brings them again nearer the zubr, as does also the strength of their skin, the rush they made at the hunter, and their antipathy to the tame cattle. Cuvier took this animal for a variety of the zubr, but in the absence of osteological testimony, I apprehend this point will never be decided.

derived from the same root as *Taurus*, (the syllable *or*, or *ur*, of the primitive language, from which the Greek ὄρος, and the very word *origin* is derived, and which conveys the idea of what is ancient and grand), *Urus*, Gall. and Lat. *Our*, *Auer*, *Ur*, *Auerochs*, Germ. *Ureox*, Eng. *Tur*, Pol. *Tor*, Russ. *Tyr*, Dan.; and one of Sclavonian origin, *Zimbr*, Mold. and *Zubr* Lith.

Though the *Bos primogenius*, of which Gesner obtained a skull from England, and of which *crania*, found in different parts of Europe, exist in the Museums of Paris, Göttingen, Darmstadt, &c. and that of Jena possesses a perfect skeleton, dug up near Hassleben, a village in the grand-duchy of Weimar,* have been proved by Cuvier to be the antediluvian representative of the *Bos taurus*,† yet the short and straight hair which the domesticated ox retains in every climate, if compared with that of its congeners, the *Bos urus*, *B. Americanus*, *B. moschatus*, makes it probable that it is indigenous to a warm country, and that it has been brought from India, by Egypt, to Europe; whereas its wild stock, like that of the camel and dromedary, has vanished at a very remote period.

Before I begin the description of the *Bos urus*, I feel compelled to make a few remarks on the more remote habitats which have been ascribed to this species. The statement that it was found in Siberia and on Mount Caucasus, had hitherto rested upon misconceptions or vague rumours, until Mr. de Baer, of the St. Petersburgh Academy, endeavoured to shew, in two articles read to the Academy on the 23rd September, and the 20th October, 1836, that the *Bos urus* is found, at the present day, in the Caucasian mountains, and that it is probably met with in some districts of India, as well as other parts of Asia.

The former opinion Mr. de Baer tries to establish on the authority of a skin sent to the Academy from Mount Caucasus, by General Rosen. There are, however, some points in that eminent philosopher's own comparison of that skin with the skin of the *Bos urus* of Lithuania, which would appear to lead to a different conclusion. In the first place Mr. de Baer owns that there are differences in the length and direction of the horns, as well as the length and colour of the hair, on different parts of the body, which differences he ascribes to the circumstance, that the skin sent by General Rosen, is that of

* A very good figure of that skeleton may be seen in the article of Bojanus, Nov. Act. Acad. Cæs. Leop. Carol. t. xiii. p. 2.

† Ossem. Foss. t. iv. p. 150, &c.

a cow. But these points might, no doubt, have been settled in a very precise manner, by a comparison with the skins of zubr-cows, which are probably nowhere to be found in greater variety than in the Museum of the Academy, and of which there exists a specimen in that of Wilna. The presence of a black stripe along the mesial line of the back, as well as the difference in the hoofs, which Mr. de Baer says are much shorter in what he calls the Caucasian variety of the *Bos urus*, are, however, enough in themselves to cause a doubt of the specific identity of the two animals. Without insisting too much on the perfect equality of wild species having a very extensive habitat, (though Dr. Pöppig found, for example the fox quite the same in Chili and Pennsylvania), I would be allowed to remark, that the dark stripe along the back is one of the constant characters of several species, and that in a whole genus, (*Equus*), the stripes of the skin form one of the distinguishing characters. But what militates even more against Mr. de Baer's opinion, is the comparative shortness of the hoof in the Caucasian animal. We may, no doubt, observe, in domesticated animals that have followed man to localities not originally their own, a considerable deviation of that organ from its primary type; as, for instance, the hoof of horses bred in mountainous districts, is considerably narrower and shorter than in the flat and soft-hoofed horses reared on the marshy plains near Madgeburg; but assuredly this analogy does not apply to wild animals, nor especially to the *Bos urus*, if it did live in Caucasia, where the swampy forests, which are its natural abode, as proved, not only by several of its habits, but particularly by the herbaceous plants to which it gives a decided preference, as we shall see hereafter, which exist in such profusion in the valleys, that it would rather have suffered itself to be extirpated there, than have taken refuge in the mountains. Thus the zebra is never found on the Karroo mountains, but always in the plains around them; while the douw, or mountain horse, (*Equus montanus*, Burch.), never descends from the same mountains into the plain. Yet the specific difference of these two animals rests chiefly on the presence or absence of a few stripes of the skin, as well as on the comparative flatness or shortness of hoof. Therefore until the skeleton of the Caucasian *Bos* shall have been compared with that of the *Bos urus*, I think we may consider the two creatures as bearing much the same relation to each other, as the *Equus montanus* and the *E. Zebra*.*

* Mr. Ed. Eichwald, who, after having made the *Bos urus* of Lithuania the object of his special study, has travelled in Mount Caucasus, could

After taking for granted that the *Bos urus* is likewise found on Mount Caucasus, Mr. de Baer advances the opinion, that the *Gaour* of India, which has but lately been discovered, in the mountains of Mine Rout, near the Bay of Bengal, is likewise a variety of the zubr. The gaour we know only from the imperfect descriptions given by Mr. Breton and Major Hamilton, (who names the species *Bos Gaurus*), of a male specimen killed in 1816, as well as through that of Major Roughsedge, who saw a specimen killed in 1818. But though the gaour be very nearly allied to the *Bos urus*, in point of structure, yet its horns are said to be flattened, (whereas they are entirely round in the *Bos urus*), its hair, from the knee downwards, is of a dirty white, and that which covers the trunk is stated to be as short and shining as that of the seal. Then the smell of musk, so striking in the *Bos urus*, has not been observed, and the animal has not been found in a marshy locality, nor in the valley. Thus I do not see why, in this little advanced stage of our knowledge of that animal, we are justified in considering it the same species as the *Bos urus*, particularly as it seems to deviate more from it, than the *Bos americanus*.

We may, therefore, with much probability, consider the zubrs of the forest of Bialowicza, as the only survivors of a species which was formerly found, in great numbers, in the vast swampy forests of the whole of middle Europe, and perhaps Great Britain, whilst no other wild bovine animal inhabited the same tract within the historical times.

(*To be continued*).

Art. II. *Outlines of a new arrangement of Insessorial Birds.* By Edward Blyth, Esq. Curator to the Ornithological Society.

Having been induced to postpone the publication of a new *Systema Avium*, in consequence of a recent connection warranting the anticipation of being able, in due time, to obtain several present *desiderata*, I now submit the following sum-

not there detect the least trace of the animal.

ney is just publishing at Stuttgart and Tübingen: 'Reise auf dem pischen Meere, und in dem Kaukasus, in den Jahren 1825 & 1826, von E. Eichwald, K.R. Staatsrath, Th. i. Abth. 1 & 2. 1834 & 1837, 8vo. I may also remark, in addition to what I have stated above, that in the report I have read on Mr. de Baer's article, there is nothing said about the smell of musk having been observed in the skin sent by General Rosen.

many to the attention of naturalists; reserving, until the conclusion of it, some remarks on the principles upon which it is founded.

The class of Birds appears to me to be resolvable into three primary divisions, which might be respectively styled,—

*INSESSORES,*
*GRESSORES,* and
*NATATORES;*

for I think it will be admitted, that, with regard to the first, (to which alone I am now desirous to call attention), a kingfisher and a sparrow, a parrot and a humming-bird, are fully as remote in their affinities from one another, as are either of them from a member of the *Accipitres*, (Linnæus); while, on the other hand, the whole of these present decidedly a closer mutual physiological relation, than either of them evinces for any species pertaining to the *Gressores* or *Natatores*. These three comprehensive primary groups, I prefer to denominate *Sub-classes*.

For the sake of perspicuity, it is here necessary to remark, that under the designation *Gressores*, I unite the *Rasores* and *Grallatores* of the quinary systematists, for similar reasons to those which have prompted the junction of the *Raptores* and *Insessores*. On no other principle could I accede to the suppression of the strongly-characterized struthious genera, or the 'oiseaux abnormaux' of recent French systematists, as a primary division; in which distinct group, it may be remarked, the bustards, which are little else than massive plovers, have been strangely misplaced.

It is also proper to add, before proceeding farther, as confirmatory of a position advanced in the preceding paragraph but one, that the genus *Alectura*, (Gray), or the "New Holland vulture" of Latham, classified among the *Vulturidæ* by Mr. Swainson, is in every respect a true Gallinaceous bird, which picks up grain voraciously, like other poultry, (as I am informed by an eye-witness of the fact). Indeed there are very few, who do not entirely confine their attention to the most superficial characters, who could for a moment suppose that the skeleton, or the digestive organs, of a vulture and poultry bird, could admit of combination. Again, the *Megapodius* and *Menura*, arranged by the same systematist among the curassows, depart, in no essential particular, (so far as is known), from the thrush tribe: the species of the former genus even progressing by a saltatory gait, which is observable in no member of the *Gressores;* and the *Menura*, as I have been informed, being a bird of song. Examination of a single feather even, plucked from either of these two genera, abundantly suffices to shew its appropriate systematic station. The resemblance which the parrots bear to the pigeons, in the particular of secreting a lacteal fluid for the nourishment of their young, may seem of importance; but I am inclined to regard this as a coincidence, rather than as a token of affinity.

In every branch of natural history, except Ornithology, it would be superfluous at the present day to remark, that the resemblances which subsist among organisms are of two distinct kinds,—namely, *rudimentary* and *adaptive*, or intrinsical, as opposed to superficial,—characters indicative of affinity, or physiological proximity, and those which imply simply what is understood by the term *analogy*. It is trite to affirm that the whale is in every essential feature a true mammalian, though modified to pass its life after the manner of fishes; yet on precisely the same principle that that animal is still vulgarly classed with fishes, has the *Alectura* been placed with the vultures, and the *Megapodius* with the curassows; the only difference being, that in these instances groups of a lower degree of value are concerned. Analogous approximations might be cited without number; as, in the *Insessores* alone, those of the swifts to the swallows, the todies to the dentirostral flycatchers, the hoopoes to the creepers or *Promerops* group, the *Scythrops* to the toucans, the humming birds to the sun-birds, (*Cinnyridæ*), &c. while separations, equally at variance with every physiological accordancy, have been necessarily as frequent. How indeed could it be otherwise, when the internal structure of a bird has received not even the slightest share of attention on the part of those who, nevertheless, venture to speak authoritatively respecting the affinities of groups? When the adaptive characters of species have, confessedly, been allowed the precedence of their rudimentary distinctions?

The composition of the group *Fissirostres* of modern English systematists, may be adduced as a very forcible illustration of the heterogeneous associations necessarily consequent on the adoption of the preposterous mode of classifying which is here impugned.

Of course, such gross violations of affinity continually intercept extensive, and sometimes important, generalizations. Thus, the improper admittance of the rain fowl, (*Scythrops*), into the *Rhamphastidæ*, and of the *Menura* into the *Cracidæ*, extends the distribution of both these families into Australia; whereas their legitimate components are inhabitants solely of South America. Again, the vast region of Australia is remarkable for possessing no known species appertaining to the vulture family, (a fact which may be regarded in connection with the absence of indigenous ruminant quadrupeds); wherefore the erroneous introduction of the *Alectura* into that family, similarly negatives another fact connected with the geographical distribution of forms. How easy, upon this principle, to affirm that the *Psittacidæ* are represented in northern Europe! We have only to admit the crossbills into it, which would be confounding groups of an inferior degree of value to those which have been specified!

The quinary distribution of birds may, I imagine, be presumed to be founded on the supposition, that the rudimental anatomy offers corresponding gradations to those which have been indicated as obtaining externally: but, if such be the notion, nought can be more thoroughly gratuitous, or even more palpably opposed to fact. For my own part, deeming that anatomy, when aided by every character which the manner of propagation, the progressive changes, and other physiological data supply, is the only sure basis of classification, I have spared no pains to collect all the information in my power, that could conduce to the establishment of a permanent system of Ornithology: and, by slow degrees, I have now arrived at a general classification, most widely and essentially different from that published in a late volume of 'Lardner's Cabinet Cyclopædia.' It remains to be seen which is the more philosophical, or consistent with the real affinities of groups.

But little, I apprehend, can be affirmed to distinguish dichotomously the members of the insessorial sub-class, as here composed. All have the toes articulated on an even plane, with the claws more or less retractile: and the young are in every instance hatched helpless and blind, requiring to have food placed in their mouths.* Excepting in the vulture family, the number of cervical *vertebræ* never exceeds thirteen;† and the entire vertebral formula is considerably less subject to variation than in the *Gressores* and *Natatores*. These characters, however, are to be considered as generalizations, rather than distinctions; and I am unaware of a single universal character of the *Insessores*, which will not equally apply to the pigeons. It may be added, that, with the exception of a very few parasitic species, which engender promiscuously,

* Will this apply to the *Alectura*? And will it not apply to the *Megapodius* and *Menura*?

† Or rather, perhaps, to speak more strictly, twelve; which is the lowest number in this class of animals, although the *Fringillidæ* have been repeatedly stated to have only nine: the thirteenth *vertebra* bearing, in numerous instances, a minute rib, which is commonly wanting in mounted skeletons, having been lost in the preparation.

the members of this sub-class are strictly monogamous; the sexes incubating by turns, and assisting to rear their broods. There is no ascertained instance of a truly polygamous bird, save among the *Gressores*.

Of course, the *Accipitres*, (Linnæus), being admitted into this great primary division, compose an exceedingly distinct ordinal section of it. Another, equally so, has never, that I am aware of, been definitively recognised, (unless by L'Herminier in his excellent work on the *sterna* of birds, where it is partially indicated). It consists of that excessively numerous group of species which are distinguished by possessing five pairs of muscles to the *inferior larynx;* all of which agree most closely in the structure of the skeleton, in that of the digestive organs, and, in short, in all the principal details of their anatomy. The members of this group accord in their *rudimental* structure, however in their *adaptive* characters they may vary exceedingly. The swallow and the tree-creeper, the promerops, the finch, and the crow, the dipper and the manakin, are merely so many modifications of a single anatomical type, to which no species that does not possess the complex vocal apparatus before adverted to, appertains. Every member of this most distinctly demarcated group, may be at once recognised by the conformation of its sternal apparatus;* and, except from the diurnal *Accipitres*, by the constant presence of two *small* cœcal appendages to the intestine, whereas all other *Insessores*, so far as my researches have gone, are either entirely destitute of *cœca*, or have them developed to the same proportional magnitude as in the owls, which, throughout the present sub-class, is never exceeded. The absence of *cœca* I have ascertained in the hornbills, kingfishers and halcyons, toucans, touracos, parrots, woodpeckers, wrynecks, piculets, (*Picumnus*), swifts, and humming-birds; and their presence, of the maximum dimensions stated, in the todies, jacamars, trogons, cuckoos, (including *Scythrops*), and moth-hunters, (*Caprimulgidæ*): judging from analogy, I infer that they are absent in the hoopoes, bee-eaters, rollers, barbets, honey-guides, and perhaps motmots, and the *Oxyrhynchus;* and developed in the puff-birds, courols, coucals, malkohas, and ani. Information relative to the anatomy of either of the twelve last-named groups, would to me be extremely acceptable.

* Several examples of this type of *sternum*, with the other bones in immediate connexion with it, are depicted in Mr. Yarrell's 'History of British Birds,' as vignettes to the descriptions of some of the thrushes, and allied genera.

It may be worth while, here, to bestow a few remarks on the developement or absence of the *cæca coli*, considered as a zoological character. That their presence is of trivial or no importance in the animal economy, when very small, is proved by the occasional absence of these appendages, in species which normally possess them: thus, of two young male ospreys which I have recently dissected, they existed in one specimen and not in the other. Again, Mr. Owen has detected *cæca*, larger than in a lark, in a single individual of the green woodpecker, throughout which group they are indisputably normally absent. The same anatomist has recorded their absence in a spoonbill, in which species I have found them, though exceedingly minute, as in the storks. Analogous discrepancies, however, obtain in various other organs, serving to indicate the extreme caution requisite in deducing conclusions from the examination of an insufficient number of specimens. Of three giraffes, dissected by Mr. Owen, the first possessed a capacious gall-bladder, whilst not the slightest trace of this organ existed in either of the others; yet the gall-bladder, (so far as has been observed), is constantly present in the antelopes, and absent in the deer; constituting, in these groups, a distinctive character. A receptacle for the secretion of the liver is also inconstantly present in some species of birds; the French Academicians failed to detect it in four out of six demoiselles, (*Gruidæ: Anthropoides virgo*); yet in the parrots and pigeons, (both *exclusively* vegetable feeders), its absence is an invariable characteristic; as its presence is throughout the group of *Accipitres*. The spoonbill, like the storks and adjutants, is described to be destitute of any muscles to the *trachea*, which ordinarily undergoes a convolution resembling the figure of 8; yet in a female which I not long ago dissected, the windpipe proceeded straight to the divarication of the *bronchi*, and it was furnished with a small pair of *sterno-tracheales*. Of seven Bewick's swans, which I have examined carefully, three possessed eighteen tail-feathers, two nineteen, and the others twenty; while a number of hooper swans respectively presented twenty, twenty-one, and twenty-two; and however extraordinary the uneven numbers may appear, yet, that no accidental deficiency existed, was ascertained to complete satisfaction, by scrupulous *internal* examination. It should be remembered that much importance has been attached to this last character by the discriminators of species; and although it is true that some species of motmots appear to have constantly ten tail-feathers and others twelve, (the outermost minute), yet, taking the *Insessores* generally, I must still contend that the number of tail-feathers in this sub-class is a valuable, or rather perhaps useful, diagnostic: for instance, in the *Accipitres*, and in the other grand division which I have partly characterized, their number is, without exception, twelve; while, curiously enough, in nearly all the genera which have been improperly placed with the members of these divisions, it does not exceed ten. I refer to *Podargus*, which has been approximated to the owls; *Caprimulgus*, and *Cypselus*, to the swallows; *Upupa* to the creepers or promerops group; and the *Trochilidæ* to the *Cinnyridæ*: in all which instances this apparently unimportant diversity indicates distinctions of real consequence, pervading the entire structure. It may be remarked that throughout the *Insessores* the number of caudal feathers never exceeds twelve; which number is in no instance fallen short of in the *Gressores* and *Natatores*,—save, however, in two or three genera, as the grebes, which possess no tail whatever.* The *Alectura* accords with the grouse, and various other *Gallinaceæ*, in possessing eighteen caudal feathers; even this external character distinctly pointing out its appropriate systematic station.†

But to return to the consideration of the *cæca*. Without regarding individual deviations or monstrosities, as of sufficient importance to mar extensive generalizations, the facts that have been already stated relative to the absence or degree of developement, of these appendages in the *Insessores*, impart a value to the character which is thence derivable, disproportionate to the influence that they exercise in the animal economy. It has been remarked, for instance, in reference to the large size of the *cæca* in the owl family, as compared with the minuteness of them in the diurnal *Accipitres*, that,—"As digestion may be supposed to go on less actively in the somnolent night-flying owls, than in the high-soaring diurnal birds of prey, an additional complexity of the alimentary canal, for the purpose of retaining the chyme somewhat longer in its passage, might naturally be expected; and the enlarged *cæca* of the nocturnal *Raptores* afford the requisite adjustment in this case. For, although the nature of the food is the same in the owls as in the hawks, yet the differences of

* Yet the grebes have the uropygal glands considerably developed, which subverts the notion that these have any necessary connexion with the tail, as has been assumed from their absence, together with the part that should contain them, in the *Gallus ecaudatus* of Temminck.

† The poultry genera differ very remarkably in the number of tail-feathers. Thus, the colins, (*Ortyx*), have only twelve, the partridges fourteen, the ptarmigan sixteen, and the true grouse eighteen, which I believe is the *ultimatum* arrived at.

habit of life call for corresponding differences in the mechanism for its assimilation."* But admitting to the full extent the reasonableness of this view, and its accordancy with fact, in the aggregate, it should still be remembered that the rapidly-flying, active, snowy owl, which on the wing is scarcely distinguishable from the jer falcon, possesses *cœca* fully as much developed as the light-flapping barn owl; while, on the other hand, the lazy, smooth-sailing buzzard, the floating kite, or the buoyantly-skimming harrier, presents no farther developement of these appendages than the darting hawks, or the impetuous far-rushing falcons.† The diurnal and nocturnal *Accipitres* differ importantly in the skeleton, as well as in other portions of the structure of the alimentary passage; exhibiting no trace whatever of a gradation or transition from one into the other, in these *rudimentary* characters, however they may superficially appear to do so. They constitute, in brief, two separate sub-types of the more general type of the *Accipitres*: and the respective amount of developement of the *cœca coli*, is one of many invariable characters proper to each. It is, as it were, a necessary accompaniment, or one of the items of the subtypical conformation.

Throughout the *Insessores*, I have found that the degree of developement of the *cœca* is thus an adjunctive character of some value in indicating natural groups; but in the *Gressores* and *Natatores* it is of less importance.‡ Of course it would be idle to demonstrate to any practical naturalist, that the majority of characters are thus of variable consequence in different groups.

To sum up, we have seen that the intestine, in the present sub-class, is either entirely devoid of *cœca*, or that these appendages, being present, are either of small size, or of considerable dimensions, that is to say, of the magnitude noticeable in the owls. They are either minute, or largely developed, in the *Accipitres*; invariably present, and of small size, in the extensive division which presents the anatomy of the raven; and either absent, or considerably developed, in the remainder of the sub-class: at present I know of no (normal) exception to these generalizations.

The structure of the vocal organs, also, as has been alrea-

* Cyclop. Anat. and Phys. i. 324.

† There are even some instances of an inverse developement of *cœca* to that required by the theory respecting the use of these appendages, which has been quoted. Thus the skuas, (*Lestris*), possess them of much larger size than the gulls.

‡ For instance, the smew possesses only one minute *cœcum*, while its congeners, the other species of *Merganser*, have two comparatively large *cœca*.

dy intimated, affords assistance towards extricating the component groups of the *Insessores* from the confusion into which they have been plunged. The reader is referred, however, for minute descriptions of the several modifications, to Mr. Yarrell's elaborate and well-known paper on the *trachea* of birds in the 'Linnean Transactions.' The following are the variations presented in the present sub-class. First; a wind-pipe destitute of any peculiar muscle, which occurs only in the genus *Sarcoramphus*, (or condor, comprising *Vultur gryphus* and *V. papa* of Linnæus); the members of which are necessarily deprived of voice, and emit no sound beyond a weak snorting. Secondly; the existence of a single pair of muscles, which have been designated *sterno-tracheales;* though the term is not in every instance applicable, as in some birds, (the crowned cranes, for example), the lower attachment of these muscles is to the first true rib, and I have noticed some other variations which require investigation: this, which is the prevalent structure throughout the entire class, is common to the rest of the *Accipitres*, and to all other *Insessores*, except the parrots, and those which have been indicated as possessing small-sized *cœca;* in the peregrine falcon, however, a short second pair, or more strictly speaking division of the first, is continued downward and attached to the bony ring whence the *bronchi* divaricate; and there are rudiments of a similar structure in other species. We may generalize by styling this a simple vocal apparatus. Thirdly; the complicated *inferior larynx* of the *Psittacidæ*, operated upon by three pairs of muscles, and which is capable of dilatation and contraction, whence the superior facility possessed by these birds of inflecting the voice, and, by the more imitative, of articulating words. Fourthly; the complex organ of the raven, and its very numerous allies, presenting as many as five pairs of muscles; though in one instance, that of the mina genus, (as I am informed by Mr. Yarrell), the long *sterno-tracheales* being absent, the number is reduced to four.* All singing birds appertain to this division; and although many species, framed upon the same rudimental type, and consequently possessing similar vocal organs, as the cotingas and manakins, and our native nuthatch, have only a monotonous cry, yet the reason of this does not proceed from the incapacity of modulating the voice, as songless species, reared in captivity under warblers, have been known to imitate the notes of the latter to perfection.

* This exception may be regarded as analogous to that which the condors offer to the rest of the *Accipitres;* all the peculiar muscles of the preceding group being retained.

Arrived at these generalizations, a suspicion is immediately cast on the reputed power of the ani, (*Crotophaga*), to imitate sounds;* and on the reported song of the todies, (*Todus*):† but we are tempted to ask why Mr. Swainson should express surprise at the musical powers of the *Cinnyridæ*, attested as they are by several observers of credit, on no other ground than because he has thought fit to approximate them to the songless group of humming-birds.‡ Examination of the *lower larynx* of the two former genera, at once disproves the assertions of numerous authors; while, in the latter instance, satisfactory confirmation is obtained. I have been informed by observers of these birds in their native haunts, of the fallacy of descriptions of the two former; and Mr. MacLeay relates that the loquacious boat-tailed grackle has been repeatedly confounded with the ani.

It is in the two groups which have been stated to possess a complex vocal apparatus, conjointly with the diurnal *Raptores*, that we find the highest cerebral developement in the feathered class, accompanied by the maximum of intelligence, or of sagacity as opposed to blind instinct; while the reverse extreme is likewise noticeable in the *Insessores*, in the instances of the cuckoo, wherein the entire mass of brain barely exceeds in weight a single eye, and of the moth-hunter, one eye of which considerably outweighs the brain;—though, in the latter case, the organ of vision happens to be of unusual magnitude, the brain also being proportionally smaller than in any other bird I know of; in connexion with which facts, it may be remarked, that the quality or attribute of docility, or rather, perhaps, imitativeness, is peculiar among the *Insessores* to the members of the three first-specified divisions; for although there are many instances of insessorial birds, not pertaining to these groups, which have been rendered extremely tame and familiar, and which have become considerably attached to persons whom they knew, distinguishing such very readily from strangers, yet I do not remember one wherein capacity for instruction has been exhibited, which forcibly contrasts with the extreme docility of the falcon, the parrots, and of the raven and its allies. It should be borne in mind, however, that there are many species, framed upon each of these three types of structure, which are far from equalling the true falcons, the typical parrots, and the crows, in mental superiority.

I have already alluded to the secretion of a lacteal fluid by

* Vide Regne Animal. † Vide Vieillot and others.
‡ Vide Birds of Western Africa, Part i. 133.

the parrots and pigeons, which may be said to evince a relationship in these groups to the *Mammalia:* and it is worthy of notice, that as milk is much more copiously secreted by herbivorous mammalians, so the parrots and pigeons are almost the only birds which, at no period of their life, touch any description of animal food. M. Geoffroy St. Hilaire, however, has described a still more curious approach to the *Mammalia* on the part of the parrots, which fact may be placed in juxta-position with that of the existence of the rudiments of dentition, in the gums of the fœtal toothless whales; than which it is even more worthy of the attention of the physiologist. In a *fœtus* of a parroquet, nearly ready for hatching, he found that the margins of the bill were beset with tubercles, arranged in a regular order, and having all the exterior appearance of teeth: these tubercles were not, indeed, implanted in the jaw-bones, but formed part and parcel of the exterior sheath of the bill. Under each tubercle, however, there was a gelatinous pulp, analogous to the pulps which secrete teeth, but resting on the edge of the maxillary bones, and every pulp was supplied by vessels and nerves, traversing a canal in the substance of the bone. These tubercles form the first margins of the mandibles, and their remains are indicated by canals in the horny sheath subsequently formed, which contain a softer material, and which commence from small *foramina* in the margin of the bone.*

But waving the consideration of the parrot family, for the present, respecting which it is admitted by the warmest advocates for the theory of universal gradation, that, "if any group in nature be isolated, it is this," and that "possessing in themselves the strongest characteristics, there is no bird yet discovered, which presents any point of connexion to them,"† let us now see if there be not many groups equally isolated, which have been overlooked in consequence of the superficial method of investigation too commonly pursued. An equally distinct group, I aver, is constituted by the multitudinous host of species which agree in possessing the complex vocal apparatus of the raven, in addition to many other peculiar characters; and I propose to designate this extensive order *Cantrices*, in preference to *Cantatores*, restricting the latter dissyllabic termination to the divisions of a higher degree of value. The term *Cantrices*, it may be remarked, has less reference to the actual utterance of song, than to the *invariable* possession of a peculiarly complicated

* Anatomie Comparée, tome ii. 193, as quoted in Cycl. Anat. and Phys. by Mr. Owen, vol. i. 311.

† Mag. Zool. and Bot. ii. 554.

*inferior larynx,* which enables the voice to be modulated. In the structure of the *sternum,* that important bone upon which a bird may be said to be especially organized, and the variations of which afford indications of really natural groups, more prominently, perhaps, than any other portion of the entire structure, considered separately,—in the configuration of the sternal apparatus there exists the most surprising uniformity throughout the most dissimilar genera modified upon this rudimental type; while, as compared with the bony framework of any other bird whatever, the skeletons of this excessively numerous group, present as insulated a form as do those of the parrots. The same may be asserted of the alimentary organs, and of other essential details of the anatomy: while, to descend to habit, we find that the process of *interweaving* a nest is all but confined to the members of this division: one or two species of parrot, the *Trochilidæ,* and the singular genus *Colius,* being the only exceptions that I know of:* all other nest-builders merely heaping together materials, which, in some instances, as in the swifts, and certain hummingbirds, are agglutinated by a viscid *mucus,* secreted by the large salivary glands of the bird. By far the great majority of this division lay bluish or speckled eggs, of what may be designated the ordinary form, smaller at one end; and the young have a few scattered plumules of down when first excluded. The feet have constantly three toes placed forwards, and one behind; and are, in some rare instances, *syndactyle,* (as in the allied genera *Eurylaimus, Calyptomenes, Rupicola,* and *Pipra*), but ordinarily present what may be denominated the *cœnodactyle*† structure, having the third and fourth, or the outer and middle toes, basally connected, and the second or inner one free to the articulation; which form of foot, it may be added, even abnormally, is of rare occurrence in other *Insessores,* and perfectly developed, as in a thrush or raven, in no other.

It is needless to observe that the establishment of the important order *Cantrices* overturns the whole fabric of the quinary distribution of *Insessores.* I challenge the advocates of the theory of universal gradation to bring forward a single instance, wherein this comprehensive group merges into any other.

For convenience only, I have commenced by indicating this distinct division; for I am by no means disposed to place

* The extremely loose and ill-built nests, to judge from description, of the nidificatory *Cuculidæ,* I suspect to be constructed without interweaving.

† Κοινος, ordinary, most prevalent: and Δακτυλος.

it immediately following the *Accipitres*. I now proceed to point out other reciprocally distinct groups, of various degrees of value and of mutual affinity; and I respectfully invite the disciples of the quinarian theory to demonstrate, that, in a single instance, there are species which connect any two of them together.

(*To be continued*).

ART. III. *A few Remarks on the Antennæ of Insects, in relation to the theory that these appendages are analogous to the Ears of higher Animals.* By EDWARD NEWMAN, Esq. F.L.S. &c.

FROM the earliest ages of entomological science, the *antennæ* of insects have been, by the thoughtless and unreflecting, taken for ears. The grounds for this theory are these: First, insects possess no other obvious ears; Secondly, the *antennæ* are generally situated where ears might be expected to be found; Thirdly, the senses of sight, smell, and taste, appear distinctly ascertained to be located in other parts of the head. Argument on this subject has yet taken no wider range.

In 1832, Mr. Rennie publicly broached the subject, re-adducing the old arguments; and Mr. Newport has still more recently, written a very long and elaborate paper on the subject, which has occupied two sittings of the Entomological Society, and which I have heard read with much interest. It is this paper of Mr. Newport's that has again called my attention to the enquiry; an enquiry, as every zoologist will, I am sure, admit, fraught with the highest interest, because it is clear that these conspicuous instruments are either the seat of some one of those senses or faculties which we ourselves possess, or of some other sense or faculty of which we at present remain in utter ignorance.

I am fully aware that Mr. Newport's voluminous paper, not being yet before the public in a tangible form, it would be out of order to offer comments on opinions that he may hereafter modify, or assertions which a more close examination of the question may lead him to withdraw. I confine myself therefore to the abstract question, avoiding with care the train of argument he has maintained, and viewing the subject in a light in which he has not attempted to place it.

Whoever has paid the slightest attention to the structure of animals, must have observed of every part, the use of which is decidedly ascertained, how beautifully, how admirably, such part is adapted to such use. If we regard the hand of man, the membrane connecting the toes of a bat, or of a duck, the prehensile tail of many tree-climbing mammals, the adhesive foot of the ceiling-wandering fly, we cannot fail to remark how nicely each peculiarity of structure is adapted to its destined end.

Throughout creation, wherever it has seemed good to Providence, in his never-ceasing care for his manifold creatures, that some function should be exercised in an extraordinary degree, there has He bestowed a corresponding instrument, not of casual form, not of fortuitous situation, but of form and site in every respect best adapted to the function for the due performance of which it was called into existence.

Here then let us enquire what form of instrument is best adapted to the faculty of hearing; and it must be distinctly understood that the question does not extend to the auditory faculty itself, but to the external portion of the instrument, or that part which is entrusted with the reception and transmission of sound. Most of the higher mammals are known to possess the faculty of hearing, in a very superior degree.—We have ample opportunity of observing the acknowledged instrument of hearing, which these possess. The result of such observation is nature's own reply. The ear of animals is, without doubt, infinitely better adapted to its office, than any artificial instrument which theory might devise or that science could perfect.

The ear of higher animals is, as far as I am aware, without exception, a hollow conch, either sunk in the head itself, or attached to the external surface of the head. At the bottom of this conch is a very obvious aperture, passing completely into the head, where it communicates with the seat of the auditory faculty. On the size of the external conch depends, in great measure, the quantity of sound received, a fact proved by the application of the hand to our own ear, after the manner of persons who are deaf; thus proving, beyond a doubt, that a large external conch is the form of instrument best adapted for the reception and transmission of sound.—We conclude, not only rationally but inevitably, for we cannot avoid it, that mice, hares, and other animals remarkable for the acuteness of their hearing, are indebted for that very acuteness to the extraordinary developement of the external portion of their auditory instrument.

Man is perfectly insensible to sounds which the timid hare hears with painful distinctness; and the poor tortoise, unfurnished with an external conch, takes no heed of sounds that are readily perceptible by man. In this again is the Creator's never-slumbering care for the welfare of his creatures, admirably exhibited. The hare, the mouse, &c. instantly retreat from the danger of which their acute hearing constantly warns them; but the tortoise cannot so retreat: acute hearing, and acute sense of danger, were to him a perpetual punishment. I have thus, I think, established from a reference to nature herself, that a hollow conch is the best external auditory instrument, and that, as a general rule, probably liable to many exceptions, the larger the conch the more acute is the auditory power. I now turn to insects.

The *antennæ* of insects are of infinitely varied form, so much so indeed, that the conclusions we draw from them can only be of a very limited and general kind. The following characters however appear constant: *antennæ* are perfectly solid, and without any tube or cavity in the interior; and they possess no external orifice by which sound could enter them, nor any internal orifice by which they could transmit sound to the seat of the auditory faculty. These characters, as I said, admit but of a general conclusion; but, though general, the conclusion is obvious, that if the *antennæ* are really auditory instruments, their employment as such implies the existence of principles in acoustics with which philosophers are hitherto entirely unacquainted.

Taking the vast insect kingdom as a mass, we find it next to an impossibility to prove that they possess the faculty of hearing; but it is not at all inconsistent with reason and analogy to suppose such to be the case. We have many insects musical; and we infer, with every apparently reasonable ground, that there is a correspondent auditory faculty possessed by the individuals for whom this music is intended.—This conclusion is not visionary, but is rational, and almost self-demonstrative. Of musical insects, the great tribes of cicadas and crickets stand far before all others; and if we carefully examine the remarkably minute *antennæ* of the *Cicada*, or the remarkably slender hair-like *antennæ* of the crickets, we must conclude, not only that these instruments are ill-adapted to collect and transmit sound, but further still, that were the task imposed on us of framing an instrument expressly to avoid arresting the progress of sound, we should fashion it precisely after the similitude of these *antennæ*.

Pursuing analogical reasoning one step farther, we should say that the luminous property of the female glow-worm implies the existence of the faculty of sight in the male; and we think it reasonable that the male should possess a more perfect and extended vision than the female, which requires not the same guide. The suggestion is a just one: nature has given to the male glow-worm, eyes six times as large as those of the female, indeed they occupy, as in Diptera, nearly the entire sphere of the head. Let us apply this to hearing: the male insects are the musicians, the females therefore require the greater developement of auditory instruments.—We cannot doubt that in accordance with the universal law of adapting the instrument to its end, this greater developement has been provided. In vain we look for the required developement in the *antennæ*, for in them it is invariably possessed by the males, not by the females.

When, in 1832, Mr. Rennie supported the views which Mr. Newport has now revived, I paid some attention to the subject, and made a variety of observations on mute insects, with a view of ascertaining their auditory powers. I could trace no connexion between the auditory faculty, and any particular part of the insect; neither could I trace any correspondence between the extent of the auditory faculty, and the developement of the *antennæ*. I could not discover that the males of *Eucera longicornis* and *Bombyx quercus* were at all cognisant of sound; they evinced no symptoms of hearing even the loudest noises. The common house fly has a quick and acute perception of sound: this is the case with many other Diptera. Let it not however be concluded that the possession of the auditory faculty is the necessary consequence or accompaniment of small *antennæ*, and *vice versâ*. This is by no means the case. *Cerambyx moschatus* certainly combines the auditory power with the possession of long *antennæ*, which however it constantly employs as tactors. In this insect both sexes are gifted with the power of producing sound. The result of a long series of observations was negative,—it established nothing.

We will now regard the subject in another light. We will suppose that the present enquiry has found the *antennæ* not of the worst, as is the case, but, like other parts of this vast and admirable creation, of the best possible formation for their supposed auditory office. We then suggest this very reasonable enquiry. Why has Providence given to some insects this extraordinary preponderance of the auditory faculty? Nothing is created in vain. Every part has its appointed function: the eye sees, the hand grasps, the foot walks: each instrument has neither more nor less power or predominance than it actually requires; each is precisely adapted to its end, and to that end only. Why then have so large a majority of insects these enormously developed ears? It is quite certain that hearing is not the main safeguard of an insect's life: experiments have never shewn that an insect, like the hare and the mouse, is warned by sound of the approach of danger, while daily experience shews us that sight has this warning effect. Allow your hand to approach a fly, and this assertion is proved. The power of hearing is not available to the male in his search of the female, for we see the males of our larger Lepidoptera, as *Bombyx quercus*, *B. versicolor*, and *Pavonia minor*, when assiduously engaged in this pursuit, traversing the regions of air at a height where no sound from the female could possibly reach them. Some other faculty, perhaps wholly unknown to us, or, more probably, as in many mammals, that of smell, may on these occasions be their guide. The latter supposition offers no outrage to reason or experience, and is abundantly supported by analogy. Finally, the power of hearing is not available in obtaining food, which, in all the *Bombyces*, longicorn beetles, and other insects with very long *antennæ*, is invariably inanimate, inert, and silent. Preservation of the kind, therefore, accomplished conjointly by individual preservation, by reproduction and its various consequent energies, or by the search of nutritious and appropriate food, is found not to require this vast auditory power. The question, then, remains unanswered, and, unless we admit the truth, that it exists not, unanswerable.

Having thus stated my opinion as to what *antennæ* are not, it will perhaps be expected that I should also give an opinion as to what they are; but it appears to me that the true office of *antennæ* scarcely needs an enquiry. No one can study the proceedings of bees in a glass hive, and observe that every object is touched, and examined, and scrutinized, by the *antennæ*, without feeling an assurance that they are then in the performance of their legitimate office as tactors? Again, who can watch the ant, who can observe the anxious scrutiny to which she subjects every object before tasting it, or even before venturing to mount upon it, without being certain that the *antennæ* are her feelers or tactors? Still more evident is their occupation in the crickets, cockroaches, and a hundred other tribes which shun the light, and make their journeyings under cover of darkness. In these the *antennæ*, as tactors, are substitutes for eyes, and perform their office when the latter are useless. This view of the subject bears investigation. We find that the grasshoppers, a sun-loving race, closely allied to the crickets, neither require nor possess the long thread-like *antennæ* of their congeners; on the contrary, their *antennæ* are short, erect, and apparently chiefly ornamental. Flies and dragon-flies, which only affect the most brilliant glare of light, are almost without *antennæ;* while gnats and *Phryganiæ*, both lovers of the evening, have long *antennæ;* one genus of gnats, (*Macrocera*), which flies in darkness, coming to the midnight lamp of him who watches for moths, has *antennæ* of enormous length. Take also the kindred groups of *Cerambycites* and *Lepturites*, the former nocturnal, the latter diurnal, and the same discrepancy of *antennæ* will be observed. In fact, illustration so crowds on illustration, that I should weary your readers were I to write a tithe of those instances which occur to me, as affording evidence that *antennæ* are given as tactors, and are only called into full activity when the opportunity of using eyes has in a great measure ceased. Tactors are capable of a much more varied perception than we should on the first thought be inclined to suppose. A power may long remain dormant, if no circumstances occur to call it into action. The human fingers become both fingers and eyes to the blind. If then in the human species the fingers of one individual possess powers, of which another can scarcely form a conception, how reasonable is it to suppose that the tactors of a cricket are still tactors in a grasshopper, although their employment as such may never be required. The four wings of insects are the instruments of flight; yet in beetles the fore pair have entirely given up that occupation, and are invariably employed as mere covers or protectors to the hind wings, and the soft and yielding *abdomen*: and again, the hind pair in flies have ceased to bear even the semblance of wings. In the same way we see the fore legs of a vast number of butterflies, (the *Rhopalocera suspensa*), losing entirely their usual function, the very obvious and important one of walking, and becoming mere tufts, or ornamental appendages, the end and purport of which might lead us into endless theories, were it not established beyond a doubt, that they are neither more nor less than legs, which the necessities of the animal has not required should be perfected in the same manner as the rest: yet by watching the habits and actions of this tribe of butterflies, we fail to discover any cause why they should possess but four legs, while the cognate group of *Rhopalocera succincta* have invariably six; their flight is neither more sustained, nor more vigorous, neither have they in any minor degree the disposition to settle on flowers, or on the ground.

The question appears to me to be still further simplified by the fact that *antennæ* are not possessed by insects alone. Crustacea are also furnished with them, and in these the *antennæ* seem to have reached the maximum of developement. Now in Crustacea the *antennæ* are tactors and tactors only. I believe I am correct in saying, that no zoologist has ever hinted at their possessing any other office: indeed zoologists are agreed in assigning to Crustacea a true ear, analogous to that of mammals. Analogy therefore fails to furnish us with even the slightest support, if we attempt to fix on the *antennæ* an office foreign to their legitimate use.

We have now seen that the *antennæ* of insects, if regarded as the external instruments of the auditory faculty, have the worst possible structure for such an office, thus outraging that great law of nature which adapts each instrument to its destined end. We have seen that the *antennæ* frequently increase in developement, where the faculty of hearing appears to be entirely useless, and greatly decrease where hearing was obviously required. We have seen that insects do not need such a preponderance of the auditory faculty, as these comparatively enormous instruments would imply that they possess. We have seen that the *antennæ* of other animals possess no auditory faculty, but are used solely as tactors or feelers; and that such animals possess an auditory faculty, the distinct site of which is ascertained. We have seen that there is abundant evidence of the *antennæ* of insects also being used as tactors or feelers, while no single instance is on record, tending to establish their use as ears. How can we then do otherwise than conclude that this supposed auditory faculty of the *antennæ* is nothing more than a vague and wild theory, unsupported by reason, analogy, or fact? How can we claim for such a theory the support of the anatomist, the general zoologist, or the man of common sense? How can we defend that theoretical fabric, whose foundation every fact undermines, whose superstructure is beaten down by every natural analogy? Is not fact the fairest test of theory? And should not theory be the child of fact?

I have done. The broad principle of enquiry with which I have treated the subject before me, is, I acknowledge, unwonted; the appeal from facts to common sense on a subject of science, may perhaps be considered somewhat out of order: yet why should this be so? Science is or should be an accumulation of fact; and that theory is alone worthy the name, which illustrates a design of Providence, by bringing a mass of facts to bear harmoniously on each other.

*April*, 1838.

ART. IV. *Further Observations on "Rules for Nomenclature."*— By W OGILBY, Esq., M.A., F.R.A.S., F.L.S., F.G.S., F.Z.S., &c.

BEFORE proceeding more particularly to notice the several points of Mr. Strickland's 'Reply' to my former 'Observations,' I must be permitted to express my deep regret that he should have felt personally hurt at any thing I may have said on that occasion, since nothing was farther from my wish than to give personal offence to any individual; and I hoped that I had sufficiently guarded myself against misinterpretation in this particular, by the explicit declaration, twice repeated, that "my censure was directed solely against the abuse of a system pregnant with many evils, and by no means intended to apply to its abettors or supporters." Mr. Strickland's name was unavoidably mixed up with my observations; but if so, I took occasion to separate him personally from their operation, by the unequivocal manner in which I expressed those feelings of respect, which, I may be permitted to say, in common with all who have the pleasure of his acquaintance, I entertain for him, both as a gentleman and a zoologist. I must again express my regret that I should have been misunderstood upon this point; but such being the case, I feel grateful to Mr. Strickland for the temperate and gentlemanly tone which he has preserved throughout the discussion, not less than for the flattering terms in which he is pleased to speak of his adversary; and if he has on one or two occasions misapprehended my meaning, it was but natural under the circumstances, and I should be the last person to complain.— Having the same end in view, and differing only as to the proper means of attaining it, our sentiments must coincide in the long run, however we may disagree in words; and if I "lashed" the system which Mr. Strickland supports, I can assure him that my censure was by no means directed against any one "code of rules" in particular, but applied to the whole system of 'codification;' and so anxious was I to avoid offending those who differ with me in opinion, that the only rule which I criticised at length, was selected simply because it originated with Illiger, (or it may be at a still earlier period, for I am not curious in this sort of antiquities), and therefore, I could not be charged with affronting any living author. I shall now briefly advert to some of the principal points of Mr. Strickland's reply.

In charging me with "deprecating all laws," and "pouring out unqualified censure upon the whole code of rules," &c. Mr. Strickland will see, upon farther reference to my paper, that he has permitted his haste to betray him into an error, and thus into an unintentional mistatement. So far am I from "deprecating all laws," that I expressly stated my opinion, "that a *few* simple 'rules for nomenclature,' if founded upon principles *so palpable and indisputable as to command the unanimous assent of naturalists*, would be both convenient and useful;" I granted that generally speaking the particular rules originally cited by Mr. Strickland, might have some practical advantage, if not pushed too far; and I desired it to be understood that "I was not hostile to such rules of nomenclature as are founded upon just and fixed principles;" nay, I even turned legislator myself, and ventured to suggest "EUPHONY and PROPRIETY OF APPLICATION," as, in my opinion, the only legitimate and requisite principles of nomenclature. My censure was directed, not against the *use* but the *abuse* of such rules, and that it was neither misapplied nor unnecessary, is proved by Mr. Strickland's own admissions, and by facts which I shall mention in the sequel.

I was very well aware that Mr. Strickland was not the maker but the compiler of the "Rules" published under his name, and that he had separated those relating to *established nomenclature* from such as are applicable to the *formation of new names;* though I certainly did not consider him, as he now assures me, opposed to the mischievous practice, upon which I chiefly animadverted, of giving them a retrospective tendency, since I find three of them, (Nos. 5, 6, and 7), expressly regulating the cases in which established names may be expunged. That Mr. Strickland did not intend to make his rules retrospective, I fully believe, and regret that I should have been led into the error of an opposite opinion; but that he has inadvertently done so, is not less certain; and it was against the interminable mischief and confusion resulting from the introduction of a principle at once so dangerous, so unfair, and so uncalled for, that I directed the weight of my censure. Nor were my fears upon this subject merely hypothetical; I had, myself, suffered to some extent from this contemptible species of petty larceny, one gentleman having done me the favour of appropriating no fewer than six of my generic and specific names within the last few months; Illiger, a very Minos among legislators, had not been sparing with the rights of his predecessors; and I could mention many other instances, were it necessary. But is not the fact cited by Mr. Strickland himself, of the well-known naturalist from whose works he has chiefly compiled his "rules," having sanctioned their retrospective character, and thereby set the example to the host of minor luminaries who circulate round him as the sun and centre of their system, and who will not be slow to profit by it, a sufficient justification of the severity with which I deprecated the mischievous tendency of these codes? The truth is, that like the old poor-laws, they are better calculated to afford a plausible pretext to idleness and peculation, than to secure the fruits of honest industry.

With regard to the terminations *idæ* and *adæ*, Mr. Strickland will perceive, on reference to my paper, that I quarrelled not with the *use*, but with the *abuse* of these terms; I have sanctioned their *use* upon many occasions, by adopting them myself, but I objected, and still do object, out of mere compliance with a rule, which Mr. Strickland will admit to be purely arbitrary, to sacrifice the legitimate classical import of the term *Simiæ*, as well as the zoological relation which I have made to depend upon its similarity of structure with the new-coined word *Simiadæ*. These Mr. Strickland will surely admit to be substantial reasons; he has himself adduced none on the contrary side of the question, except the propriety of complying with the rule, which, with great deference to Mr. Strickland's logic, is begging the question; since, that being the very subject in dispute, he is clearly prohibited from taking for granted what he ought to prove,—namely, that my nomenclature is necessarily vicious, because it does not comply with his rule. Nor can I altogether agree with Mr. Strickland as to the import of the affix *idæ*. He says it expresses "not the resemblanee of one group to another, but the inclusion in a larger group of a smaller," and that the term Alcmæonidæ signifies "the house or family which included Alcmæon himself, and his immediate relations." If for *relations* Mr. Strickland had written *descendants*, I think he would have been nearer the truth, for I am not aware that the affix in question ever included collaterals; nay, if I be not greatly mistaken, it is absolutely identical with the affix *oidæ*, which, as Mr. Strickland admits, expresses relationship, the *o* being merely the last letter of the primitive Greek word with which ειδης is most commonly joined in composition. The root of the affix *idæ*, as I take it, is to be sought in the verb ειδω; it is cognate with the terms ειδος, ειδωλον, ιδεα, and ιδεαι, all of which signify *forma*, *species*, *similitudo*, likeness or similarity; and enters frequently into composition in this sense, as Αμυγδαλο-ειδης, *amygdalæ species gerens*; Ανθρωπο-ειδης, *like a man*, or *anthropoid*; Ατμο-ειδης, *vapori similis*; Θεο-ειδης, *Deo similis*;* &c. It is needless to mention that *idæ* is only the Latin form of the plural of ειδης; so that Mr. Strickland will perceive that the primitive and only legitimate meaning of the term is *re-*

* Ab his Scapulæ sententiis differt Cl. Westwoodius, sed malè.

*semblance*, *likeness*, or *similarity*, and not *inclusiveness*, as he supposes.

If Mr. Strickland find this suggestion correct, I think he will admit it to be decisive of the question, in my favour, even upon his own grounds; but at all events, the zoological application of the affix in question is equally conventional, either upon Mr. Strickland's principle or mine, and I must be pardoned for observing that the perseverance with which my application is criticised, *in spite of its priority*, is but an example of the indulgence displayed towards one's own *doxy*, and the intolerance towards every other man's *doxy*, which is inseparable from the very spirit of "legislation." Whether the term *Simiadæ* be employed to denote the anthropomorphous *Quadrumana* of the old world or the anthropomorphous *Pedimana* of the new, its use is equally arbitrary; since its original import no more expresses the relation of the baboons to the apes, than of the American monkeys to the African: and as to the *memoria technica* which Mr. Strickland insists so much upon securing, by calling the American animals *Cebidæ*, because they contain the genus *Cebus*, the advantage is of mighty small consequence, since the term, at most, suggests but a single genus, whilst there are nine or ten others to which it furnishes no key whatever.

To my question, "what would science gain by the change of *Simiadæ* into *Cebidæ?*" Mr. Strickland answers, "it would gain a term implying that the family contains the genus *Cebus*, (which it does), instead of one implying that it contains the genus *Simia*, (which it does not)." With great deference to Mr. Strickland, neither of these terms implies either one or other of the things which he has here supposed, except by the operation of his own rule, which, *being the subject matter in dispute, cannot be appealed to in proof of its own propriety*. But this is a sophism, which, as I have had occasion to remark elsewhere, runs through the whole of Mr. Strickland's argument. Neither is Mr. Strickland correct in accusing me of "altogether discarding the Linnean term *Simia*, since I really retain it, not only in its *legitimate acceptation*, but as the name of a more important group than he wishes to assign it to.

In refusing to limit the term *Simiæ* to the orangs, for which I stated my reasons at length in my former "Observations," without meaning, in the most remote degree, to apply any of the "cardinal sins" there enumerated, to Mr. Strickland, though I regret to find him labouring under this misconception, I stated, that, had I done so, "I should have been using the term in a new sense, different from its legitimate acceptation, and from the sense which had been hitherto attached to it in Zoology." The latter part of this statement Mr. Strickland has taken considerable pains to combat, and appeals, in support of his position, to the authority of Linnæus and Erxleben. That both these naturalists employed the term *Simia* in a sense different from its real signification, is very true, but that neither one nor the other of them sanctions its application in the sense contended for by Mr. Strickland, is no less so; and I should not consider myself justified in wilfully and knowingly committing a fault, because others have done so before me. And here let me pause, once more, to remark the arbitrary and intolerant spirit of "legislation," tolerant of its own sins, impatient of another's virtues: it is granted on all hands, that my application of the term *Simia*, is conformable to the exact and legitimate meaning of the word; yet here we have a "code of rules," professing to secure "propriety of application," and in the same breath upbraiding me for my adherence to this very principle, professing to secure "the right of the founder of a higher division to give it a name," and at the same time contesting my exercise of this unquestionable privilege! And why? Because, in spite of the "right" and the "propriety," which the code pretends to secure by one rule, their exercise, *in this particular instance*, clashes with another; and thus it is modestly expected, nay insisted on, that every consideration of propriety, priority and convenience, should give way to these ill-digested and contradictory "rules"! The whole system is one monstrous sophism, an egregious "*petitio principii*," and I must therefore crave leave to persist in my own nomenclature, in spite of its anathemas, not because it is my own, but because it is the best I have met with.

In protesting against my unqualified censure of all rules, "as arbitrary and dogmatical, and equally opposed to good sense, sound criticism, and fixed principles," Mr. Strickland admits that some of them may be open to criticism, but thinks it unfair to infer from one or two examples, that the whole are equally deserving of censure. To convince Mr. Strickland that I did not generalize too rapidly in this matter, or draw my inference from insufficient premises, I must beg leave to make a few remarks upon two or three others of the rules in question, taking my examples at random from his own "code" and that of Illiger, and assuring him that in deprecating the carelessness of the system, I mean no disrespect for the authors or compilers of the "rules," or, to use the words of the celebrated Dr. Reid, on a similar occasion, "that no disparagement is meant to the understandings of the authors or maintainers of such opinions, which commonly proceed, not from defect of understanding, but from haste, and an excess of refinement."

The 6th rule of Mr. Strickland's code enacts that "a name may be expunged, whose meaning is false as applied to the object or group which it represents," and according to the 11th, "the meaning of a name must imply some proposition which is true as applied to the object which it represents."—The idea expressed in the first of these rules is one of the besetting sins of the age, and as it opens a wide door for the most captious and mischievous innovation, so unfortunately its operation is not confined to Zoology, but extends to every other department of science, and even to the language of common life! The second rule is equally unnecessary, though not so mischievous, since it professes to apply only to new names, whilst the first is retrospective; both arise from a total disregard of the true use and meaning of language, a heavy charge against gentlemen who profess to dictate laws and expound the principles of nomenclature. *Words* are but the *signs* of ideas; their application is at first purely arbitrary; they gain currency only by convention, and so long as we agree to give them a particular signification, it matters not a pinch of snuff what may have been their original or literal meaning, or whether they had any meaning at all. If there be any difference, the latter sort are indubitably the best, in spite of the dictum laid down by "Rule 11;" because, as signs of ideas, they can never lead to error or confusion, whereas those recommended by the "rule," are in their very nature equivocal. But let us hear what Locke says upon this subject, an authority from which, I presume, even the legislators for zoological nomenclature will not be hardy enough to dissent. "Names are but arbitrary marks of conceptions; and so they be sufficiently appropriated to them *in their use*, I know no other difference any of them have in particular, but as they are of difficult or easy pronunciation, or of more or less pleasant sound; *and what particular antipathies there may be in men to some of them*, is not easy to be foreseen;.... for my part, I have no fondness for, nor antipathy to, any particular articulate sounds, nor do I think there is any spell or fascination in any of them." This is philosophy and good sense, but it is not the fashion; the modern rage is all for change and innovation; "Poluphlosboiophanism" is the order of the day; it has invaded the very names of all ranks from the prince to the peasant;

> "Julius Augustus Alexander Spire,
> "Was gamekeeper to Thomas Stubbs, Esquire;"

the old name of Metaphysics, which had done very well for two thousand years, has been lately found unsuited to this "poluphlosboiophanous" age; the science of mind is now Psychology, Ideology, Phrenology, or Pneumatology, just as it happens to suit the taste of the legislator, and I live in daily hope of the advent of some adventurous Shiloe, who will extend the fashionable principle to History and Biography, to the great advantage and improvement of these branches of knowledge. It is a sign of the times; the unknown tongues have not died with Mr. Irving, though I fear the power of interpreting them has, and if not soon stopped, we may look out for nothing less than a second dispersion of mankind from this universal babylonic confusion.

Rule 7 is equally objectionable, though for a different reason, but as its scope is comparatively limited, I shall pass on to Rule 14, which is one of those cited in Mr. Strickland's "Reply." "The meaning of names should be founded on *absolute* characters, not on relative or comparative ones." To my simple apprehension, this rule involves a metaphysical impossibility. What are *absolute* characters or qualities? I know of none such in nature, and if the author of the rule does, I can only say that he beats John Locke and Dugald Stewart hollow, and should forthwith communicate so rare and important a discovery to the rest of the world. At all events, having much the advantage of his readers, he should have taken pity on our ignorance, and defined what he meant by absolute characters, or at least drawn some line of distinction between them and relative; a task, however, which might, perhaps, *bother* a whole jury of legislators, with Mr. Westwood for foreman. But let me not be accused of hypercriticism; perhaps by *absolute*, the author may mean *differential* characters, and by *relative*, mere *modifications;* if so, the rule is less objectionable; but I have been induced to notice it because it affords a glaring example of the carelessness with which I formerly accused such rules of being drawn up.

Let us now glance at Rule 18, another of those cited in Mr. Strickland's "Reply;" "names of families and sub-families should be derived from the most typical genus in them." It is under the authority of this rule that I am so severely reprimanded for not calling the anthropomorphous *Pedimana*, *Cebidæ*, because the group includes the genus *Cebus*, which the legislators are pleased to call its typical genus, though for what reason, or what right it has to that distinction more than the genus *Mycetes*, or *Lagothryx*, I am utterly at a loss to imagine. But let us see with what justice I am accused. We hear continually of the *type* of such or such a genus, and of *typical* species, *typical* groups, and *typical* genera. Now if the word type be merely synonymous with *example*, I see no objection to it, but on the contrary have employed it in this signification myself: but it is notoriously employed by others in a very different sense, and one to which I confess I can attach no definite meaning. A generic term, such as the name of a group, genus, or family, necessarily expresses an abstract idea, which refers to no existing thing, but is a mere creature of abstraction, or if you will, of imagination. To talk therefore of the *type of an abstract idea*, is sheer nonsense, and only betrays how little those who use the term study its import.

Turning to the code of Illiger, I find the following enactment; "*Nomina ex vocabulo græco et latino similibusque hybrida, non agnoscenda sunt;*" which I quote merely to shew the singular latitude which the legislators allow themselves, even in breaking through their own rules. There is not a single instance of the *Greek* affix *idæ* or *adæ* being appended to a *Latin* word, in which they do not openly violate this law!—But Mr. Strickland may tell me that the law is not found in his code: very true, but it is as good a law as any found there, and proves that whilst the authority of the legislators clashes *inter se*, they are unreasonable in attempting to make it obligatory with others. Again, according to Illiger, "*Nomina anatomicorum, artificum, (et vitæ communis) nomenclaturis communia, omittenda sunt.*" Here is a splendid field open for the poachers; and it must be confessed that they have the example as well as the precept of the author. What other purpose this pernicious retrospective principle can possibly answer, unless it be charitably intended to prevent us from confounding *Arvicola vulgaris* with Columella or Triptolemus, or mistaking *Tantalus Ibis* for the ancient prototype of the "tea-totallers," I am utterly at a loss to conceive. But I have spent more time upon this part of the subject than I had originally intended, though I am still far from having exhausted the objections which I might urge against the system of "codification." I hope however I have said enough to justify my former denunciation of the rules, as "arbitrary, dogmatical, and carelessly drawn up."

Mr. Strickland says, "Mr. O. says that euphony and propriety of application are principles which he finds *no where* clearly developed *in any* of the codes of nomenclature lately published. Now on turning to vol. i. N. S. p. 175, he will find that euphony is provided for by Rule 13, and that Rules 11, 12, 14, 15, 18, 20 and 21, are all intended to insure propriety of application; so that the phrase, "*no where* clearly developed *in any* of the codes," is another instance of the rather free use of superlatives in which Mr. O. has indulged." Had Mr. Strickland in this passage underlined *clearly* instead of the words which he has put in italics, and which is an alteration of his own, not found in the original, he would have more justly conveyed my meaning: but let us see how far I am to blame, even upon his own showing.—Turning to Rule 13, which Mr. Strickland says provides for the euphony which I failed to discover in any of the codes, I find it says, "Names should not be too long, even though classically compounded." Now unless Mr. Strickland had told me so, I confess I should never have discovered how this rule provided for "euphony." To my mind euphony is a very different quality from redundancy; nor can I imagine what it has to do with the mere length or shortness of words. The Greek and German languages, remarkable for the length of their polysyllabic compounds, are equally celebrated for the harmony and liquid softness of their enunciation; the term "poluphlosboiophanous," which I took the liberty of introducing to the English reader in my former "Observations," has been admired for its euphony ever since Homer wrote the Iliad, yet I know few longer, except

"σπερμαγορειλεωθολικαθωλιπολιτης,—

A word that ought only to be said on holidays, when one has nothing else to do,"—so that far from meriting the reproach of "indulging too freely in the use of superlatives," I have really been more lenient towards the "Rules," in this matter of euphony, than they deserved; since in reality it appears evident that this essential quality is not only *no where clearly* provided for, but that it is *no where provided for at all.* As to "propriety of application," the term is never mentioned in any of the codes I am acquainted with, and granting that the rules enumerated by Mr. Strickland do, in some sort, aim at securing it, I must confess that I still consider the phrase "no where *clearly* developed," as strictly and justly applicable to the case. But I care little for the phrase itself, and should not have thought it worth defending, had not Mr. Strickland charged it with being overstrained.

I have hitherto confined my observations principally to individual "rules," but I confess that one of my greatest objections arises from the interminable length of the "codes" themselves, and the great multiplicity of laws which they embrace, frequently arbitrary and unfounded, and sometimes opposed to one another; so that it is next to impossible to comply with them all, or avoid being tripped up by some expert legislator when you least expect it. The code collected by Mr. Strickland himself contains twenty-two rules; that of Illiger, nineteen; besides which we have the 'Codex Westwoodianus,' and, for aught I know to the contrary, a hundred others which I have not had the good fortune to meet with, but which, taken all together, must needs make the search after a new name as difficult and intricate as that for the north-west passage, or the philosopher's stone. Here lies Scllya, there Charybdis; to the right, a rock, to the left, a sand-bank; the passage being so beset with whirlpools and quicksands that Palinurus himself, with the *advice* and *experience* of Mr. Westwood to boot, could scarce steer through the labyrinth. In short, these "Codes for Nomenclature" put me in mind of nothing so much as Mrs. Malaprop's account of the " laws of CONFUSION, the Chinese Philosopher,

"Where you feel like a needle going astray,
"*With its one eye out*, through a bundle of hay."

I have now done with "Codes" and "Codification." The subject was forced upon me, or I should never have voluntarily taken it up: I have been arraigned before a court of which I dispute the jurisdiction, and tried by laws which derive no force either from their wisdom or utility, and whose authority, I have endeavoured to shew, neither is nor ought to be binding, inasmuch as it is derived not from necessity, consent, or any fixed principles, but only from the arbitrary dictum of individuals; and whose practical operation, far from securing the stability or uniformity of scientific nomenclature, can only tend to involve it in interminable confusion and uncertainty. I repeat again that I am not hostile to such "rules for nomenclature" as are founded in *rerum naturâ*, and conformable to good sense, sound criticism and fixed principles; and if what I have said here and elsewhere, can in any way tend to promote so desirable an object, I shall not think my labour in vain. Mr. Strickland and those who think with him, have, I am sure, the same end in view as I have myself,—that of benefiting science, and restraining the depredations of poachers and petty larceners,—we disagree only about the proper means, nor do I think our opinions differ so much in reality as they appear to do in words. So long, however, as the very *groups themselves*, in Zoology, are not less unsettled and fluctuating than their names, it is useless to think of reforming or amending the nomenclature of the science; it is beginning at the wrong end; let us rather set about studying the natural boundaries and relations of the groups, and it will be time enough afterwards to settle their nomenclature.

ART. V. *Letter from* The Rev. W. B. CLARKE, *on the Non-Identity of Suffolk Diluvium and Crag.*

MY Dear Sir,

As nothing tends so materially to the increase of error, as ascribing to others those opinions or expressions which they do not employ, I am sure that you will allow me to make a remark or two on the note which you have appended to my letter "in reference to the alleged occurrence of the bones of terrestrial *Mammalia* in the red and coralline crag of Suffolk." (P. 224—225).

I have alluded in that letter to Mr. Lyell's opinions respecting the relative ages of the crag and *diluvium;* and my words are,—'I have shewn that the *diluvium* and *crag* are not, as Mr. Lyell has supposed, of the same age.' To this you have added in a foot-note,—'The above observation of Mr. Clarke's appears to us calculated to convey a wrong impression of the opinion Mr. Lyell has advanced upon this subject; for although he may have referred certain beds to the tertiary epoch, which more properly belong to the diluvial, yet we think there is no ground whatever for assuming that Mr. Lyell has considered, in an extended sense, the *diluvium* of Suffolk and Norfolk to be of the same age as the crag.'—*Ed.*

Giving you credit for that desire to be candid and fair which I assume to myself, I must beg you to compare my assertion respecting Mr. Lyell's views, as to the unity of age of these formations with his own words, in which he conveys, 'in an extended sense,' all and more than I have attributed to him. After describing the composition of the crag beds, and what I term *diluvium,* together with their transported and foreign contents, he says,—'It has been questioned whether all the above-mentioned beds can be considered as *belonging to the same era.* The subject may admit of doubt, *but after examining, in* 1829, *the whole line of coast of Essex, Suffolk, and Norfolk, I found it impossible to draw any line of separation between the different groups.* Each seemed in its turn to pass into another, and those masses which approach in character to *alluvium,* and *contain the remains of terrestrial quadrupeds,* are occasionally intermixed with the strata of the crag.' (Vol. 3, 8vo. ed. ch. xiii. pp. 171 & 172).

You will now, I am assured, acquit me of misrepresenting Mr. Lyell's opinions. It is true, however, that in the last edition of his 'Principles &c.' he has adopted another view.—He says, (ed. 5, 1837, vol. iv. p. 76), 'Superimposed upon the fossiliferous crag in the cliffs of Norfolk and Suffolk, is a formation of much greater thickness and *of more uncertain age.*

It has been sometimes classed with the crag, and sometimes distinguished from it under the name of *diluvium.*'

But the remarks in my former letter had reference to the views I adopted in my Memoir on Suffolk Geology, in distinction to Mr. Lyell's, as first adopted by him; and it was not till after that Memoir had been read, that I first saw his expression, 'more uncertain age,' in the edition published after the reading of that paper, and the discussion on the very subject of crag and *diluvium*, in which both you and myself took part at Bristol, in 1836. How far any opinions held by me, in common with others, may have had any influence on the distinguished author and geologist, whose opinion on the subject of the crag and *diluvium* I ventured to oppose, I cannot presume to say; yet it is certain, that he held the views I attributed to him, and that he has now only modified them to a certain extent. As my object in this letter is to set myself right with your readers, I shall not extend it so as to afford any further proof that my position as to the *different ages* of the Suffolk *diluvium* and the crag, is a correct one. At a future time I may, perhaps, trouble you with a few illustrations from my notes upon the subject.

Your's faithfully,
W. B. Clarke.

*Stanley Green,*
*April* 10*th*, 1838.

Editor of the Magazine of Natural History.

## REVIEWS.

Art. I. *The Zoology of the Voyage of H.M.S. Beagle, under the command of Captain Fitzroy, during the years* 1832—1836.—*Published with the approval of the Lords Commissioners of Her Majesty's Treasury.* Edited and superintended by Charles Darwin, Esq. M.A., F.G.S. C.M.Z.S. Naturalist to the Expedition. Part I. No. 1.—*The Fossil Mammalia,* by Richard Owen, Esq. Professor of Anatomy aud Physiology in the Royal College of Surgeons. London: Smith, Elder & Co., Cornhill. 1838.

It is with much pleasure that we take an early opportunity of noticing the commencement of a work, which, when complete, will contain a mass of zoological detail, of no ordinary value and interest; and perhaps unexampled in amount, considered as the result of single-handed research, undertaken by an individual whose attention is known to have been, during the same time so successfully directed to other matters of philosophical investigation. The circumstances under which the scientific world is about to be put in possession of this rich fund of new information upon so many objects of natural history, are of a somewhat unusual nature; for pecuniary assistance has, in this country, hitherto been rarely extended by the government, for the advancement of zoological knowledge, by specific grants to aid the publication of such works as the present. Although the assistance so liberally afforded to Mr. Darwin on the present occasion,* cannot fail of being a source of gratification to all those who feel an interest in the progress of Zoology, as indicating the just appreciation of the value of his labours, in the quarter from which that assistance was derived, at the same time we cannot help expressing our conviction, that the policy of this measure on the part of the government, is, to a certain extent, a debatable point. That the immediate result is a beneficial one, cannot be disputed; but is it not brought about by the intervention of means involving consequences which, to a greater or less extent, may operate injuriously upon the very cause which it was originally intended to serve?

How many ardent cultivators of scientific pursuits there are in the field of Natural History, the results of whose labors are launched forth, backed only by their own resources, or those of their publishers! Purchasers are prone, inconsiderately perhaps, to judge by comparison; and when a scientific volume of such paramount interest as the one in question, comes before the public at a price far less than the actual expense of publication, may not the prospective effect be unfavorable, as regards the making public the researches of those naturalists, who may not be so fortunate as to gain a share of the same powerful co-operation?

It is perhaps almost unnecessary to remark, save for the sake of argument, that instances might readily be mentioned of individuals, who, in devoting their time and energies to the illustration of particular departments of Natural History, are, to a very great extent, dependant upon the encouragement given to scientific publications, and who could not, by possibility, employ their talents in pursuits of this nature, unless able, from their scientific acquirements, to reap some pecuniary advantage. Now if a certain proportion of expensively illustrated works are offered by government to the public, at a greatly reduced price, a natural consequence will be, that these will sell, to the partial exclusion of some of the more costly publications which are brought out at individual risk,

*A similar grant has also been made to Dr. Andrew Smith, for his forthcoming work on South African Zoology.

and hence a check would, in this respect, be placed upon the spirit of private speculation. Let us suppose, for instance, that Mr. Gould, whose intention of visiting Australia was noticed in a recent number of the Mag. Nat. Hist. had returned to this country, contemplating the publication of a work, which, instead of being restricted to the birds, should embrace the entire Zoology of that portion of the globe, would he not, upon finding that two works of the same general nature as his own, were being issued for the price of letter-press and paper only, feel this circumstance an obstacle in the way of his own success, unless he were conscious that his established reputation as a naturalist, would ensure him a sufficient sale to justify his risking the necessary outlay of capital? The works, it is true, could not be regarded in any way as interfering with each other in their nature and object, as each would refer to distinct parts of the world, but it is obvious enough that in cases where the resources of public institutions or of private individuals did not allow of their subscribing to all three, that the preference would be given to those published under the patronage of the government.

We make the above casual observations, without meaning to express any decided opinion upon the merits of the question, but rather with a view of directing attention to the subject.

The first public announcement of the treasures Mr. Darwin was accumulating in the southern continent of America, is still vividly fresh in our recollection; and such of our readers as were present at the Geological Society, on that evening, will doubtless remember the great interest excited by extracts from his letters, which were communicated to the meeting by Professor Sedgwick. Since that time, Mr Darwin's return to this country, and his residence in London, have enabled him to take an active part in the scientific proceedings of that flourishing Society, where the proofs which have been given of his talent, have more than realised the sanguine anticipations indulged in by those, who, during his absence on the expedition, had the opportunity of becoming acquainted with some partial details of the researches in which he was so successfully occupied. Captain Fitzroy was certainly most fortunate in meeting with a gentleman who has shewn himself so admirably suited to carry his wishes into effect, with regard to the scientific part of the expedition.—Possessing a general and comprehensive knowledge of Natural History, without entertaining so strong a predilection in favor of some one branch of it, as might have led him to concentrate his observations upon that alone, to the exclusion of others;—endowed with extraordinary talent for observation, and a just confidence in his own powers of induction and generalization; and, added to these, the capability of recording his views upon such phenomena as might present themselves to his notice, in a style at once clear, forcible and concise;—are among the qualifications which rendered Mr. Darwin peculiarly fitted to accompany, in the character of Naturalist, a voyage like that undertaken by the Beagle.

We cannot omit a passing notice of the course pursued by Mr. Darwin, in reference to the disposal of the rich stores in the different classes of the animal kingdom, collected by himself during the progress of the expedition. There can be no doubt that the scientific attainments of this gentleman are such, as would readily have enabled him to characterise the greater part of the new forms which he had collected, so as at least to have entitled him to be considered the original describer of the species; and the name of 'Darwin' would, in that case, have been appended to some hundred birds, quadrupeds, reptiles, &c.; a means of acquiring scientific notoriety, most eagerly caught at by some aspirants to zoological fame. The manner, however, in which Mr. Darwin has acted, with reference to this point, is not less creditable to his liberality of feeling, than to his appreciation of the way in which science would reap the greatest amount of advantage from the materials in his possession. Thus we find it stated in the preface, that while the specimens themselves have been presented to those Museums in which they would be likely to prove most serviceable, the descriptions of the recent *Mammalia* have been undertaken by Mr. Waterhouse, the able Curator of the Zoological Society; the birds by Mr. Gould, the celebrated Ornithologist; the reptiles by Mr. Bell; the fish by the Rev. L. Jenyns; while the fossil *Mammalia*, the history of some portion of which constitutes the contents of the part now under notice, have been placed in the hands of Professor Owen.

Mr. Owen's elaborate description of the *Toxodon* and *Macrauchenia*, two of the most remarkable forms among the fossil *Mammalia*, and his dissertation upon their probable affinities, is prefaced by a slight history of the physical aspect of the region in which these extinct genera were discovered, with some account also of the nature of the deposit in which they were embedded. This geological introduction, written by Mr. Darwin, brief as it is, details some facts which appear to us of the very highest importance, and which we trust will be more fully treated of in the separate work which he is engaged in preparing, upon the history of these deposits.

The occurrence of certain species of marine shells, identical with species existing in the neighbouring sea, in the same formation as that containing the fossil *Mammalia*, is particularly noticed by Mr. Darwin, as a proof of the very recent epoch to which these fossiliferous beds should be referred.—Upon this point, however, and upon the manner in which the remains of land animals were introduced in such abundance into these marine deposits, we will give the author's views in his own words.

*** "We may feel certain, that at a period not very remote, a great bay occupied the area both of the Pampas, and of the lower parts of Banda Oriental. Into this bay the rivers which are now united in the one great stream of the Plata, must formerly have carried down, (as happens at the present day), the carcasses of the animals inhabiting the surrounding countries; and their skeletons would thus become entombed in the estuary-mud which was then tranquilly accumulating. Nothing less than a long succession of such accidents can account for the vast number of remains now found buried. As their exposure has invariably been due to the intersection of the plain by the banks of some stream, it is not making an extravagant assertion, to say, that any line whatever drawn across the Pampas, would probably cross the skeleton of some extinct animal.

"At Bajada, a passage, as I have stated, may be traced upwards from the beds containing marine shells, to the estuary-mud with the bones of land animals. In another locality a bed of the same mineralogical nature with the Pampas deposit, underlies clay containing large oysters and other shells, apparently the same with those at Bajada. We may, therefore, conclude that at the period when the *Arca*, *Venus*, and Oyster were living, the physical condition of the surrounding country was nearly the same, as at the time when the remains of the *mammalia* were embedded; and therefore that these shells and the extinct quadrupeds probably either co-existed, or that the interval between their respective existences was, in a geological point of view, extremely short. In this part of South America there is reason to believe that the movements of the land have been so regular, that the period of its elevation may be taken as an element in considering the age of any deposit. The circumstance, therefore, that the beds immediately bordering the Plata, contain very nearly the same species of molluscs, with those now existing in the neighbouring sea, harmonizes perfectly with the more ancient (though really modern) tertiary character of the fossils underlying the Pampas deposit at Bajada, situated at a greater height, and at a considerable distance in the interior. I feel little doubt that the final extinction of the several large quadrupeds of La Plata did not take place, until the time when the sea was peopled with all, or nearly all, its present inhabitants." Page 6.

"In another part of the bay, called Punta Alta, about eighteen miles from Monte Hermoso, a very small extent of cliff, about twenty feet high, is exposed. The lower bed, seen at ebb tide, extends over a considerable area; it consists of a mass of quartz shingle, irregularly stratified, and divided by curved layers of indurated clay. The pebbles are cemented together by calcareous matter, which results, perhaps, from the partial decomposition of numerous embedded shells. In this gravel the remains of several gigantic animals were extraordinarily numerous. The cliff, in the part above high water mark, is chiefly composed of a reddish indurated argillaceous earth; which either passes into, or is replaced by, the same kind of gravel as that on which the whole rests. The earthy substance is coarser than that at

Monte Hermoso, and does not contain calcareous concretions. I found in it a very few fragments of shells, and part of the remains of one quadruped.

"From the bones in one of the skeletons, and likewise from those in part of another, being embedded in their proper relative positions, the carcasses of the animals, when they perished, were probably drifted to this spot in an entire state. The gravel, from its stratification and general appearance, exactly resembles that which is every day accumulating in banks, where either tides or currents meet; and the embedded shells are of littoral species. But from the skeleton, in one instance, being in a position nearly undisturbed, and from the abundance of *Serpulæ* and encrusting corallines adhering to some of the bones, the water, at the time of their burial, must have been deeper than at present." Page 7.

"Of these shells it is almost certain that twelve species, (and the coralline), are absolutely identical with existing species; and that four more are perhaps so; the doubt partly arising from the imperfect condition of the specimens. Of the seven remaining ones, four are minute, and one extremely imperfect. If I had not made a collection, far from perfect, of the shells now inhabiting Bahia Blanca, Mr. Sowerby would not have known as living kinds, five out of the twelve fossils: therefore, it is probable, if more attention had been paid to collecting the small living species, some of the seven unknown ones would also have been found in that state. The twelve first shells, as well as the four doubtful ones, are not only existing species, but nearly all of them inhabit this same bay, on the shores of which they are likewise found fossil. Moreover, at the time, I particularly noticed that the proportional numbers appeared closely similar between the different kinds,—in those now cast up on the beach, and in those embedded with the fossil bones. Under these circumstances, I think, we are justified, (although some of the shells are at present unknown to conchologists,) in considering the shingle strata at Punta Alta, as belonging to an extremely modern epoch." Page 9.

The most important consideration which occurs to us as arising out of the facts noticed by Mr. Darwin in his examination of the deposits of the Pampas and neighbouring localities, is that the series of embedded fossil *Mammalia* should consist of extinct genera or species, including some forms with very remote affinities to any existing at the present day; whilst the marine shells which so frequently accompanied the bones of quadrupeds, were, with two or three exceptions, referrible to species inhabiting the nearest seas.

Mr. Lyell, it is true, has endeavoured to shew that in the class *Mammalia* species have not an existence throughout so extended a period of time as in the *Mollusca;* but in the present instance, we apprehend that the revolution which has taken place in the South American quadrupeds, has occurred within so recent period, that a solution of the phenomenon will hardly be discovered in the slow and gradual operation of existing causes. Were it not for the circumstance of several skeletons having been discovered, with the different bones in their relative positions, we should have ventured to remind Mr. Darwin that the fossils of two or more geological periods may be introduced, to an unlimited extent, into one and the same deposit, without the slightest clue being present by which such a condition may be detected. The proposition that the contemporaneous deposition of organic bodies in sedimentary beds, is a proof of contemporaneous pre-existence, ought long since to have been scouted by all geologists who have the slightest insight into the operation of existing causes. If a few hundred square miles of the bed of the sea along the eastern coast of England, were at this moment to be elevated above the level of the surrounding ocean, and the plain thus formed intersected by streams, the skeletons of extinct *Mammalia* which are there being quietly entombed, literally by hundreds of thousands, would become exposed in the same abundance as they have recently been noticed in the various localities alluded to by Mr. Darwin. Now we know that in this case there would be no relation of contemporaneous *pre-existence* between the tusks of the mammoth and the oyster-shells adhering to them, though undoubtedly there would be one of contemporaneous *deposition*. Had the entire skeletons, discovered by Mr. Darwin, been those of species now inhabiting South America, we should have been strongly inclined to suspect that the Pampas deposit, like that now accumulating on some parts of our own coast, probably contained the remains of quadrupeds of different periods. In the latter, the bones of *extinct* animals occur necessarily in a detached state, but the carcasses of such of our indigenous quadrupeds as may chance to be drifted down by rivers which there enter the sea, would probably be inhumed entire.

The length to which our present notice has extended, obliges us to defer, until the publication of the second part, our remarks upon the extraordinary fossil genera, *Toxodon* and *Macrauchenia.*

## SHORT COMMUNICATIONS.

CAPTURE *of the White-tailed Eagle*, (*Falco albicilla:* Penn. Mont. *Haliaetus albicilla*, Selby), *on the Suffolk Coast, February* 22*nd*, 1838.—A fine specimen of this noble bird, an adult female, was observed by some boatmen to fall into the sea, at the mouth of the River Orwell, and not again rising, they put off and secured it without difficulty: it expired in a few minutes after its capture.

The men who secured it could give no reason for its thus falling, (unless it pounced at a fish, and was unable to mount again), as it was in fine condition, and did not appear to have been wounded.

Thinking the above might be interesting to some of your numerous readers, (if thought worthy of insertion), I have taken the liberty of forwarding it, the bird being in my possession.—*Ipswich, February*, 1838.—*T. Townsend.*

*Locality for Brookite.*—This extremely beautiful and rare mineral is generally supposed to be one of the productions of Snowdon; but the true locality of it is on the road side between Beddgelert and Tremaddoc, Carnarvonshire, about 8 miles from Snowdon. It there occurs in large and distinct crystals, many of which are transparent, accompanied by Rock-crystal and Cleavelandite, in cavities and adhering to the walls of a very large irregular vein of quartz in a somewhat slaty grauwacke rock. I have found two crystals of anatase in the same vein.—*G. B. Sowerby.*

*Probable cause of the Death of Parrots, and other Birds confined in Cages.*—A cockatoo having died suddenly during the night, I was solicited to examine it, for the purpose of exculpating certain individuals who were suspected of having administered some deleterious substance in order that they might not be further annoyed by its noises and screechings. Having opened and inspected several other organs, my attention was directed to the *gizzard*, on account of its extreme solidity and apparent repletion. Upon making an incision in it, I observed it to be full of small pieces of brass and iron wire, variously twisted, with five small pebbles, about the size of peas. I then made an enquiry relative to the state of the bird's health, when it appeared that for some time past it had shewn symptoms of disease, and had not touched any thing in the shape of food for ten days together; in the mean time sickness and disease were produced, owing, without doubt, to the wire acting as a poison. On further enquiry I ascertained that neither sand, gravel, nor similar articles necessary for the trituration of the food in the gizzard, had been placed in the cage. Judging from the smooth and rounded appearance of the pebbles, I have not the slightest hesitation in saying that they had been in the gizzard ever since last summer, (a period of at least seven months). Upon closely examining the gizzard, its internal surface was found to be much corroded, and of a dark green and brownish colour; it was also thickened in some parts to the extent of 4½ lines. The cellular structure at the opening was much inflamed and corroded, and in some parts entirely destroyed by the acridity produced by the metal.

Had gravel or sand been placed in the cage instead of mahogany saw-dust, the life of the bird would undoutedly have been prolonged. The nature of the sawdust not offering sufficient resistance in order to accomplish the desired end, the bird instinctively picked the smaller pieces of wire, used to bind the cage together, to compensate for this deficiency on the part of its owners. Much instinct was shown in the manner in which it had folded the pieces of wire in order to swallow them; most of the pieces when doubled and twisted measured one third of an inch in length, but when unfolded measured nearly one inch. The contents of the gizzard after having been washed and dried, weighed 26.6 grains.—*Daniel Cooper*, 82, *Blackfriars Road.*

*We see* by an announcement on the advertising sheet of our present number, that the collection of objects in Natural History, formed by Dr. Andrew Smith, in South Africa, and which has, for some time past, been exhibiting at the Egyptian Hall, Piccadilly, is shortly to be put up to public sale. We observe also that the skull of the *Deinotherium*, the discovery of which has recently excited so much attention among naturalists, along with a large series of tertiary fossil *Mammalia*, the property of Dr. Klipperstein, of Gissen, is advertised for sale through Mr. Sowerby, of Great Russell Street.—*Ed.*

## LITERARY INTELLIGENCE.

*Shortly will be published* a monograph on the Anatidæ or Duck Tribe, including the geese and swans. Illustrated by twenty-four lithographic plates, chiefly by Goued, Scharf, and Lear, and upwards of seventy wood-cuts, illustrating the forms of the bills and the feet in the different genera. By Thomas C. Eyton, Esq. F.L.S. Author of a history of the rarer British Birds, intended as a supplement to Bewick.

*Kollar's* Natural History of Injurious Insects, reviewed at p. 235 of this Magazine, has been translated into English, and will shortly be published. It will be illustrated with engravings, and edited by Mr. Westwood.

*Professor* Thomas Rymer Jones, of King's College, London, is engaged in writing a general outline of the animal kingdom, exhibiting the structure and internal economy of every class of living beings, and their adaptation to the circumstances in which they are severally destined to exist.

The work will be systematically illustrated by an extensive series of drawings by the author, and published on the plan of Professor Bell's, and Mr. Yarrell's works on British

John Van Voorst, Paternoster Row, April 23rd, 1838.

# THE MAGAZINE

OF

# NATURAL HISTORY

## JUNE, 1838.

Art. I. *Some Observations on the Habits of the Dottrel, (Charadrius Morinellus,* Linn.*) made in Cumberland, during the Summer of* 1835. By T. C. Heysham, Esq.

Previous to the publication of Mr. Selby's 'Illustrations of British Ornithology,' so many authors of undoubted talent and veracity had stated that the dottrel was not only a regular summer visitant, but annually resorted to various districts in the northern counties of England and the Highlands of Scotland to breed, that I am altogether at a loss to conjecture on what grounds a naturalist of Mr. Selby's ability and research could deliberately assert that this bird is merely a cursory visitant in this country, during its migration to and from its breeding quarters in the northern latitudes, as well as that the eggs of this species have never yet been found, with this exception, that he was never able to meet with either during the season of incubation, in his various excursions to the Cheviot hills and the Highlands of Scotland.

In order, however, that the reader of this paper may be better able to form an opinion on this question, I shall, in the first place, give a few extracts from the different authors who have written on the subject, (some of their works having become exceedingly scarce, and consequently very difficult to procure), then transcribe the whole of Mr. Selby's article, and conclude with a few remarks on the habits of this bird during the breeding season, the result of my own observation, which I am confident will convince the most sceptical on this point, that the dottrel is not only a regular summer visitant, but annually breeds on the mountains which contribute so materially to the grandeur and magnificence of some of the most beautiful and romantic scenery in the county of Cumberland.

Dr. Heysham, I believe, is one of the first naturalists in this country who has given any authentic information relative to the habits of this bird. In his 'Catalogue of Cumberland Animals' I find the following remarks: "The dottrel comes in May, is a scarce bird in this county, but is more plentiful in Westmoreland. In June, 1784, ten or twelve were shot on Skiddaw, where they breed. On the 18th of May, 1786, I had two females sent from the neighbourhood of Appleby; on dissection, I found the eggs very small, so that it is probable that they do not lay till June. They leave this county the latter end of September or beginning of October; I have seen one which was shot on the top of Skiddaw on the 16th of September."* At the time the above was written, Dr. Heysham had seen three eggs of this bird, which had been found on Skiddaw. The subjoined description of these eggs was published in the 'Philosophical Magazine,' along with a few remarks of my own on this species. Dr. Heysham's MS. is still in my possession.

"Sometime last summer a nest of the dottrel was found on Skiddaw. The old bird was killed, and the eggs brought away, which were three or four in number. I saw three of them; they are somewhat larger than a magpie's egg, the ground is a dirty clay colour, marked with large irregular black spots. February 14th, 1785." †

In the 'Ornithological Dictionary' and 'Supplement,' Col. Montagu relates the following particulars. "The dottrel appears to make this country a resting place in its migratory flights to and from its breeding place. It is seen on some of our downs, heaths, and moors, from April, to the beginning of June, and returns again in September, and remains till November. On the Wiltshire downs it resorts to the new-sown corn or fallow ground, for the sake of worms, its principal food. They fly in families of four or six, in the autumn, which we have observed to be the two old birds and their young; but sometimes a dozen or more flock together. It is a stupid bird, and easily shot; when disturbed it will frequently extend one wing, and does not fly to a great distance. It doubtless goes northward to breed, but we do not find any one who mentions the nest or eggs. It is probable some may breed in the mountains of Scotland. We once saw them in pairs in that country, sufficiently late to form such an opinion, and we are not singular in this conjecture." ‡

* Hutchinson's 'History of Cumberland,' vol. i. p. 19. 1794.

† 'Phil. Mag. and Annals,' N.S. vol. vi. p. 280. 1830.

‡ Montagu's 'Ornithological Dictionary.' 1802.

"It should seem that this bird has been seen in several parts of Great Britain throughout the year, the natural conclusion of which is, that some actually breed with us; but no person to our knowledge has been fortunate enough to take their eggs, so as to be clearly identified by a competent judge: it is true, a person of credit, who frequents the Mendip Hills, in Somersetshire, declares that they breed there, and that he has taken their eggs. Young birds are frequently shot early in September, on those hills and similar situations, but that is no proof of their breeding there, as the nestling plumage continues till towards the following spring, and is very different from the adult, being entirely destitute of the bands on the breast, and the ferruginous and black on the belly. Colonel Thornton, in his 'Sporting Tour,' p. 104, says he killed a dottrel on a Highland mountain, August 16th, and saw several brace. The same gentleman informs us that he saw dottrels in pairs on the Grampian mountains, but never saw a young bird, (meaning a runner, incapable of flight). From all accounts it is quite an alpine bird in the breeding season, and probably breeds with, and may be confounded with, the golden plover in the Highland swamps." *

The next author who alludes to this subject is Greaves: in the third volume of his 'British Ornithology,' he says that "we are informed by Mr. Gough, of Middleshaw, in Westmoreland, that this bird breeds on the neighbouring hills.† We have been favoured with several eggs from different parts of Scotland, said to belong to this bird; but our friends not accompanying them with the bird, we are under doubts with regard to their identity." ‡

Dr. Latham in his 'General History of Birds,' gives some very accurate information with respect to the breeding localities of this species in the Highlands of Scotland. He states that "the dottrel is a local bird in respect to England, being in some parts sufficiently common, in others not known; seen in tolerable quantities in Cambridgeshire, Lincolnshire, and Derbyshire, in April, May, and June; met with on the Wiltshire and Berkshire downs in April and September, in small flocks of eight or ten, being on their passage to and from the north where they breed. The same on the sea side at Meales, in Lancashire, the beginning of April, continuing there about

* 'Supplement to Montagu's Orn. Dict.' 1813.

† Dottrels, about twenty-five years ago, used to breed annually on the hills in the vicinity of Sedbergh and Dent, in the West Riding of York, and in all probability still continue to do so in small numbers, having received specimens from the above localities, within the last few years.

‡ Greaves' 'British Ornithology,' vol. iii. 1821.

three weeks; from thence to Leyton Haws, where they rest for a fortnight. Are at the same time in plenty about Holderness, in Yorkshire, and upon the woulds. These birds appear towards the end of May, in that district of Aberdeenshire called Braemar, being the most elevated part of the country, where they hatch their young, on dry mossy ground, near to and on the summits of the highest parts, sometimes in the little tufts of short heather or moss, which is to be found in those elevated grounds, and in so exposed a situation. They take so little trouble to form their nest, that were it not for their eggs, no one could suppose there was one. The hen sits three weeks, and the young make their appearance about the middle of July. They rarely lay above three eggs, and generally bring forward as many young. Towards the end of October, they gather together in large flocks, and sometimes hundreds may be seen together, for very considerable numbers breed in the district above-mentioned. However, their assembling in large flocks at the above season, is no proof of their leaving the country before winter, as grouse do the same, which are constant inhabitants; and our informant once fell in with a small flock of about a dozen, at the foot of the highest mountain in that country, about the end of February or beginning of March, the ground having been for many weeks deeply covered with snow. Three of these were shot, in good condition, though not so fat as those he used to kill in August and September. As to their breeding place, it is always at an elevation of from 1500 to 2000 feet above the level of the sea, and Dr. Heysham informed me that ten or twelve were shot on the top of Skiddaw in Cumberland, in the month of June."*

At the conclusion of a very interesting paper in the Linnean Transactions, on the capture of the buff-breasted sandpiper, (*Tringa rufescens,* Vieill.), near Melbourne in Cambridgeshire, Mr. Yarrell remarks that "the extensive range of hills round Melbourne, is frequented by dottrel in considerable numbers, for a short period every spring and autumn, and the only locality from which I could ever obtain their eggs, was the Grampian hills." †

Additional evidence of a similar tendency might be cited from other writers had it been at all necessary; but I think it clearly appears from the quotations already given, that many years before the publication of Mr. Selby's 'Illustrations,' it had been satisfactorily ascertained:—

First; that the dottrel was a regular summer visitant, not

* Latham's 'General History of Birds,' vol. ix. p. 335. 1829.

† 'Linnean Transactions,' vol. xvi. p. 109. 1829.

only in the northern counties of England, but also in the Highlands of Scotland.

Secondly; that this bird annually resorted to various mountains in the north of England, as well as in Scotland, to breed.

Thirdly; that the eggs of this species had not only been found, but likewise described.*

I shall now, without further comment, lay before my readers Mr. Selby's remarks.

"The dottrel can only be reckoned a cursory visitant, at two periods of its migratory flights, viz. in spring, during the months of April and May, when on its way to higher latitudes, for the breeding season, and again in September and October, on its return to its winter quarters in the warmer parts of Europe and Asia. By some writers, however, it has been supposed that a part of the birds which visit Britain in spring, remain to breed upon the moors of the northern counties of England and the Highlands of Scotland. Amongst whom Montagu and Dr. Fleming seem to favour this opinion; the former of whom, in his 'Ornithological Dictionary,' after stating the probability of the fact, observes that he once saw dottrels in Scotland sufficiently late to induce him to entertain such an idea; and further adds, that Colonel Thornton informed him of having seen dottrels in pairs upon the Grampian hills: but unfortunately, in neither of these cases is the precise time of the year mentioned. Dr. Fleming, in his 'History of British Animals,' cites a passage from the 'Statistical Account of the Parish of Carnylie,' in favor of the above supposition: but the paragraph is too generally worded to establish as a fact, the residence and breeding of these birds upon the Grampian mountains.

"In Northumberland, (where considerable flocks annually appear in certain haunts near the coast, in the month of May, and where their visit seldom extends beyond a week or ten days), I have, during summer, examined all the upland moors and the range of the Cheviot hills, these being the situations to which they would naturally retire, if any remained to breed, but always without success: nor did the bird appear to be known to the shepherds, or other inhabitants of these districts. The same may be said of the moors of Cumberland, and the south-western parts of Scotland, where indeed it is of very rare occurrence, even during its periodical flight; the line of the migration of the passing bodies that visit us in the spring,

* The eggs of the dottrel are figured in no less than three continental works, all of which were published prior to or in the year 1830, two of them are exclusively devoted to the eggs of the European birds.

being along the eastern coasts of the island. I may also add that in my various excursions to the Highlands of Scotland, I never met with the dottrel in the summer or breeding season, though its congener, the golden plover, was frequently seen; nor has any instance occurred of the nest, eggs, or immature young of the bird having been yet found. It is seen on its return from its breeding quarters, in particular haunts, during the months of September and October, generally in families of five or six together, being the old birds and their brood: occasionally however, earlier appearance may happen, as in the case of the bird mentioned by Colonel Thornton in his 'Sporting Tour,' which he killed in Scotland, on the 16th August; and a dottrel, apparently a bird of the year, once fell before my own gun when shooting grouse, on the 20th of August. These, in all probability, were birds of early hatchings, which appear frequently to precede the main bodies of their species in their equatorial migration, as I have frequently remarked in the history of the sanderling. The dottrel has always been considered a stupid bird, but for what reason I cannot conceive. I allow that on its first arrival it shews but little fear of man, but this I apprehend arises more from inexperience of persecution in its native wilds, than from any other cause, and which appears evident from the birds, when harassed and repeatedly fired at, soon becoming too cautious to admit of near approach any longer. Their habits also contribute to render them unwary; for being nocturnal feeders, (like many others as the *Charadriadæ*), they are at rest and asleep during the greater part of the day, in which state also the golden plover, (a wary bird when roused), will frequently admit of a close approach. As to the story of the dottrel mimicking the actions of the fowler, by stretching out its leg, wing, or head, when he sets the example, it without doubt arose from the motions that they, as well as other birds, usually and most naturally make, when roused from a state of repose, and which every one who attends to the habits of the feathered race, must, (in flocks of gulls, tringas, plovers, &c.), have frequently observed."*

Having disposed of this question I will now narrate, as succinctly as possible, what has fallen under my own observation relative to the habits and economy of this bird. In the neighbourhood of Carlisle dottrels seldom make their appearance before the middle of May, about which time they are occasionally seen in different localities, in flocks which vary in number from five to fifteen, and almost invariably re-

* Selby's 'Illustrations of British Ornithology,' vol. ii. p. 236. 1833.

sort to heaths, barren pastures, fallow grounds, &c. in open and exposed situations, where they continue if unmolested, from ten days to a fortnight, and then retire to the mountains in the vicinity of the lakes, to breed. The most favourite breeding haunts of these birds, are always near to or on the summits of the highest mountains, particularly those that are densely covered with the woolly fringe-moss, (*Trichostomum lanuginosum*, Hedw.), which indeed grows more or less profusely on nearly all the most elevated parts of this alpine district.* In these lonely places they constantly reside the whole of the breeding season, a considerable part of the time enveloped in clouds, and almost daily drenched with rain or wetting mists, so extremely prevalent in these dreary regions: and there can be little doubt that it is owing to this peculiar feature in their economy, that they have remained so long in obscurity during the period of incubation. The dottrel is by no means a solitary bird at this time, as a few pair usually associate together, and live, to all appearance, in the greatest harmony. These birds do not make any nest, but deposit their eggs, (which seldom exceed three in number), in a small cavity on dry ground covered with vegetation, and generally near a moderate-sized stone, or fragment of rock. In early seasons old females will occasionally begin to lay their eggs about the 26th of May, but the greater part seldom commence before the first or second week in June. It would appear however from the following facts, that they vary exceedingly in this respect. On the 19th of July, 1833, a perfect egg was taken out of a female, which had been recently killed on Robinson; and on the 26th of May, 1834, I received four dottrels from Keswick, which had been shot on Great Gavel the day before. In the ovary of one of them I found an egg almost quite ready for exclusion, being a difference of nearly eight weeks. So great a discrepancy in all probability is of very rare occurrence, yet it will subsequently appear that eggs recently laid, and a young bird, a few days old, were found on the same day, at no great distance from each other. The males assist the females in the incubation of their eggs. How long incubation continues I have not yet been able to ascertain, but I am inclined to think that it rarely lasts much longer than eighteen or twenty days. A week or two previous to their departure, they congregate in flocks, and continue together until they finally leave this county, which takes place sometimes during the latter end of August, at others, not be-

* The favourite breeding stations of the dottrel, are frequently called 'smittle places' by some of the guides and anglers at Keswick.

fore the beginning of September. A few birds no doubt are occasionally seen after this period, but they are either late broods, or birds that are returning from more northern latitudes. This autumn I visited several breeding stations on the 25th of August, and again on the 2nd of September, but in neither instance could I observe a single individual.

Anxious as I have been for several years past to procure the eggs of the dottrel, for the purpose of adding undoubted specimens of so rare an egg to my cabinet, as well as to prove beyond all doubt that this bird breeds in Cumberland, yet it was not until the present year that I had the gratification of accomplishing an object which I have had so long in view. After repeated excursions through the lake district, this summer, for the express purpose, I was so fortunate as to obtain their eggs in two different localities, namely, three on Whiteside, contiguous to Helvellyn, on the 29th of June; and two on the 5th of July, on Robinson, in the vicinity of Buttermere. The former had been incubated twelve or fourteen days, the latter were only recently laid, and in both instances the birds were seen to leave their eggs; one, on quitting them, immediately spread out its wings and tail, which it trailed on the ground a short distance, and then went away without uttering a single note. On this day, (5th July, 1835), a young bird, a few days old, was also captured.

Having spent a considerable portion of several days on Robinson, in company with a very able assistant, searching for the eggs of the dottrel, I had, of course, ample opportunities of observing their manners; and I flatter myself that the following particulars will be interesting to some of my ornithological readers. On the 3rd of July we found three or four pair near the most elevated part of this mountain, and on all our visits thither, whether early in the morning or late in the afternoon, the greater part were always seen near the same place, sitting on the ground. When first discovered, they permitted us to approach within a short distance, without shewing any symptoms of alarm; and frequently afterwards, when within a few paces, watching their movements, some would move slowly about and pick up an insect, others would remain motionless, now and then stretching out their wings, and a few would occasionally toy with each other, at the same time uttering a few low notes, which had some resemblance to those of the common linnet, (*Linaria cannabina*). In short they appeared to be so very indifferent with regard to our presence, that at last my assistant could not avoid exclaiming, "what stupid birds these are!" The female that had young, nevertheless evinced considerable anxiety for their safety, whenever we came near the place where they were concealed, and as long as we remained in the vicinity, constantly flew to and fro above us, uttering her note of alarm.

As soon as the young birds were fully feathered, two were killed for the purpose of examining their plumage in this state; and we found that after they had been fired at once or twice, they became more wary, and eventually we had some little difficulty in approaching sufficiently near to effect our purpose. The moult appears to commence somewhat early in old birds; a male that was killed on the 25th of July, was completely covered with pen feathers, and the belly, from incubation, almost entirely bare. The stomachs I dissected were all filled with the *elytra* and remains of small coleopterous insects, which in all probability constitute their principal food during the breeding season.

These birds I understand are getting every year more and more scarce in the neighbourhood of the lakes; and from the numbers that are annually killed by the anglers at Keswick and the vicinity, (their feathers having long been held in high estimation for dressing artificial flies), it is extremely probable that in a few years they will become so exceedingly rare, that specimens will be procured with considerable difficulty. I have subjoined the names of some of the principal mountains in this county, on which dottrels have been known to breed, and I have also added, as far as practicable, their elevation above the level of the sea, under the idea that this information may prove of some utility to naturalists who may hereafter feel inclined to investigate the manners of this species in the same district. The relative positions of these mountains may be seen at a single glance, on referring to Greenwood's excellent Map of the county of Cumberland.

| | | |
|---|---|---|
| Helvellyn, | 3055 | Feet above the level of the sea.* |
| Whiteside, | | |
| Whatson Dod, | | |
| Great Dod, | | |
| Saddleback, | 2787 | |
| Skiddaw, | 3022 | |
| Carrock Fell, | 2110 | |
| Grasmoor, | 2756 | |
| Robinson, | 2292 | |
| Gold Scalp, | 1114 | |
| Great Gavel, | 2925 | |

Before I conclude this paper I will briefly describe and also offer a few observations on the eggs found on Whiteside

* Carrock Fell, I have reason to believe, is the lowest of these mountains, consequently all those whose elevation is not given, will exceed 2110 feet in height.

and Robinson. All these eggs were very similar with respect to colour and markings, but differed a little in size and formation, varying from $1\frac{12}{20}$ to $1\frac{15}{20}$ of an inch in length, and in breadth from $1\frac{2}{20}$ to $1\frac{4}{20}$, the ground colour wine yellow, varying a little in tint, and all thickly covered with large blotches and spots of different shades of brownish black, particularly on the obtuse end. Hence it appears that they differ a good deal from those seen and described by Dr. Heysham, their ground colour being a dirty clay. The eggs of the dottrel however figured by Schinz, Thienemann and Polydore Roux, also vary in this as well as in other respects; it is therefore extremely probable that the eggs of this bird are subject to considerable variation.

### DESCRIPTION

### of a young dottrel, a few days old, captured alive on Robinson, July 5th, 1835.

Front of the head, throat, a broad space round the neck, and all the under parts covered with a whitish down. Top of the head, occiput, and all the upper parts of the body, dark brown, mixed here and there with buff-orange, and whitish down. The few feathers that have made their appearance on the breast, belly, and flanks, buff-orange, slightly spotted with greyish brown; a few feathers on the back blackish brown, edged with reddish white. Bill black. *Irides* very dark brown. Legs and toes pale cinereous, slightly tinged with green.

### DESCRIPTION

### of a young female, (by dissection), three weeks or a month old, killed on Robinson, July 25th, 1835.

Forehead, throat, and sides of the face cream yellow, covered with small spots and fine streaks of greyish brown. Crown of the head, occiput, and also the feathers on the back, dark brown, all more or less broadly edged with buff-orange. Scapulars and wing-coverts olive-green, deeply edged with reddish white. Tail the same, finely margined with white, the centre feathers broadly tipped with reddish white, and the three lateral ones on each side ending in a large irregular whitish spot. Sides of the neck, flanks, and a broad band above each eye, buff-orange, the former finely streaked with greyish brown. Breast cinereous, slightly tinged with reddish white, and marked on each side with large spots of olive-green. Belly white, finely spotted here and there with greyish brown. Bill black. *Irides* dark brown. Legs pale olive-green, soles, bright yellow.

*Carlisle, September*, 1835.*

* Communicated March, 1838, by the Author.—*Ed.*

ART. II. *On the Influence of Man in modifying the Zoological Features of the Globe; with Statistical Accounts respecting a few of the more important Species.* By W. WEISSENBORN, D. Ph.

*(Continued from Page 256).*

### DESCRIPTION, HABITS, &c. OF THE *Bos urus.*

OF all animals now existing and sufficiently well known, the American bison, (*Bos Americanus*), bears the greatest resemblance to the *Bos urus.* This resemblance is close enough to have induced even Pallas to take both for the same species, and I think a description of either ought to begin with comparing one with the other.

The comparative shortness of the legs, tail, and horns, the weakness of the croup, the somewhat greater breadth of the forehead, and the orbits, which descend less, and have less projecting rims in the *Bos Americanus*, constitute differences of outward structure, which to a somewhat practised eye give to that species an aspect, by which it may be at once distinguished from the *Bos urus.* Besides, the *B. Americanus* has fifteen pairs of ribs and as many dorsal *vertebræ*, and only four lumbar *vertebræ*, whereas in the *B. urus*, the numbers are respectively fourteen and five. Moreover the American ox has not the same antipathy to the *B. taurus* as the zubr; it may be used to produce a mixed breed with the domesticated cattle, and is, at all events, more tameable, as numbers of them are kept in the paddocks of the western states of North America, whereof I obtained certain information from Mr. W. Lenz, who returned from his travels in America but a few months ago; and lastly, I cannot find in any work I have consulted on the subject, that the *B. Americanus* smells of musk. The original natural size of the two animals is about the same, the weight of the two animals being about a ton.

I shall now compare the *B. urus* with one of his congeners better known to European readers, and by entering more into detail, endeavour to bring, at the same time, many essential parts of the description of the former to the notice of the reader. Let us represent to ourselves a bull, whose upper mesial line, beginning at the atlas and ending at the root of the tail, does not approach to the horizontal, but slopes downwards, both before and behind the fourth to the seventh dorsal *vertebræ*, (or those which answer to the withers), namely, before, at an angle of about 30°, and behind, at one of about 15°. The chest of the *B. urus* appears therefore considerably higher, and the whole of its fore-quarters more developed, than in the tame ox, whilst the hind-quarters are not only more gracefully built, but appear the more so from contrast, particularly as the hair about the neck, withers, chest, and shoulders, is much longer than that which covers the posterior part of the trunk. The elevation of the anterior part of the back in the zubr, is chiefly caused by the great length of the spinous processes of the dorsal *vertebræ*, in which also that of the last *vertebra colli* partakes in a great measure.—Those of the fourth to the seventh *vertebræ* are, however, not the longest, though corresponding to the greatest height of the back; that of the second dorsal *vertebra* is the longest of all, measuring 16 inches in length, French measure, and upwards, whereas in the common ox, it is never more than half that length, and in the fossil *B. primigenius*, if reduced, by subtracting one sixth, to the size of a zubr, where it is 16 in. long, it would not be more than 12. The zubr has fourteen pairs of ribs,* and only five lumbar *vertebræ*, whereas the *B. taurus*, as well as the *B. primigenius*, and most other species, has thirteen and six respectively. Besides, the skeleton of the zubr is of a lighter make.

The head of the zubr is smaller and shorter in proportion than that of the common ox. The surface of the *occiput* forms an obtuse angle with the frontal bone in the former, and an acute one in the latter. The forehead of the zubr is broader, owing to the great depth of the orbits, which project like tubes and are convex, whereby the facial angle becomes greater than in the *B. taurus*. The horns do not rise, as in the latter, at the crown of the head, or at the ends of the line separating the occiput from the frontal bone, but about opposite the middle of the convexity of the forehead, or two inches before the line just mentioned. Of their form we shall speak afterwards, as those of the *B. taurus* have no constant form whatever.—The tube-like orbits, which are narrower at the rim than in their hollow part, have such a direction that the eyes, though at a greater distance from each other, point less sideways than in the *B. taurus*. The bare part of the muzzle in the zubr,

* Bojanus states that the male *Bos urus* has fourteen, but the female only thirteen pairs of ribs. But he is contradicted by two later observers, Jarocky, (l. c. p. 37), and Eichwald, (Naturhistorische Skitze von Lithauen), who most positively ascribe fourteen pairs of ribs to both sexes. How so accurate an observer as Bojanus was led into an error, which must have struck him as very paradoxical, it is difficult to explain, unless we suppose that the zubr cow which he obtained for the museum of Wilna, was a *monstrum per defectum*. However, the circumstance ought not to be overlooked, that only the skeleton of the male, presented at the same time by the Emperor Alexander, was prepared for the museum, whereby a mistake on the part of Bojanus becomes somewhat less improbable. As for the minor differences in the skeletons of the two species, I must refer the reader to that author's monograph of the *urus*, as well as to Cuvier.

only extends over the middle of the upper lip, and the borders of the nostrils, whereas in the *B. taurus* it forms a broad surface. As for the teeth, the number of which is the same in all the species, those of the zubr are better adapted to scrape, as well as to triturate hard substances, as bark and branches. The incisors of the zubr are therefore stronger and rougher above, and the last three molars, which increase in size posteriorly, (but are nearly of the same size throughout in the *B. taurus*), are furnished with an additional tubercle, rising from the middle of their crowns. The ears and eyes are smaller, and the mouth is more contracted in the zubr.—Its chest is not only higher, but also wider and without a dewlap. The *scrotum* is never pendulous, but wrinkled, and the *testes* are scarcely larger than those of a ram. The udder and teats of the zubr cow are far less developed, and the tail of the *Bos urus* with its brush, which measures from 10 to 11 inches, does not come lower down than the hock joint. The legs of the zubr are, however, higher than those of the *Bos taurus*. The hair of the latter is stiff, lying close to the skin and much of the same description throughout; that of the zubr is softer, standing off at an obtuse angle, and of two very different sorts.

After these comparisons the rest of my description will refer to the zubr alone. The size of this animal in its present abode is considerably less than it was formerly; a deterioration which may be observed in all those wild herbivorous animals, whose liberty is checked by the approach of human cultivation, and which no longer have a perfectly uncontrolled choice of locality and pasture. The six-years-old male lately obtained for the museum of Wilna, measured only 6 ft. 11½ French inches from the crown of the head to the *tuber ischii*, and 4 ft. 4½ inches from the highest part of the *os sacrum*, down through the trochanter to the *calces*, whereas the height at the withers was 4 ft. 9 in. Yet we read that in 1595 an auerochs, 13 ft. long and 7 ft. high, was killed near Friedrichsburg;* and another specimen, killed along with forty-one others, in the forest of Bialowicza, by King Augustus III, of Poland, as late as 1752, weighed 1450 lbs., as testified on a monument erected on the spot where the animal was slain.—Count Joh. Sigismundus held a hunting party in 1612, when eight auerochs were killed, the largest of which weighed 1770 lbs. And in the more remote ages we may suppose that the old bulls sometimes grew to a size, which makes the statement

* See Henneberger, 'Erklärung der grossern preussichen Landtafel,' ii. 3. 251. Here the head was probably included in the measurement.

of Cæsar, as to their bulk being little less than an elephant's, appear only a moderate exaggeration. Now-a-days the old males are never found more than 7½ ft. (French measure) in length, and 5 ft. in height, though in the time of Pallas there was found one that measured 6 ft. at the withers.

The hair of the zubr is of two different sorts; the one is soft, woolly, and short, almost like that of the camel, and covers the whole trunk and the extremities down to the knees; the other long, rough, thicker at the extremity than at the root, and covers the upper part and sides of the head, as well as the neck, withers, and shoulders. Between the branches of the lower *maxilla*, along the neck to the chest, it is lengthened into a sort of beard, and on the upper crest of the neck, it forms a sort of mane. The hair is of different qualities according to the age, sex, and season. In young specimens it is browner, softer, and much shorter; in the old ones, blacker, stiffer, and longer. In the bull it often grows at the beard, mane, and on the shoulders, to the length of 1 foot, in the cow, scarcely to more than 9 inches. It is thickest, longest, and darkest, in November, as the winter fur appears with the first snow; and it begins to fall at the approach of the warm season, sometimes as early as February. The change then, according to Mr. Eichwald, is often effected within two or three days. The summer fur is far less shaggy, and being at first of a greyish brown colour, becomes more and more shining, until in the month of August, or about the rutting season, it presents a jet-black colour under certain angles of reflection.

The horns bear a fine proportion to the size of the animal; their growth is not so rankly luxuriant as in some castrated oxen of different breeds, for example, the Sicilian and Hungarian; but what they want in length is made up by strength. The horns of the 6-years-old bull, whose skeleton was prepared for the Wilna museum, measure 10½ inches round, at the base; while their length along the external curve is 18 inches. They are flattened in no part of their extent, but are perfectly round, and rendered more or less rough near the root by rings. From the root, which is comparatively thick, they are first directed outwardly and a little downwards, then they rise upwards, and the suddenly-tapering point is bent inward and a little backward. These organs are much longer and stronger in the bull than in the cow. Their colour is black, and their substance very hard.

The expression of the eye, which, as we have observed before, is considerably smaller than in the *Bos taurus*, is meek when the animal is not irritated, but becomes exceedingly ferocious when its anger is awakened. The *pupil* then becomes a perpendicular slit, whilst the white *sclerotica* occupies the fore-part of the space between the eyelids, and much of the red *conjunctiva* becomes visible, and the eyes appear to sparkle and assume the expression of madness.

The tongue, which, near its base especially, is covered with hard tubercles, has a blue colour, as well as the lips, gums, and palate. Bojanus says, that in three adult specimens he found the colour of the tongue but little different from that of the common ox: but Jarocki confirms Gilbert's statement as to the blue colour. This probably increases with the state of excitement of the capillary vessels, and is in a great measure lost some time after death, and Bojanus appears to have seen only specimens that had been killed some time before.

The tail is covered with short hair, and furnished at its extremity with a brush of long and bristly hair, which is nearly as stiff as that of a horse's tail. In young specimens this brush comes no farther down than the *calcaneum tarsi*, or the hock joint; whereas in the old ones it reaches somewhat below it.

The *vertebræ* of the tail descend only as low as the middle of the thigh, or opposite the knee-joint, and the length of the brush never exceeds 15 in. according to Hagen, (l. c. p. 213). The statement of Cuvier that the tail reaches the ground, is, therefore, erroneous.

The smell from which the *Bos urus* has either obtained the name of bison, or which has taken its German name, bisam, from that of the animal, is between that of musk and violets. Its chief seat is that part of the skin and hair which covers the convexity of the forehead. It is stronger in the male than in the female, and strongest during the rutting season, when it may be perceived at the distance of a hundred yards from the herd. The flesh of the zubr is not, however, tainted with it, as in the *B. moschatus*; on the contrary, it is extremely well-flavoured, and Jarocki says, its taste is between that of the elk and ox, which does not convey any definite idea to such as, like myself, have never tasted the former.* It was so highly esteemed in former times, that pickled zubr-beef was sent from Poland as a present to foreign kings. The flesh of the zubr roasted, looks blueish. The flesh of the bulls, even in winter, is quickly tainted, if the *scrotum* be not cut off from the fresh-killed carcass.

The age to which the *Bos urus* attains, is differently stated by different authors. Some assert that the animal never lives longer than fifteen or sixteen years; others allow it as many

* Prince Dolgorukow's guests recognised in it a slight resinous taste.

as twenty: but the game-keepers in the forest of Bialowicza, who, I think ought to be heard before all others in that matter, believe that it lives fifty years and upwards.

The strength of the zubr is enormous, and trees of 5 or 6 inches in diameter cannot withstand the thrust of old bulls. It is neither afraid of the wolf nor bear, and assails its enemies both with its horns and hoofs. An old zubr is a match for four wolves; packs of the latter animal however sometimes hunt down even old bulls, when alone, but a herd of zubrs has nothing to fear from any rapacious animal.

Notwithstanding the great bulk of its body, the zubr can run very swiftly. In galloping, its hoofs are raised above its head, which it carries very low. However, the animal has but little bottom, and seldom runs farther than one or two English miles. It swims with great agility, and is very fond of bathing.

The zubr is generally exceedingly shy, and avoids the approach of man. They can only be approached from the leeward, as their smell is extremely acute. However, when accidentally and suddenly fallen in with, they will passionately assail the intruder. In such fits of passion the animal thrusts out its tongue repeatedly, lashes its sides with its tail, and the reddened and sparkling eyes project from their sockets and roll furiously. Such is their innate wildness, that none of them has ever been completely tamed. When taken young they become, it is true, accustomed to their keepers, but the approach of other persons renders them furious, and even their keepers must be careful always to wear the same sort of dress, when going near them. Their great antipathy to the *Bos taurus*, which they either avoid or kill, would render their domestication, if it were practicable, but little desirable. The experiments made with a view of obtaining a mixed breed from the zubr and *Bos taurus*, have all failed, and are now strictly prohibited. Probably there is something in the smell of the tame cattle which the zubr detests. But for this aversion, the crossing might produce a valuable breed, as the flavour of the beef might not only be improved, but the quality of the leather also changed considerably for the better; for the hide of the zubr is double the thickness of that of a common ox, and is extremely tough, and far more durable for all sorts of harness work.

Now and then individuals of the zubr become, in their wild state, uncommonly daring and fearless of man. This is particularly the case in such old bulls as walk alone. An instance is related by Jarocky, where an old male of that description almost got the character of a highwayman. He would station himself on the high road, and, without minding the clack of whips, rush at the carriages or sledges, and make the horses run away.

Up to the age of ten or twelve years, the zubrs live together in herds of from ten to forty head. At a greater age, the bulls either separate themselves of their own accord, or are expelled from the herd. However in the rutting season, these old bulls join the herd again, and even such as are no longer capable of propagating their species, which they are said to be up to the age of thirty, are considerably excited, and rage indiscriminately against their own kind. At this season, three-years-old bulls, and even cows, are not unfrequently found killed by these savage anchorites; which, as the processes of the dorsal *vertebræ* continue growing, are easily distinguished by the great developement of the boss on their withers.—The rest are particularly playful during that season, and delight in up-rooting young trees, whereby they sometimes injure their horns.

As to the period of gestation in this species, I find different statements. In the French dictionaries of natural history, it is said to last eleven months. Bojanus says it lasts nine, and Mr. Eichwald, seven or eight, as he found that the calves are born about the latter end of March. They generally bear but one calf, but at the most vigorous age sometimes have twins. The calf follows its mother as soon as it is dry, and is suckled for a whole year, according to Jarocki; Mr. Eichwald, on the contrary, says the males drive it away from the cow at the beginning of the rutting season, which would make the suckling time only five or five and a half months. As, however, the game-keepers know with precision that the cows bear only once in three years, I have the greater faith in Mr. Jarocki's statement.

The thickets near the swampy banks of rivers and rivulets are the favourite places where the *Bos urus* takes up his residence, and from which the animal seldom walks to any considerable distance. In summer, and during the warmer portion of autumn, they select sandy spots; in winter they keep quiet by day, in the thickest part of the fir wood, only browsing at night, and finding sustenance in the bark of young trees. In spring they resort to neighbouring places where the herbaceous plants which they relish begin to sprout.

The food of the *Bos urus* consists, first, of the bark of trees; and it is to the bitter ones, as willows, poplars, horse-chesnuts, &c. that they give the preference. The hardness of these substances often causes the incisors, in old zubrs, to be worn away down to the gums. They are also fond of lichens which grow on trees, but never touch mosses that grow on the ground. As to herbaceous plants, they give the preference to those which grow in swampy localities, as several of the *Umbellatæ*, as well as *Cnicus oleraceus*, *Calluna vulgaris*, and different *Ranunculi*. Of grasses they relish *Agrostis arundinacea*, and particularly the dabrowka, (*Hierochloe* or *Holcus borealis*). The tomka, (*Anthoxanthum odoratum*), on which it has been asserted that the zubr chiefly relies for its subsistence, and to which some authors have attributed the musky smell of the animal, is not found at all in the forest of Bialowicza. The list of these vegetables, as well as the habits of the zubr, prove to a certainty that it has not been destined by nature to live upon mountains.

The voice of the *Bos urus* is a short grunt,* and when a person is near a herd, it may be compared to the sound of a distant straggling fire of soldiery; at a greater distance it resembles the sound made by birds in flying.

When the stomach of the *Bos urus* is opened, and a light brought near the opening, a high flame is seen flashing up. Mr. Jarocki mentions this as something peculiar to the species; but the stomach of all ruminating and other animals, evolves inflammable gases; and that which causes the well-known disease in cows, sheep, &c. called *tympanitis*, consists for the greater part of hydrogen. This circumstance, therefore, appears to possess no particular interest.

In the stomach, (probably the *rumen*), of a specimen killed on the 12th of October, 1836, were found intestinal worms, belonging to the *Amphistoma conicum*, or entozoon, likewise often met with in the *rumen*, or also the *reticulum* of the *Bos taurus*.

I shall now conclude my description of the *Bos urus* with adverting to the peculiar circumstances under which that animal is now living in the forest of Bialowicza, (pr. Bealowezha), which may be considered as the only primitive forest in Europe. This woodland district is level upon the whole, and swampy. It is intersected by numerous rivulets, and a considerable river, the Narew; these have their origin in many morasses, some of which have not yet been thoroughly investigated. Its total surface amounts to about 352 English geographical square miles, of which about 60 are rushy swamps;

* This circumstance has suggested to me the idea that the name of Βισων may still be of Greek origin, and derived from Βησσω or Βηζω, to cough, thence Βηζων or Βισων, the coughing ox, as the voice of the *Bos urus* must have struck the Grecians as much as that of the *Bos grunniens* did the travellers in Thibet.

the remainder is overgrown with Scotch and red firs, in the proportion of $\frac{4}{5}$; and with numerous species of deciduous trees, in that of $\frac{1}{5}$. A list of these may be found in Baron de Brincken's 'Mémoire déscriptif sur la forêt impériale de Bialowicza, &c.' Varsovie, 1826. In this forest, where the elk is also still met with, there were, according to the census of 1828, given by Mr. Eichwald, 696 head of zubrs, and thirty or forty besides in a neighbouring wood of comparatively small extent. Mr. Jarocki, who gives the number of them after the census of 1829, states the sum total of the adult individuals to have been at that time 663, and 48 calves besides. Whether the number has subsequently considerably decreased, as *supposed* by Dr. H. O. Lenz, ('Gemeinnutzige Naturgeshichte' p. 419), in consequence of the Polish revolution, is to me very doubtful, as I have been assured by a Polish gentleman, that the forest of Bialowicza had not, in any appreciable degree, been disturbed during that period.

In this forest the zubr lives, under the protection of strict, but no longer inhuman game laws, as much as possible in its primitive state of locality and liberty. Yet are they so far affected by the cultivation which circumscribes them, that without the assistance of man, they could not well get through the winter. During that season, they receive supplies of hay at certain places, where the stacks must be well secured, otherwise the zubrs break in to them, and spoil much more than they consume, by thrusting their heads deeply into the mass of hay, in order to get at the most fragrant part of it.

All noisy occupations are strictly prohibited in those parts of the forest where the zubrs live, and when wolves are hunted, it is done with great caution and but few dogs.

The manner of hunting the zubr, as described by Herberstein, is no longer in use. "Those," he says, "who hunt the bison must be very strong, adroit, and knowing men. A spot is selected where the trees are at the proper distance from each other, and neither too thick in the trunks, that the hunters may be able to get quickly round them, nor too thin, that they may be sufficiently protected. Near such trees a number of hunters are posted singly; and when a bison has been driven to the spot by the dogs, it makes a violent rush at the first hunter who may present himself. He, however, screens himself behind his tree, and wounds the animal with his spear. But the bison is not so easily killed, and becoming more and more furious, rages not only with its horns, but likewise thrusts out its tongue, which is so rough, that when it catches any part of the hunter's dress, the man is lost; for the bison will pull him down and kill him on the spot. If however a hunter is over-fatigued with running and thrusting, and wishes to take breath, he throws a red hat to the animal, against which it vents its fury with its horns and feet. Then another hunter will attract the animal's rage towards himself, by shouting 'Ululu'; and at all events the animal must be killed, otherwise the hunters could not get away from the spot, without imminent danger."

In our days when one or more zubrs are to be killed, which can be legally done only by the especial permission of the Emperor of Russia, the wood is beaten up, as for other game, but the drivers, who are furnished with sticks, beat against the trees, shouting 'Uhaha.' The marksmen must be posted to the leeward of the zubrs, otherwise the latter will infallibly force their way through the line of drivers.

From the time of Augustus III, down to the year 1836, the forest of Bialowicza had not been the scene of a solemn zubr-chase. On the 12th of October, 1836, however, one was held, with a view of furnishing some of the museums in Prussia with specimens; and Prince Dolgorukow, the governor-general of the province of Balystock, who presided at it, caused it to be conducted with more than usual solemnity. Two thousand drivers and marksmen were assembled, besides an immense number of spectators whom curiosity had drawn to the spot, where a balcony of fir-branches had been erected for the prince and his suite. Thither different herds of zubrs were driven, to be fired at, and the flesh of the largest bull was dressed, to give additional interest to the concluding act of the party, a plentiful dinner.

In conclusion, I ought not to forget to mention, that very good figures after nature, of both the male and female *Bos urus*, are contained in the little work of Mr. Jarocki, the title of which has been given above.

*Weimar, March 1st*, 1838.

## Art. III. *Outlines of a New Arrangement of Insessorial Birds.* By Edward Blyth, Esq.

(*Continued from p.* 268).

In my preceding communication it will be remembered that I reduced the class of Birds to three primary *embranchemens*, the first of which, *Insessores*, includes the *Accipitres* of Linnæus.

Proceeding, then, to arrange the *Insessores* (so constituted) into orders, I deemed it expedient to detach, first, the *Rapaces* from one extremity of the series, and the *Cantrices*, mihi, from the other. It was necessary to treat, in part, of the latter important and vastly comprehensive group, that the exceptionless constancy of its numerous distinctive characters might be duly appreciated, and its consequent thorough separateness acknowledged, on the occasion of any reference or allusion being made to it, the more especially as so many imaginary, but un-real, or what may be termed skin-deep affinities have been indicated, as connecting some of its components with genera at most according, superficially, in external aspect.

To promote this effectually, it became further requisite to enter somewhat diffusely into details, relative to some of the more prominent internal differential characters, the valuable aid of which has rarely been sought by ornithological systematists: and the generalizations to which these investigations have given rise, (all suggested by myself, from data chiefly the accumulated result of my own observations, whether or not others may chance to have preceded me in deducing them), will tend, I hope, to shew the necessity of studying all parts of an animal's structure, in order to arrive, conclusively and securely, at its systematical relations.

It devolves on me, now, to descant on the insessorial genera excluded from the two well-defined orders which have been mentioned. They form a succession of distinct groups, more or less extensive, and of various degrees of value and of mutual affinity, but which do not admit of being collected into a few separate orders, though nought can perhaps be stated in common of the entire series. I shall therefore bestow on them, provisionally at least, the appellation *Heterogenes*: and commence by succinctly placing them before the reader, as nearly according to the order of their mutual relations as I am able, reserving, for the present, a more detailed exposition of their characters. The elucidation of this series of forms is, indeed, the more immediate object of the present essay.

I may be pardoned for repeating here, that the intestine, in all these birds, is either quite devoid of *cœca*, or else, these appendages being present, are of considerable size, pedicillate, and dilated towards the extremity, as in the owls: they are absent in the majority; and present chiefly in those which pass most of their time in a state of quietude. Save in the parrots, there exists no *craw* or enlargement of the *œsophagus*; but the stomach is generally capacious, extending into the abdominal portion of the cavity of the body. The parrots only, also, have more than the ordinary *sterno-tracheal* muscles connected with the *inferior larynx*.

Among the many distinctions which subsist betwixt the *Rapaces* and *Cantrices*, one of the most prominent consists in the diverse modification of the stomach, which in the *Heterogenes* is variously intermediate. The shape of the egg is nearly spherical in the *Rapaces*, and considerably more elongated in the *Cantrices;* and in this, also, a gradation from one to the other is effected in the series of *Heterogenes.*

In the circumstance of retaining the first plumage till the second autumn, again, the rollers, bee-eaters, and kingfishers, which three families have also the least muscular stomachs, and lay the most globular eggs, would seem to have the best claim to be ranged immediately following the *Rapaces;* but a better series may be formed by commencing with the hornbills, in which the muscular coat of the stomach is much thicker. To proceed.—

Tongue very small, short, and heart-shaped. Intestine short and without *cæca.* Sternal conformation peculiar; the posterior edge of the breastbone with only one slight emargination on each side. Feet typically syndactyle. Tail consisting of ten feathers only. Example, *Bucerida;* hornbills.

"Stomach a membranous bag."* *Sternum* more deeply emarginated. Feet cœnodactyle. Ex. *Upupidæ;* hoopoes.

*Sternum* doubly emarginated. Twelve tail-feathers. Ex. *Coracidæ;* rollers, (*Coracias* and *Eurystomus*). With the feet syndactyle. Ex. *Meropidæ;* bee-eaters: (*Merops* and *Nyctiornis*). *Halcyonidæ;* halcyons and kingfishers.

Tongue lengthened, tapering, and very thin. Stomach more muscular. Intestine extremely short, and furnished with large *cæca.* Ex. *Todidæ;* todies. With the outer toe reversed. Ex. *Galbulidæ;* jacamars.

Tongue laterally barbed. Stomach as in preceding.† The *cæca* probably absent. Only ten tail-feathers in some. Feet syndactyle. Ex. *Prionitidæ;* motmots.

Feet zygodactyle, having the outer toe reversed. No *cæca.* Only ten tail-feathers. Ex. *Rhamphastidæ;* toucans and aricaris.

Tongue barbed only towards the extremity. The feet having the first and fourth toes disposed laterally. Ex. *Musophagidæ*, in part; or the touracos, (*Corythaix*), plantain-eaters, (*Musophaga*), and napecrests, (*Chizærhis*) With all four toes having a forward tendency; the foot being plantigrade. Tongue not barbed. Ex. *Musophagidæ*, the remainder; or the colies, (*Colius*).

Tongue very peculiar: the *œsophagus* dilated into a crop, which becomes glandular during incubation: intestine very long and slender. Sternal apparatus differing very considerably from the rest, having a small *foramen*, at most, in place of an emargination: the *furcula* absent in some.‡ *Inferior larynx* complicated, and operated upon by three pairs of muscles. Feet plantigrade, and zygodactyle. Twelve tail-feathers, &c. &c. Ex. *Psittacidæ;* parrots.

* Selby. † Le Vaillant.

‡ In some *Rhamphastidæ* the clavicles are separate and very short.

Tongue vermiform and protrusile: intestine of mean length. *Sternum* doubly emarginated. Ex. *Picidæ*, in part; woodpeckers, piculets and wrynecks. The tongue not protrusile. Ex. *Picidæ*, the remainder; or the honey-guides, (*Indicator*). With only ten tail-feathers. Ex. *Bucconidæ*; barbets.

Feet zygodactyle, but on a different principle from the others; the ordinary inner toe being reversed. *Cæca* developed. Twelve tail-feathers.—Ex. *Trogonidæ*; trogons.

First and fourth toes disposed laterally. Ex. *Tamatiadæ*; or the puff-birds, (*Tamatia* and *Lyporynx*), the barbacous, (*Monasa*), and the courols, (*Leptosomus*). None of the remaining genera have more than ten tail-feathers.

Feet zygodactyle, the outer toe reversed. Only eight tail-feathers. Ex. *Crotophagidæ*; anis. With ten tail-feathers. Ex. *Cuculidæ*; cuckoos, couas, coucals, and malkohas; which should perhaps range in two or more separate *families*.*

Feet cœnodactyle, but the outer toes separate to the articulation. Ex. *Podargidæ*; podargues. Having the thumb directed inward. Ex. *Caprimulgidæ*; moth-hunters.

The four toes directed forward. No *cæca*, nor posterior emargination to the *sternum*. Ex. *Cypselidæ*, in part; the swifts, (*Cypselus*). With cœnodactyle feet. Ex. *Cypselidæ*, the remainder; (*Chætura*). The minute and narrow tongue of the swifts and moth-hunters much lengthened and protrusile. Ex. *Trochilidæ*; humming-birds.

(N.B.—The swifts and humming-birds are very intimately allied in their whole structure; but of this hereafter).

The foregoing brief enumeration of some of the principal distinctive characters of these various groups, will suffice to shew that the yoke-footed birds cannot, with any propriety, be ranged together as a single separate division.

As in the *Rapaces*, so in the *Heterogenes*, the moult probably takes place in no instance more than once in a year; and the majority shed all their nestling feathers a few weeks after leaving the nest. Others undergo no change till their second autumn.

The eggs, in by far the greater number of instances, are pure white; and most commonly deposited in holes of some description. With few exceptions, the young are hatched naked; but in the moth-hunters, (and perhaps in the swifts), are densely clothed with down from their first exclusion.

A few are destitute of any gall-bladder, as the toucans, parrots, and cuckoos: in the touracos this organ is very small.

The sternal apparatus presents very considerable modification; the entire group of *Cantrices* appearing to be equiva-

*In *Cuculus*, and in *Caprimulgus*, the *sterna* are singly emarginated, and not very unlike. The malkohas, coucals, and at least the true *Coccyzi*, (those of Africa), are stated by L'Herminier to have doubly notched *sterna*. I am quite ignorant of those of *Crotophaga* and *Podargus*.

lent only to some of the divisions of *Heterogenes:* yet I confess my inability to reduce the series of the latter to groups of a corresponding degree of value; as a continuity of succession, (though not an intergradation of species), prevails generally, which effectually resists all attempts at separation, except into a considerable number of divisions.

Thus, although no passage exists from the motmots into the kingfishers, or into the toucans, and although the kingfishers and toucans differ materially, yet the interposition of the motmots so connects those other two groups, that they cannot be ranged with either of them to the exclusion of the other; and the toucans, in like manner, combine the characters of the motmots and touracos, &c. Again, the hornbills and hoopoes accord in their alimentary organs with the rollers, bee-eaters, and kingfishers, but not in the skeleton; while the todies and jacamars approximate them in the skeleton but not in the alimentary organs, &c. This much is clear, that the structure of the foot, and even of the bill in many instances, is of considerably less importance than is commonly deemed.

In my succeeding communications, I will bring together all the information that I have collected, relative to each group of the *Heterogenes* respectively: but I am not prepared to enter into similar details on the *Cantrices*, the component groups of which being of inferior value, are less obviously different. Moreover, ornithologists have written less on their differential characters, than on those which they have conceived to link the different families together; which latter being often very superficial, that is to say, consisting merely in a slight resemblance in the shape of the beak, while everything else is overlooked, as in the instances of a tit, (*Falcunculus*), being placed with the shrikes, a fringillidous bird, (*Calamophilus*, which is most nearly allied to *Estrilda*), with the tits, &c. &c., the overweening consequence which has been attached to such unimportant *adaptive* characters, has induced an amount of confusion which requires no little study to disentangle. If naturalists, before offering an opinion on the affinities of groups, were but to consider well the totality of characters belonging to each of those which they suspect to be allied, were but to study all their points of difference, as eagerly as they catch at those of similarity, the progress of scientific ornithology would be greatly accelerated. To exemplify my meaning, let me ask upon what data the *Anthus Richardi* has been deemed to connect the pipits with the larks? If we trace the progressive changes of these two genera, we find that the larks are clad at first in a very peculiar mottled nestling plumage, which is entirely shed previously to the first winter; after which the moult takes place in autumn only, any seasonal difference that may be exhibited being produced solely by the wearing off of the edges of the feathers. But the first plumage of the pipits is similar, except in texture, to that of the adult; and the primaries are never shed before the second autumn: moreover, the clothing feathers are renewed again in spring, and regularly twice a year, even where, (as in the tree pipit), the summer and winter garb are scarcely distinguishable. Now the *A. Richardi*, I am able to affirm with confidence, accords in these particulars exactly with the other pipits, presenting no approach whatever to the larks: and my observations lead me to conclude that the *Alaudidæ*, or larks, on the one hand, and the *Motacillidæ*, or pipits and wagtails, on the other, are insulated groups, every member of which will be found to conform to the characters which I have here indicated;* and that, consequently, there is no grading or transition into the finches, on the part of the one, nor into the enicures, on that of the other. At the same time, while considerable similarity in external aspect is thus no sure intimation of affinity, the reverse does not of necessity imply a wide removal; for if we take up the thrush tribe, or some others that might be cited, we find a special type most excessively modified, and radiating in various directions, till the extremes at length become so very dissimilar, as to be recognized with difficulty: and hence has arisen the very prevalent illusion, that there are no real divisions throughout organized nature.

"L'echelle pretendue des êtres," says Cuvier, "n'est qu'une application eronnée à la totalité de la création, de ces observations partielles qui n'ont de justesse qu'autant qu'on les restreint dans les limites où elles ont été faites, et cette application, selon moi, a nui, à un degré que l'on aurait peine à imaginer, aux progrès de l'histoire naturelle dans ces derniers temps." (Preface to the 'Regne Animal').

*May 3rd*, 1838.

* It would be easy to point out further differences in their habits: for instance, the larks dust themselves, but never wash; the others wash frequently, but never dust; &c.

ART. IV. *A Monograph of the Genus Semnopithecus.* By W. C. L. MARTIN, Esq. F.L.S. &c.

THE genus *Semnopithecus*, established by Fred. Cuvier, contains a group of *Simiadæ* exclusively restricted to India and its islands. As respects external characters, the members of this genus differ, in many essential points, from the *Cercopitheci* of Africa, insomuch that a glance is sufficient to enable us to discriminate between them. Nor is it only in external characters that this difference exists; it obtains to a most remarkable degree in the structure of the digestive organs, as will be pointed out hereafter, proving that the alliance between these genera, is less immediate than might at first have been imagined. In many respects, indeed, the *Semnopitheci* approximate towards the gibbons, especially in dentition, and contour of body. Like the gibbons, (*Hylobates*), and the macaques, (*Macacus*), the *Semnopitheci* have five instead of four tubercles on the crown of the last molar tooth of the lower jaw. The body is slender, the limbs long and thin, as are also the hands and feet; cheek-pouches are either wanting, or very small, but there is a large laryngeal sac, communicating with the *larynx;* the callosities are small; the tail is of great length. In the *gibbons*, there is as in the *Semnopitheci*, a laryngeal sac, and small callosities; in the former animals however, it is in the *arms* that we find so remarkable a degree of length, and *not* in the *posterior* extremities, which are indeed short in proportion. In the *Semnopitheci* on the contrary, the *hinder limbs* are even more strikingly developed than are the anterior, and with this developement of the hinder limbs is associated a long and slender tail, acting as a balance in all their movements. The rounded form of the skull, the developement of the forehead, and the obtuseness of the facial angle, are marked characters in the gibbons; the *Semnopitheci*, while young, exhibit these peculiarities also, but as they attain to maturity, the muzzle advances and the forehead recedes, becoming apparently diminished also in its admeasurements, so that the facial angle, instead of continuing at about 60°, is reduced to 40° or 45°. The supra-orbital ridge is by no means prominent, but it is surmounted by a row of long bristly hairs, projecting forward, and forming a sort of continuous eyebrow, more full in some species than in others. In indicating the points of structure in which the *Semnopitheci* approach the gibbons, we do not mean to say that the species of the one genus can by any possibility be assigned to the other genus,—the gibbons are too well defined a group, and have characters too clear to be mistaken, even setting aside the total absence of a tail. On this point we need not insist.

If we examine with attention the hands and feet of the *Semnopitheci*, we shall find the *metacarpal* and *metatarsal* bones, and also the *phalanges* of the fingers greatly elongated, while the thumb, both of the hands and feet, is disproportionately small. The thumb of the hands indeed is so insignificant, that it appears almost useless, and can scarcely be regarded as antagonizing with the fingers, or as assisting in the action of grasping. The condition of the thumb is a more important character than might at first be supposed, as will easily be understood when we investigate its developement in other groups of the present family.

Turning from India to Western Africa, we are presented with a genus, in which the thumb of the fore hands is reduced to so low a degree in the scale, that indeed it cannot be said to exist; its situation being indicated nearly by a small nail-less tubercle. The genus to which we allude is that of *Colobus*, which, in fact, may be described as being a repetition of the *form* of *Semnopithecus*. In both we have the same small round head and short flat face, the same attenuated contour of body, long slender limbs, and elongated tail, and the same dental *formula*. Even in the character of the fur, which in many of the *Semnopitheci* is full, soft, and long, we perceive the accordance. So far then are there two genera intimately related, and if, in *Colobus*, the thumb of the fore hands be wanting, it is but little more than rudimentary in *Semnopithecus*. By way of note we may here observe that the absence of a thumb is not peculiar to the genus *Colobus;* the American genus *Ateles*, containing the long, slender, prehensile-tailed spider-monkeys, is similarly conditioned. It would seem indeed to be a rule, (we here refer more exclusively to the *Simiadæ*), that whenever the limbs and hands are peculiarly elongated, that such developement takes place at the expense of one of the parts entering into their structure; independently of the instances already adduced, in which a reduction of the thumb, even to the minutest rudiment, is accompanied by such a conformation, we may turn to the orang, in whose structure a similar feature is presented, viz. a reduction of the thumb, in connection with hands and arms of prodigious elongation. As however we wish to be cautious in promulgating theories, which are often more plausible than true, we shall not push this subject "*ad extremum*;" it suffices to have hinted at it.

It is then, we conceive, by means of *Semnopithecus* on the one hand, and *Colobus* on the other, that we are furnished with an immediate link of union between the *long tailed monkeys* of India and Africa. The genus *Colobus* in fact appears to be related rather to the *Semnopitheci* than to the *Cercopitheci*, a group comprehending the typical *Simiadæ* of the old world The *Cercopitheci*, or "guenons" of the French writers, have the head tolerably round, but the forehead low, and the superciliary ridge prominent; the muzzle projects, giving a facial angle of about 45°. Their form is spare and light, their limbs and tail long, but in a much less degree than in the *Semnopitheci* or *Colobi*, and the thumbs of the fore hands, though short, are much better developed than in the *Semnopitheci*. The callosities are larger, the cheeks have ample cheek-pouches, and the tubercles of the molar teeth are bolder and more acute. With respect to cheek-pouches in the genus *Colobus*, it may be observed that Geoffroy St. Hilaire states them to be tolerably well developed. Mr. Ogilby asserts that they are very large and distinct, adding that he was "the more particular in making this last observation, because the organs in question had not been previously recorded as existing in the *Colobi*, and because M. Geoffroy St. Hilaire, in his valuable lectures, even doubts their existence." The words of M. Geoffroy are these;—"Leurs *abajoues sont assez developpées*." We have ourselves carefully examined the dried specimen in which Mr. Ogilby considers the cheek-pouches to be "extremely apparent and rather capacious," and though we hesitate in differing from so discriminating and judicious a naturalist, we cannot help confessing that we did not feel satisfied on this point. The skin of the head and face, in order to the preparation of the specimen, had evidently been separated from the bones, and after the application of the ingredients used in preserving it, returned to its former position. In drying, a space would naturally intervene between it and the bones of the jaws, and it would be difficult to say, in a specimen so prepared, whether the vacuum thus presented indicated capacious cheek-pouches, or was merely a consequence of the flaying of the head, and the subsequent contraction of the skin in drying. The presence or absence of these cheek-pouches, in dried specimens, is a very difficult point to ascertain.

The teeth of the *Cercopitheci*, furnished with more acute tubercles, are adapted for grain, hard fruits, roots and insects, those of the *Semnopitheci* for leaves and soft fruits, on which these monkeys principally subsist. With this modification of the dental system is associated a still more decided modification in the structure of the stomach, at least on the part of the *Semnopitheci*, which would hardly be expected. In the guenons, macaques, and other genera, the stomach is simple,—in the *Semnopitheci*, on the contrary, it is highly complex, being divided into numerous large *sacculi*, a mode of organization leading M. Otto to regard it as an analogue of the ruminating stomach of the *Ruminantia*, an hypothesis which appears to be inadmissible. This peculiarity of the stomach of the *Semnopitheci* was first observed by Wurmb, in the proboscis monkey, but not described in detail; it was subsequently noticed by M. Otto in the *S. leucoprymnus*, and it has since been observed by Mr. Owen in the *S. maurus* and the *S. fascicularis*, Raffles, and the *S. Entellus*. The latter species has indeed been more than once dissected by ourselves, and the stomach prepared. Mr. Owen's original description of the stomach of the *Entellus* is as follows. "It may be regarded as consisting of three divisions;—First, a cardiac pouch, with smooth and simple *parietes*, slightly bifid at the extremity. Secondly, a middle, very wide and sacculated portion. Thirdly, a narrow, elongated canal, sacculated at its commencement, and of simple structure towards its termination. The latter, from its great vascularity, and the more abundant distribution of the nerves of the eighth pair, Mr. Owen regards as the true digestive stomach; the two former divisions being rather to be considered as preparatory receptacles." These divisions are not, however, characterized, as in the stomachs of the *Ruminantia* or *Cetacea*, by any essential difference of structure, none of them possessing a cuticular lining. Mr. Owen conceives it highly probable that the food of the *Semnopitheci* is more *herbaceous* than that of the *monkeys* generally, and "that the enlarged capacity of the stomach enables them to carry off great quantities of herbage to masticate at their leisure, the great developement of these receptacles compensating at once both for the absence or rudimentary condition of the cheek-pouches, and for the less nutritious quality of the food." That the cardiac and middle *sacculi* are receptacles for a vast mass of herbaceous aliment, we admit,—but, as far as we are aware, there is no proof of the act of regurgitation taking place in these animals, nor do we consider it to be needed, inasmuch as the soft mass would only require to be transmitted gradually from the magazine-like *sacculi* into the true digesting portion, in order to its due elaboration. Besides, the stomach, though divided into compartments, does not exhibit the same structural peculiarities as obtain in the stomach of the *Ruminantia*. Nevertheless it is possible, that regurgitation may occasionally take place, as it does in the kangaroos;—we say occasionally, not habitually and necessarily, as in the ox or antelope. Now in the

*Cercopitheci*, as we have stated, this complex form of stomach does not exist; but on the contrary, we have reason to believe that it obtains in the *Colobi*, as it does in the *Semnopitheci*; —and we anxiously wait the opportunity of dissecting a *Colobus*, in order to put the point to the test.

From what we have said, the general characters of the genus *Semnopithecus*, and the situation in which it stands among the conterminous groups of the *Simiadæ*, may be easily understood. On the latter point we may sum up our ideas by observing that India presents us with the following forms of *Simiadæ*,—viz. the *orangs*, the *gibbons*, the *Macaci*, and the *Semnopitheci*. Africa presents us with the chimpanzee, (*Troglodytes*), the *Cynocephali*, the magots, (*Inuus*), the *Cercopitheci*, the *Cercocebi*, if they deserve separation, and the *Colobi*. The *Macaci* of India pass, by an easy transition through the *Macacus niger* on the one hand, and the Barbary ape, (*Inuus sylvanus*), on the other, into the *Cynocephali*, or dog-faced race. The affinity of the orangs and chimpanzee, (though less immediate than has been imagined), is nevertheless obvious; the orangs naturally merge into the gibbons, and these approach nearer to the *Semnopitheci* than to any other of the tailed monkeys; the *Semnopitheci* are closely linked to the *Colobi*, which may be regarded as binding the *Semnopitheci* to the *Cercopitheci*, though approximating more decidedly to the former group than to the latter, which, through the species placed in the genus *Cercocebus*, links with the *Cynocephali*.

Two genera which we sink into that termed *Semnopithecus*, require a passing notice,—we allude to *Nasalis*, Geoffroy, and *Lasiopyga*, Illiger. The genus *Nasalis* contains two species, the *N. larvatus*, Geoff. and the *N. recurvus*, Vig. and Horsf. On the anatomy of the former species we have laid a few statements before one of the scientific meetings of the Zoological Society, the substance being as follows. Like the *Semnopitheci*, the *Nasalis larvatus* has a complex stomach, an intestinal canal of extraordinary length; no cheek-pouches, (notwithstanding M. Geoffroy's assertion), but a laryngeal *sacculus* of enormous magnitude, undivided, and extending below the clavicles; a fifth tubercle on the last molar of the lower jaw, and in fact a general similarity of structure to that of the other species of the *Semnopitheci*, so that we know not on what solid grounds it can be separated from the members of that oriental genus. (See Zool. Proceed. 1837, p. 70).

It may be advanced indeed that the form and developement of the nose, resembling to a certain extent the analogous organ in the human subject, differs essentially from that of the *Semnopitheci*, and imparts to the physiognomy an air of intelligence, almost justifying the popular belief of the natives of Borneo, that the *Kahau*, (as they term it from its cry), is a being endowed with reason. It is to be observed, however, that the nose is not developed to so great a degree in the second species, (*Nasalis recurvus* of Vigors and Horsfield), and that setting this organ aside, or supposing it removed, the face would not materially differ in its outline from that of the *Semnopitheci* generally. It may be added that the general contour of the body is the same as in the rest of the *Semnopitheci;* as we particularly noticed this fact in the specimen we dissected: the body was meager, and the limbs long and slender.

Perhaps it may be deemed presumptuous to contend against the authority of Geoffroy, who founded the genus *Nasalis*, but the aim of every naturalist is truth, and truth owns no authority. Geoffroy St. Hilaire in his lectures, indeed, admits the uncertainty in which his genus *Nasalis* stands, when he says of the *Kahau* that its manner among the trees, and its general habits, are similar to those of all the other *Semnopitheci*, but that "nevertheless it does not appear to us to be *yet demonstrated* that the long-nosed monkey, (singe nasique), is truly a *Semnopithecus;* and it is very possible, that when the species shall become less imperfectly known, we may be under the necessity of *re-establishing the genus Nasalis*, in which it was formerly isolated, but which has not been admitted by the majority of modern authors." Since however the anatomy of this animal is known,—since its digestive apparatus is that of a *Semnopithecus*, the stomach exhibiting those structural peculiarities as yet actually found in no other group of the *Simiadæ*, all doubtful speculation seems at an end. We must therefore, (and we think, rightly) merge the genus *Nasalis* into *Semnopithecus*, from which it has been needlessly separated.

The next genus in question, namely, *Pygathrix* of Geoffroy, *Lasiopyga* of Illiger, stands in the same predicament as *Nasalis*, and must also merge into *Semnopithecus;* the apparent want of callosities in the douc monkey induced both Geoffroy and Illiger to found each a genus for its reception. Now it happens unfortunately for these authors, that the specimen on which both relied was mutilated, the callosities being cut away; but callosities do not only exist in the douc, but they are large; a fine specimen of this beautiful monkey has been often carefully examined by ourselves, and we give the fact of the presence of callosities upon our personal observation.

In our account of the douc however, as well as of the long-nosed monkey, and its small ally, the *S. recurvus*, Vig. and Horsf. we shall retain the above generic names as synonyms.

*(To be continued).*

ART. V. *Remarks on Mr. Ogilby's "Further Observations on Rules for Nomenclature."* By H. E. STRICKLAND, Esq. F.G.S. &c.

"Plato and truth are both dear to me, but it is my duty to give the preference to truth."—ARISTOTLE.

I WOULD not again have introduced this subject into your pages, were it not that Mr. Ogilby appears, in several instances, to have so far misapprehended my meaning, as to oblige me, in justice to myself, to put forward a few words of explanation. I am fully disposed to believe, with Mr. Ogilby, that we both have the same end in view, and that we differ less in reality than in appearance. And if this discussion shall tend to disentangle the truth from the complex net-work of words, it will not be without its use.

§ 1.—*Retrospective operation of Rules.*—When I stated at page 200, that I had introduced into my code the conservative doctrine that the rules there proposed should not be retrospective, I certainly did not expect that Rules 5, 6, and 7 would have been brought forward as proof to the contrary.—The rare and extreme exceptions provided for by these rules, are such as I conceived no zoologist, however conservative, would dissent from. Rule 5 provides for the extinction of names which had before been applied to some other species in the same genus, or to some other group of the same rank. Rule 6 states that "a name may be expunged whose meaning is false as applied to the object or group which it represents." This of course can rarely happen; and when it does, it is better, I think, that the person who gave the false name should pay the penalty of his negligence, by the obliteration of the name, than that so obvious a source of error and confusion should be made perpetual. Yet so conservative was the spirit in which those rules were drawn up, that even here it is provided that in those cases "where a name, though false, does not really mislead, it should be retained, *if long established*," e. g. *Caprimulgus.* Rule 7 provides that "a name may be expunged which has never been clearly defined." I cannot comprehend what objection Mr. Ogilby has to that. If a name is not clearly defined at first, it cannot be recognized afterwards, and therefore means nothing. Numerous names used by Aristotle and Pliny are in this predicament, and therefore it is that modern naturalists do not scruple to exclude those names altogether, or to use them in new and conventional senses.

It is on the strength of these three special exceptions that Mr. Ogilby accuses me of "inadvertently" making my rules retrospective, and it is "against the interminable mischief and confusion resulting from the introduction of a principle at once so dangerous, so unfair, and so uncalled for," that he "directed the weight of his censure." I appeal to impartial judges to pronounce what there is dangerous, unfair, or uncalled for in Rules 5, 6, and 7.

Mr. Ogilby further writes, "But is not the fact cited by Mr. Strickland himself, of the well-known naturalist from whose works he has chiefly compiled his "rules," having sanctioned their retrospective character,—a sufficient justification of the severity with which I deprecated the mischievous tendency of these codes?" So, because Mr. Swainson chooses to make *his* code retrospective and consequently mischievous, therefore *my* code, and codes in general, retrospective or not, are to be deprecated as mischievous.

§ 2.—*Terminations in* idæ *and* adæ.—Mr. Ogilby is perfectly right in stating that the affix *oidæ* expresses the relationship of similarity,—"the *o* being merely the last letter of the primitive Greek word with which εἰδης is most commonly joined in composition." But all classical scholars will agree in thinking that he is "greatly mistaken" when he considers the patronymic affix *idæ* or *adæ* to be "absolutely identical with the affix *oidæ*." Matthiæ, (no mean authority), in his 'Greek Grammar,' section 99, classes patronymics in *idæ* not among compound words, but among substantives which receive a new meaning by a change of *form*. Therefore *idæ* is a mere formal termination,—not a super-added word. Various forms of these terminations were used by the Greeks to express family relationship,—the principal of which were ιδης, αδης, and ιων. Indeed the *quantity* of *idæ* proves it not to be derived from εἶδος, *similitudo*, for it would then be *long* instead of *short*. It is true that some patronymics have the diphthong ει instead of the simple ι, but in such cases the ε belongs to the preceding root,—not to the affix. Thus, no one would derive Ἀτρείδης from Ἀτρ-ειδης, *resembling Atreus*, but from Ἀτρέ-ιδης, *akin to Atreus*. When resemblance is implied, the ο is always prefixed to the ειδης, and therefore, if that be Mr. Ogilby's object, he must, as I before remarked, write *Simioi-*

*dæ*, and *Gliroidæ*, or else drop the Greek affix altogether, and make it *Simiiformes*, *Gliriformes*.

I never intended to express that *inclusion* is the *essential* idea implied by the termination *idæ*, but only that it necessarily results from the *close and immediate affinity* which is *essentially* implied by words so terminated. Thus according to the received usage of modern naturalists, the term *Corvidæ* for example, implies a family containing those genera which are closely and immediately allied to *Corvus*, inclusive. Whether the convenience attending these uniform terminations for families be so great as to justify their universal adoption, is matter of opinion. Mr. Ogilby thinks they should not be universal,—I think they should. Be this as it may, I trust it has been proved that family names in *adæ* and *idæ*, (not *oidæ*), cannot be correctly used to express mere resemblance or remote affinity, as in the groups which Mr. Ogilby has termed *Simiadæ* and *Gliridæ*.

§ 3.—*Real signification of the word* Simia.—Mr. Ogilby says in p. 279, "that both Linnæus and Erxleben employed the term *Simia* in a sense different from its real signification, is very true, but that neither one nor the other of them sanction its application in the sense contended for by Mr. Strickland is no less so." I will deal with the latter part of this sentence first. I argue that Linnæus *does* sanction our modern application of the term *Simia* to the orangs, by having himself applied it to the group in which the orangs are contained. If for instance we are justified in using the term *Falco* or *Strix* in a more limited sense than Linnæus did, we are, by parity of reasoning, justified in treating *Simia* in the same way. With regard to Erxleben, though I have not his work at hand to refer to, yet I believe I am correct in stating that he *does* apply the term *Simia* to the orang outangs, though Mr. Ogilby asserts that he does *not* sanction its application in that sense.

Now for the former part of the sentence quoted, viz. that "both Linnæus and Erxleben employed the term *Simia* in a sense different from its real signification." The whole question here is, "what is the *real signification* of the term *Simia?*" Mr. Ogilby's answer would probably be, "the sense in which it was used by the ancients." And pray let me ask, what is the "real signification," in this point of view, of the terms *Cebus* and *Callithrix?* Pliny applies them to certain African monkeys, yet Mr. Ogilby is content to use them for American genera! Is this acting consistently? Is this paying due regard to classical usage and to the right of priority?

If Mr. Ogilby insists on annulling the generic term *Simia*, as used by the moderns, and bringing it back to its Plinian meaning, let him do the same with *Cebus* and *Callithrix*.

To me however it appears that by carrying our veneration for the ancients to this extent, we are injuring the cause of Zoology. Classical criticism has but little connection with modern science; and I have remarked in a former paper, that "the zoological knowledge of the ancients was so vague and imperfect, that few naturalists think it necessary to be very exact in applying their names with precision, for the plain reason that it is rarely possible to ascertain the precise species to which these names anciently referred." Excellent therefore as is the rule of priority, yet I greatly doubt whether any advantage would arise from carrying it farther back than the times of Linnæus and Brisson. Linnæus was the first to attach any clear and definite idea to a zoological genus;—he was the first to apply trivial names to species, and to give definitions of these groups on a uniform plan, so that they could be recognized in future. Systematic Zoology therefore dates from the publication of the '*Systema Naturæ*,' and it would, I think, be highly undesirable at the present day, to extend the operation of the law of priority into the dim obscurity which precedes that great zoological event.—Linnæus indeed might have been more careful in adopting the nomenclature of his predecessors, imperfect though it was,—but it is too late to complain of that *now*. The law of prescription, which is found so convenient in civil matters, ought also to operate in science; and the undisputed possession of a name for a given period, should authorize its permanent adoption, the law of priority notwithstanding. I should therefore define the "real signification" of the term *Simia, when used by zoologists*, to be its *zoological signification*,—that is, the signification first imposed upon it by Linnæus, the father of Zoology, and afterwards modified by subsequent naturalists.

§ 4.—*Etymological meaning of names.*—Mr. Ogilby next proceeds to criticise certain of my "rules" in detail. He commences with Rule 6, which is quoted above. Now I fully agree with him when he says that "words are but the signs of ideas," and that "so long as we agree to give them a particular signification, it matters not what may have been their original meaning, or whether they have any meaning at all."—If Mr. Ogilby will refer to vol. viii. pp. 37, 38, of this Magazine, he will find that I long ago said the same thing, in very nearly the same words. See also Rule 9, vol. i. N. S. p. 175. But my Rule 6 is introduced solely on account of that infirmity of human nature, whereby, when the meaning of a word is *false*, men will *not* "agree to give it a particular signification" contrary to its obvious one. Such words therefore fail of their effect as conventional signs of ideas, and there can be no doubt that they should be rejected. But a proviso is attached to the rule, that when such words as *Caprimulgus*, *Apoda*, &c. *have* accidentally acquired a conventional meaning, in spite of the falsity of their etymological one, they cease to mislead, and should be retained. It appears then that Mr. Ogilby and I agree in principle, though we differ in the application of our principles to practice. And I can only say, that if zoologists *would agree* to use such terms as are destitute of an etymological meaning, I, for one, should not have the slightest objection to them, and Rule 11 might then be dispensed with.

§ 5.—*Absolute and relative characters.*—Mr. Ogilby seems to be greatly puzzled with my Rule 14, that "the meaning of names should be founded on absolute characters,—not on relative or comparative ones." Could I have anticipated his difficulties, I would have appended to the rule a few words of explanation. By absolute characters, I meant characters which are apparent in the object itself, without reference to its congeners, such, for instance, as are expressed by the terms *rufipes*, *viridis*, *sibilatrix*, *Americanus*, &c. Names founded on relative or comparative characters, are such as imply comparison with some other object, and which cannot therefore be intelligible, unless a knowledge of the object compared be presupposed.—Of this class are the têrms *tinnunculoides*, *vespiformis*, *major*, *minor*, &c. Unless a person is acquainted with the species *tinnunculus*, he gains no additional knowledge from the term *tinnunculoides*, which in such a case only explains *ignotum per ignotius*. Objections to this class of words are not of modern date, for they are urged by Linnæus in his '*Critica Botanica*.' To prevent the adoption of such terms in future, was the object of Rule 14; and I know of no other more intelligible form of words than that in which it is announced.

§ 6.—*Meaning of the word type.*—My view of the word type is precisely the same as Mr. Ogilby's. By the type of a genus I mean that species which is usually selected as an *example* of the genus, and "by the most typical genus" of a family, I mean that genus which seems to afford the best sample of the characters on which the family is based, with the least tendency to diverge into other families. My doctrine is, that all species were created free and equal, and that all the distinctions about *typical*, *aberrant*, &c. are instances of mere human favoriteism, which have no existence *in rerum naturâ*. Man selects a group of closely-allied species, which he calls a genus, and confines within certain discretionary limits; and that species which affords the fairest sample of the whole, he calls a *type*. I am aware that the quinary theorists attach to the word *type*, a deeper and more mysterious meaning; but this is not the only one of their doctrines to which I do not subscribe. I have therefore no objection to alter Rule 18 into the following form. "The names of families and subfamilies should be derived from that genus in them which affords the best example of their characters."

§ 7.—*Euphony.*—By euphony I understand agreeableness of sound; and I cannot but think that too great redundancy of syllables is no less prejudicial to this object, than a want of "harmony and liquid softness."

If Mr. Ogilby will publish his own code of "euphony and propriety of application, he will confer a great benefit on scientific nomenclature. As his eyes are open to the numerous errors in the codes of his predecessors, we may hope that his code will be neither "arbitrary, dogmatical, and carelessly drawn up," nor guilty of that "interminable length" apparent in my code, which actually extends to nearly three 8vo pages, and no less than twenty-two clauses, thereby setting a bad example of prolixity to the framers of acts of parliament. I shall rejoice if the '*Codex Ogilbyanus*' shall appear to be an improvement on its predecessors, for I am well aware that the existing codes are far from perfect, though I do not think Mr. Ogilby has been quite just in his criticisms of them.

I have now said all that appears necessary to explain my views, and trust there will be no occasion to recur to the subject. I hope that this protracted discussion will at least point out to those naturalists who shall in future have occasion to name new species or new groups, that the best way of defeating the designs of the poachers and petty larceners whom Mr. Ogilby so justly censures, is to adopt such names as the very poachers themselves cannot meddle with. If a new group is distinguished by a name whose meaning is at once obvious and distinctive, the poachers will in vain attempt to appropriate it;—they may seize on it for a time, but justice will soon restore the stolen goods to their owners.

ART. VI. *Miscellaneous Ornithological Notes.* By MR. JOHN SKAIFE.

THE SMEW. I have now lying before me a beautiful specimen of the female smew, (*Mergus albellus*), which I obtained at Preston, on Saturday, January 13th, 1838. In the excellent figure by Gould, ('Birds of Europe,' pl. 42, vol. 5), the female is distinguished by a black mark on the cheek, and around the eye; in his description Mr. Gould observes that 'this marking in the female has hitherto escaped the observation of ornithologists.' This assertion is not strictly correct, at least in regard to one ornithologist, (Montagu, ed. by Rennie, 1831, p. 467), who says that 'the female has the same black mark on the side of the head as the male.' In the 'British Cyclopædia of Natural History,' edited by Partington, at p. 237, vol. iii. in the description of the smew it is stated, 'the spot on the eye is dusky.' But other naturalists have omitted all notice of this mark in the female; as Temminck, ('Manuel d'Ornithologie'), does not mention it, neither does Wilson, ('Birds of America,' edited by Jameson), nor Bewick. The description and figure given by Bewick of his 'lough diver,' ed. of 1832, vol. ii. p. 278), might have been taken from the bird I now have under my inspection. In this specimen there is not the slightest trace of a black mark on the cheek, or about any part of the head. My specimen in evidently an old bird, and in full feather. A fortnight after I procured this specimen, I obtained a second at Preston, in precisely the same state of plumage, with not a trace of the black mark. With great diffidence I venture to offer the following suggestion for the consideration of ornithologists. Seeing that the black mark is not universal in females, may not the birds distinguished by it possibly be young males, and those not possessing it be females?

White Partridge. In the township of Alston, a few miles from Preston, in the summer of last year, (1837), a covey of partridges was frequently seen, which contained four birds of a perfectly white colour; the remaining birds in the covey being in the ordinary plumage. The white birds were all shot in the month of September, 1837, by different persons; three were suffered to go to decay, and only one prepared for the private cabinet of the gentleman who shot it. A more beautiful bird I never beheld; the plumage was of the purest white throughout, without a single speck or flaw of any other colour. The eye was of that bright red peculiar to albinoes; as the white rabbit, polar bear, ferret, &c. I never saw a ptarmigan whose plumage was of a clearer white than this partridge; which is the more remarkable, as the so-called white partridges are seldom without an admixture of feathers of the usual grey colour.

The Stormy Petrel. After a dreadfully severe storm of wind in September, 1837, a stormy petrel, (*Thalassidroma pelagica*), was picked up on Preston Moor, by a little boy, alive, but completely exhausted, although it survived its capture two days, and so far recovered its strength and activity, that had it not been killed for the purpose of mounting, it would probably have flown off. This bird is now in my possession, and is the smallest of the species I ever saw, though in perfect plumage. Preston Moor, where this bird was taken, is a low, marshy piece of ground, close to the town, recently enclosed and drained, and is hardly entitled to the name of 'Moor,' as with that term is usually associated the idea of a wild, mountainous and desert country.

THE POMARINE GULL; (*Lestris Pomarinus*). The same storm which drove the poor petrel to such an uncongenial locality, sent to the moor above-mentioned two pomarine gulls in youthful plumage, both of which were captured. I obtained one of them. In some places these birds are considered, and probably are, anything but rarities; but I assure you, in this part of the kingdom* they are so seldom seen, as to be considered great curiosities.

THE RED-BREASTED MERGANSER; (*Mergus serrator*). A most splendid male specimen of this bird was shot at * * * * * *† near Southport, on Saturday, February 10th, 1838.—So rare is this bird in these parts, that none of the bird-stuffers, nor the oldest sportsmen and fishermen, ever remember to have seen one of this species before. Southport is a fashionable bathing-place, on the west coast of Lancashire, a few miles below the estuary of the Ribble.

THE WILD SWAN; (*Cygnus ferus*). The present dreadfully severe weather has driven to the estuary of, and even high up, the river Ribble, a flock of wild swans, originally twenty-seven in number. The capture of four of these has come within my own observation; the first was shot in the neighbourhood of * * *† upwards of twenty miles from the mouth of the river, on Wednesday, February 7th. This bird I did not see myself, but from the description I obtained of it, should judge it must be a young bird, similar to the one shortly to be described. The second was shot near Walton-le-Dale, about two miles up the Ribble, above Preston; this being shot by a farmer, the Goth actually had it plucked and roasted. The third was shot near Clitheroe, still higher up

* When I say 'this part of the kingdom,' and am alluding to waterfowl, I do not mean the town or immediate neighbourhood of Blackburn, where I reside, near which, being an inland town, there can be little probability of gulls being seen; but I mean the sea-coast of Lancashire, where I have obtained most of my specimens of waterfowl.

† Our correspondent must have forgotten the request which has so frequently appeared on the wrapper, respecting the writing of proper names in legible characters.—Ed.

the river; this was an old bird, in the most perfect state of plumage; the cere was of a beautiful bright yellow, and the bird altogether bore a striking resemblance to Gould's figure. The fourth bird came into my possession on Saturday, February 17th, 1838, in quite a recent state, having been killed, I believe, near the embouchure of the Ribble two days before. It is evidently a young bird, though full grown: from the end of the bill to the tip of the tail it measured 5 feet, and the wings when extended measured 8 feet from tip to tip. The breadth of the foot, when the web was stretched out, was 7½ inches. Altogether the linear dimensions were equal to, or rather greater than those of the above-named adult specimen. The bird was excessively thin and meager, and weighed only 12 ℔s. whilst the weight of the adult was 20 ℔s. The cere was of a pale flesh colour, with blotches and dashes of black, but exhibiting no trace whatever of yellow; and the plumage, instead of being of the beautiful snowy white of the adult, was of a dirty greyish white throughout, conveying to the mind, at first sight, the impression that the bird was dirty, but on a closer inspection this colour of the plumage was found to be permanent. In the works of the various ornithologists in my possession, the writers content themselves with describing the adult birds, and make no mention of the different colouring of the young bird; from this, however, I must except M. Temminck, who describes the young bird very minutely, and his description for the most part agrees with the appearance of my specimen.

THE CANADA GOOSE. It is generally believed that this bird is not indigenous to Europe, and Gould omits all mention of it in the 'Birds of Europe.' Possibly it may be so, but I am inclined to agree with a writer in your Magazine, who is of opinion that the specimens shot occasionally in England, are really, *bonâ fide* wild specimens, and not domesticated or semi-domesticated birds, escaped from confinement in gentlemen's parks, or from farm-yards. On Saturday, January 27th, there were two remarkably fine specimens of this bird in the Preston market; I purchased the finest of them, and therefore had an opportunity of minute inspection, and certainly, in my opinion, the bird presented no marks of domestication; but I repeat, I may possibly be mistaken: and if it had escaped some time from confinement, it would have much more the appearance of a wild bird, than if its escape had been recent.

*Blackburn, Lancashire,*
*February 19th*, 1838.

## SCIENTIFIC INTELLIGENCE.

*At the Meeting* for scientific business of the Zoological Society, May 18th, Mr. Waterhouse exhibited a valuable and highly interesting series of skins of *Mammalia*, from the island of Fernando Po, which had recently been presented to the Society's Museum by George Knapp, Esq. The collection contained eight or nine species, which Mr. Waterhouse considers to be entirely new; in which are included two undescribed species of the genus *Colobus*, forming a most important addition to that group of *Quadrumana*, of which our knowledge is so extremely limited, from the very small number of skins hitherto brought to Europe. Mr. Waterhouse proposes to name one of these *Colobi* in honour of Pennant, *C. Pennantii*, and he remarked that it is the nearest species to the bay monkey of that naturalist, yet discovered, but differs from it in having the throat and cheeks white, and in exhibiting three distinct shades of colouring on the body; the species described by Pennant was also from a different locality, Sierra Leone, a circumstance which strengthens the probability of its being distinct. For the remaining species of *Colobus* Mr. Waterhouse proposes the specific appellation of *Satanas;* its uniform black colour will at once serve to distinguish it from the only allied species, *leucoprymnus* and *ursinus*, the former having white thighs and a white throat, while the latter has the tail entirely white. Mr. Waterhouse next proceeded to describe two species of the genus *Cercopithecus*, one of which was named *C. Martini*, and the other *C. erythrotis*. A new species of genet, which Mr. Waterhouse stated to differ from all other African genets in its general colour, and the dark marks and spots upon the body, was called *Genetta Poensis*. A new otter was called *Lutra Poensis;* and an antelope, also included in the same collection, was characterized as *Antilope Ogilbyi*. The skin of this last animal was imperfect, being without the head and extremities; but it was regarded by Mr. Waterhouse as most closely allied to the *A. scripta*, in which case he remarked that it would belong to the sub-genus *Tragelaphus* of Ham. Smith, or the more extended group to which Mr. Ogilby has applied the name of *Calliope*.

Mr. Waterhouse then proceeded to notice two extremely interesting skins which had just been brought over from Sierra Leone by Major Dundas Campbell, and sent by him for exhibition at the Society's evening meeting, with a promise, on the part of Major Campbell, to present them to the

Society, in the event of his being able to make an arrangement with a party, to whom he had parted with them as an article of commerce. One of these specimens was a remarkably fine skin of a species of *Colobus* described by Mr. Ogilby some time since, in the Society's 'Proceedings,' under the name of *ursinus*; the skin, however, upon which Mr. Ogilby founded his species, was imperfect, and until the opportunity afforded by the inspection of the present specimen, nothing was known of the colour of the head and face, which prove to be greyish white. The other skin was a new species of the genus *Cercopithecus*, peculiar for its long fur, and for the hair being parted down the middle of the back, as in most of the *Colobi*. The specific name of *C. Campbelli* was proposed for the above animal.

Mr. Ogilby exhibited and described various species of kangaroo rats, (*Hypsiprimnus*), from the Society's collection, and read several extracts relating to them from a paper which he had prepared upon the subject, so long ago as the year 1832, and which, though partly read before the Linnean Society at that time, had never been made public, owing to the imperfection of the materials then in this country, for the perfect illustration of the genus. Reserving the detail of his observations for an express monograph, Mr. Ogilby briefly characterized the following species. *Hyp. setosus*, *myosurus*, *melanotis*, *formosus*, *Philippi*, *cuniculus*, and *murinus*.

A new *Chameleon* from Fernando Po was then described by Mr. Martin, who proposed to call it *C. Bibroni*, in acknowledgement of the great assistance he had derived from the work of M. Bibron, whilst engaged upon the determination of the species of *Reptilia* in the Society's collection.

*New species of Popillia.*—At the Entomological Society on Monday evening, the 7th of May, a paper by Mr. Newman on the genus *Popillia*, (Leach), was read. The author describes twenty-one new species, as under.

1. P. *regina*. Omninò lætè viridi-ænea, glabra, splendidissima: elytra profundè striata, striis punctatis: mesosternum valdè productum, curvatum. *Habitat* Asia. Corp. long. .7 unc. lat. .45 unc.

2. P. *dorsigera*. Nigro-ænea, elytrorum fasciâ medianâ transversâ communi fulvâ: podex brunneus pilis albis bisignatus: elytra striata striis punctatis et (1mo excepto) abbreviatis. *Habitat* Africa. Corp. long. .75 unc. lat. .4 unc.

3. P. *brunnea*. Nigra; clypeo, antennis, elytris, pedibusque brunneis, metatarsis piceis: podex pilis albis bisignatus: elytra striata striis puctatis. *Habitat* Africa. Corp. long. .65 unc. lat. .4 unc.

4. P. *Æneas*. Olivaceo-viridis; antennis, pedibusque brunneis, metatarsis piceis: podex pilis albis bisignatis: elytra punctato-striata. *Habitat* Africa. Corp. long. .65 unc. lat. .4 unc.

5 P. *olea*. Olivacea, luce varians: antennis elytrisque testaceis, fulgore metallico nitidis: pedibus testaceis fulgore cupreo nitidis: podex pilis albis bisignatis: elytra punctato-striata. *Habitat* Africa. Corp. long. .5 unc. lat. .3 unc.

6. P. *mutans*. Brunnea, fulgore æneo nitida; antennis pedibusque concoloribus: podex haud signatus: elytra punctato-striata, utrinque prope suturam profundè foveata. *Habitat* Ind. Orient. Corp. long. .5 unc. lat. .35 unc.

7. P. *chlorion*. Obscurè viridis: antennis piceis: pedibus chalybeo-nigris; podex pilis albidis bisignatus: elytra striata, utrinque prope suturam profundè foveata. *Habitat* Ind. Orient. Corp. long. .4 unc. lat. .25 unc.

8. P. *Adamas*. Nigro-cyanea, nitida; pedibus concoloribus; antennis nigris: podex pilis niveis bisignatus: elytra punctato-striata, utrinque prope suturam profundè foveata. *Habitat* Ind. Orient. Corp. long. .4 unc. lat. .25 unc.; magnitudine valdè variat.

9. P. *complanata*. Caput, prothorax, et scutellum viridi-ænei: clypeus brunneus, antennæ brunneæ capitulo nigro: elytra testacea complanata punctato-striata, utrinque prope suturam vagè foveata; pedes brunnei fulgore metallico nitidi. *Habitat* Ind. Orient. Corp. long. .45 unc. lat. .275 unc.

10. P. *lucida*. Chalybeo-ænea, antennis piceis, elytris testaceis; pedibus brunneis fulgore metallico nitidis: podex pilis niveis bisignatus: elytra punctato-striata utrinque prope suturam profundè foveata. *Habitat* Ind. Orient. Corp. long. .3 unc. lat. .2 unc.

11. P. *Japonica*. Cupreo-ænea; antennis piceis capitulo nigro; pedibus viridi- aut cupreo-æneis, tarsis nigris: elytra testacea, suturâ marginibusque nigro-æneis: podex pilis albis bisignatus: elytra punctato-striata. *Habitat* Insul. Japon. Corp. long. .45 unc. lat. .275 unc.

12. P. *difficilis*. Lætè ænea; antennis testaceis capitulo nigro; elytris testaceis, pedibus brunneis, fulgore metallico nitidis: podex æneus, pilis albis obscurè bisignatus: elytra punctato-striata. *Habitat* Ind. Orient.—Corp. long. .325 unc. lat. .175 unc.

13. P. *nasuta*. Cuprea; antennis piceis: clypeo elongato recurvo: elytris cupreo-testaceis: pedibus nigro-æneis, cupreo variis, tarsis nigris: podex æneus, nullo modo signatus: elytra punctato-striata. *Habitat* Ind. Orient. Corp. long. .45 unc. lat. .275 unc.

14. P. *acuta*. Lætè cupreo-ænea; clypeo elongato recurvo acutissimo; antennis brunneis; elytris pedibusque testaceis fulgore cupreo nitidis: podex æneus nullo modo signatus; elytra punctato-striata. *Habitat* Ind. Orient. Corp. long. .425 unc. lat. .265 unc.: magnitudine valdè variat.

15. P. *rugicollis*. Caput viride, clypeo antennisque testaceis: prothorax viridis, rugosus, marginibus testaceis: elytra testacea sulcata, sulcis punctatis: podex nigro-æneus, pilosus, immaculatus. *Habitat* Ind. Orient.—Corp. long. .375 unc. lat. .2 unc.

16. P. *fimbriata*. Nigra; antennis testaceis, capitulo nigro: caput et prothorax virescentes: elytra chalybea: podex pilis albis manifestè 1-lineatus. *Habitat* Ind. Orient. Corp. long. .3 unc. lat. .175 unc.

17. P. *sticticollis*. Testacea, capitis maculis 2, prothoracis maculis discoidalibus 2, marginibusque antico et postico, scutelli margo, elytrorum sutura, margoque lateralis versus apicem nigri. *Habitat* Mexico. Corp. long. .45 unc. lat. .275. unc.

18. P. *vidua*. Nigra, glabra: antennæ testaceæ capitulo nigro. *Habitat* Mexico. Corp. long. .425 unc. lat. .25. unc.

19. P. *semirufa*. Ferruginea, antennarum capitulus, capitis vertex, prothoracis discus, elytra tota, protibiæ omninò, metatibiarum apices, tarsique undique nigri. *Habitat* Mexico. Corp. long. .425 unc. lat. .25 unc.

20. P. *Castor*. Brunnea, prothoracis discus rugosus, brunneus, marginibus ochraceis: elytra sulcata, sulci profundè punctati: elytrorum humeri nigri. *Habitat* Mexico. Corp. long. .28 unc. lat. .175 unc.

21. P. *Pollux*. Nigro-ænea: prothoracis marginibus, elytrisque totis testaceis: pedes brunnei, tarsis piceis: elytra sulcata, sulcis profundè punctatis. *Habitat* Mexico. Corp. long. .27 unc. lat. .16 unc.

Mr. Newman also describes the following published species. *Rufipes* and *bipunctata* of Fabricius; *biguttata* of Wiedemann; *cyanea, minuta, cupricollis, virescens, marginicollis*, and *nitida* of Hope. *Beryllina* of Hope he considers a variety of *cyanea;* and *formosa* and *smaragdala*, both remarkable for their splendid colouring, he gives as varieties of *cupricollis*. The number of distinct species is thirty, all of them in the rich cabinet of Mr. Hope; and also five named varieties: one additional species is added from the British Museum.

*Meetings of the Friends of Natural History, of Berlin.*— January 16th. Prof. Ehrenberg exhibited samples of the siliceous earth, which was found a short time before, near Ebsdorf, in the neighbourhood of Lüneburg, in Hanover. This earth, which has been discovered at six different places in the same district, forms two layers of different colours, and is covered with one of peat-earth only, 1½ foot thick. The upper *stratum*, which is from 10 to 18 feet thick, is very white, and consists of pure *silica*, according to the analysis of Prof. Wiggers, of Göttingen. The second, the colour of which is brownish grey, is at least 10 ft. thick; it also consists of *silica*, with a small proportion of bitumen: the latter disappearing on the earth being heated, its colour likewise becoming white. As Prof. Hausmann of Göttingen suspected this earth to be composed of the remains of organic beings, he sent samples of both the varieties to Prof. Ehrenberg, who examined them under the microscope. Both sorts are much alike, with reference to their composition, and not only *contain* the minute shields of *Infusoria*, but *consist* of them. Prof. Ehrenberg had distinguished in them sixteen different organic bodies, of which fourteen are the siliceous *testæ* of *Infusoria*. The white or upper *stratum* is entirely composed of such *testæ*, in a state of perfect preservation, with a slight admixture of grains of quartz; much resembling in this respect the mountain meal, (bergmehl), of Santafiora, but it is purer. Prof. Ehrenberg has already distinguished twelve different species of *Infusoria*. The brownish grey, or lower layer, consists of the same *testæ*, but in a less perfect state, and of two more species, which Prof. Ehrenberg could not detect in the upper *stratum*, namely, *Gallionella varians* and *Cocconeis clypeus*. But what is more remarkable, it contains an admixture of vegetable substances and forms. In the lower part of the sample there were found the *pollen* of a species of *Pinus*, and the siliceous *spiculæ* of sponge, in the proportion of about $\frac{1}{10}$. All the twelve species of the upper layer, as well as the *Gallionella*, are to be met with in the living state near Berlin. *Cocconeis clypeus* is found, along with *Navicula viridis*, in the Kieselguhr (siliceous deposits) of Franzenbad. The *pollen* of a *Pinus* Prof. Ehrenberg first discovered in the mountain meal of Deggernfors, in Sweden, afterwards in the Kieselguhr of Kymmene-Gärd, in Finland, and lately in that of Franzensbad, but always in small quantities. Prof. Ehrenberg then demonstrated on living earth-worms, that the digestive process in these creatures, has not the effect of destroying the structure of the siliceous integuments of the *Infusoria*, but that the *Bacillariæ*, which they devour in great quantities, lose only their animal constituents, their *testæ* being voided in a perfect state.

February 20th. Prof. Ehrenberg communicated that the severe cold, (—18—20° R.), of this winter, had not killed all the *Infusoria* in the vegetable mould of the deer-garden near Berlin; but on the lumps of earth being cautiously thawed, many of the animalcules were seen moving about, though a great number certainly appeared to be dead. He also exhibited a large mass of the infusorial earth from the lake of Lillhaggsjön, which, from time immemorial, has been added to flour, in making bread.

March 20th. Prof. Link read a paper on the developement of roots. He stated that, whilst the leaf-buds originate from the pith, the roots always spring from the ligneous body. Mr. Weiss exhibited *scoriæ* from the puddling furnaces of Ilsenburg, in the Hercynian forest, on which regular octahedrons of magnetic iron ore had formed.

April 17th. Prof. Link detailed the results of his microscopical examination of the coal of South America. It appears to owe its existence to the same vegetable substances as the coal of other countries. One variety seemed to be principally formed of palm wood. Prof. Ehrenberg mentioned that perfectly dried wheel-animalcules and other *Infusoria*, could not be revived; a fact which he had established by numerous experiments. Prof. Müller laid before the Society the plates of the 1st number of his and Dr. Henle's work on sharks and skates.

May 15th. Prof. Link continued his observations on coal, which he considers as primeval peat. He could discover in it no traces of dicotyledonous plants, to which the anthracite mostly owes its origin, though it also contains much fir.—Prof. Ehrenberg stated that for ten months his *Infusoria* have kept alive, without any supply of water.

*Petrified Wood.*—Prof. Göppert of Breslau has treated with acids different sorts of petrified wood, (those combined with lime, iron, or copper, he treated with muriatic acid, and those combined with *silica.* with fluoric acid), and thus succeeded in removing the petrifying materials to such a degree, that the fibre became flexible, and in many cases exhibited the generic character. He thus laid bare the *vasa scalaria* of a plant, (*Stigmaria fucoides*), having a very extensive geographical range, and which Rhode was inclined to class with the *Cacti*, but the structure of which was before entirely unknown. These vessels became flexible, and the partitions between their membranes distinctly visible. The results of these enquiries give great probability to the opinion, that these petrifactions have been produced by aqueous solutions of the lapidifying substances.

*Dryness of the atmosphere in Peru.*—On the highest plateaux of the southern part of Peru, the air is dryer than in perhaps any other part of the globe, and the strong winds which blow there at regular intervals every day, exsiccate all the dead organic bodies subjected to their agency, within an incredibly short time. Though the cold may contribute also to preserve them from corruption, yet but a small proportion of the result can be attributed to this cause. When horses, mules, or other beasts of burden are left behind to die, by their drivers, the vultures of the Cordilleras immediately assail and kill them: but while the birds are opening the belly and feeding upon the entrails of their victim, the exsiccation of the carcass makes such rapid progress, that the vultures are not able to tear the skin and flesh, which form a natural mummy, and is preserved for centuries in the open air, just where it happens to fall. The flesh nearly disappears, so that the skin looks as if glued to the bones. The hair, teeth, and hoofs remain in a most perfect state of preservation. (Reisebeschreiburg des Prof. Julius Meyen).

*M. de Russegger* has now accomplished the object of his journey, viz. to enquire into the mineralogical treasures of all the countries subject to Mohammed Ali, from the Taurus, in Asia Minor, down to Fazoglo, on the Elue River, or from 37° to 12° N. lat. The success with which his travels have been attended, as to the immediate purpose of his mission, is beyond what the most sanguine hopes of the viceroy could have anticipated; and the result promises to be hig resting in a scientific point of view. Since our last notice Mr. de Russegger has written twice, viz. from Roserres, in the country of Fazoglo, on the 19th December, 1837, and from Fazoglo, on the Blue River, on the 8th of February, 1838.—In the mountains of Shegedi, in Sennaar, he found a very considerable vein of silver ore, the matrix being quartz, and the rock through which it passes clay slate; and in the chain of Okelai and Keduss, on the western boundary of Abyssinia, he met with an immense mass of quartz, (in granite), containing various silver and copper ores. At Roserres the traveller joined the army of Mustapha Bey, and continued his journey to the south, through the negro countries of Fazoglo, Akaro, Kassan, and Kamamil, to Shangolla, on the limit of the Gallas countries. On his way back to Fazoglo he examined the whole tract in a mineralogical point of view. He found many rivers, the alluvial deposits of which are so rich in gold, that they may be worked with great profit. But the richest district was discovered in the country of Fazoglo.—"Between the chains of Fallowu and Fasangoru, lies the valley of the river Adi, which, in an extent of two or three German miles, is covered with mountains of quartz, containing quartz iron ores, with native gold imbedded in them. We found this latter metal in great quantities, both in the solid rock and in the rolled stones of the river. I bring with me a fragment of quartz containing native gold, one grain of which weighs two carats. The whole of the alluvial ground between these quartz mountains, is immensely rich in gold, and the negroes are extensively engaged in washing for it along the river Adi, a circumstance hitherto quite unknown to the Egyptians.—An army of a thousand men might be set to work directly; and with the cheapest arrangements, and scarcely less simple than those of the negroes, each would obtain gold to the amount of 6 or 8 florins convent. mon. (12 to 16 sh.) per day. The locality is extremely favourable, for the distance from the Blue River, which bears large barges during the rainy season, is only three leagues, and there is plenty of wood." Upon the whole, Mr. de Russegger feels convinced, that the little insulated mountains of the tropical part of Africa, contain inexhaustible treasures of various metals. He hoped to arrive at Cairo towards the end of June.

*Curious experiment in grafting.*—A gardener at the botanic garden of Metz, named Simon, has grafted a scion of the chesnut on an oak, and the experiment has perfectly succeeded. The Royal Academy of Metz mentions this curious fact in its [illegible] on the Progress of Gardening in 1837.'

[illegible] *caught in Switzerland.*—Near Wattenburgh, not far from Seftingen, in the canton of Bern, in the beginning of April, 1838, a fine specimen of the *Capricorn* was caught, but restored to liberty, in consequence of the legal enactments. A Swiss locality where this rare animal is still said to breed, is the forest of the Gournigel, near Bern.

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## SHORT COMMUNICATIONS.

*Cicindela hybrida*, Linn.—The greatest confusion exists in modern entomological works, respecting this species of flying beetles; (see Stephens' 'Illustr. Brit. Ent.' vol. i. pp. 8, 18, and 175; and vol. v. p. 366: Curtis, 'Brit. Ent.' No. 1, second edition: Andouin and Brulle, 'Hist. Nat. Ins. Coleopt. 1. livr. 1.; Laporte in Selberm. 'Rev. Entomol.' No 7. and 'Hist. Anim. Artic.'; Klug, 'Jahrbucher,' 1834; Erichson, 'Kafer Mark Brandenburg'). According, however, to the Linnæan specimen of this species, preserved in the collection of Linnæus, in the possession of the Linnean Society, and ticketed in the hand-writing of Linnæus himself, the species is identical with that to which Dejean has doubtingly assigned the name of *C. hybrida*, and which Stephens has described under the name of *C. riparia*. Moreover, the Linnæan cabinet does not contain a specimen of the species which Sowerby figured under the name of *C. hybrida*, and which has been described by the French authors under the name of *C. maritima*.

By the side of the Linnæan specimen are placed, (as though regarded as the same species), a copper-coloured specimen of the small *C. sinuata*, Fabr. ('Col. d'Eur.' t. 4, f. 6), and also a specimen of a third species, as large as *C. campestris*, of a dark greenish black colour, with markings like *C. riparia*, and ticketed in a more recent hand, "Mt. Simpelon, Alps; Dr. Young." These two specimens, and more particularly the latter, have in all probability been introduced into the cabinet since the death of Linnæus, by Sir J. E. Smith, its late possessor. In the Benksian cabinet, (the insects in which were named by Fabricius), at the Linnean Society, a specimen of the species figured by me, is also named *hybrida*.—This species was first introduced into the British lists by Mr. Stephens, under the name of *riparia*, in the first number of his 'Illustrations,' and in the second number he describes, under the name of *C. aprica*, another supposed species, which he doubtingly considered might possibly be an extreme variety of the former; more recently, (Appendix to vol. v.), his opinion upon this subject appears to have been confirmed, and indeed some of the French authors regard, not only *apri-*

*ca* and *riparia*, but also *integra*, *montana*, and some others, as varieties of the *hybrida* of Linnæus and Dejean. Much stress has been laid upon the colour of the labial *palpi* in this and the allied species, both by Messrs. Stephens and Curtis; this character, however, (as the former author indeed subsequently observed, 'Illust.' vol. i. p. 20), is of little importance, these organs, both in *C. hybrida* and *sylvicola*, being variable in colour from nearly white to black; which variation Mr. Stephens considers to be attributable to age, whilst M. Brulle regards it as sexual; the latter stating that these organs are obscure in the female and pale in the male. This however can scarcely be correct, since I possess a female of *C. maritima*, (*hybrida*, Sowerby), with *palpi* as pale as in the males, whilst I have a female of the true *hybrida*, with black labial *palpi*.—*J. O. Westwood.*

*Cuscuta Epilinum*.—In the summer of 1836, I gathered a species of *Cuscuta* upon flax, in a field near Ellesmere, Shropshire, which I then took to be *C. Europæa;* but finding, on subsequent examination, the scales within the corolla, said to be wanting in that species, I forwarded specimens to Sir W. J. Hooker, and directed his attention to its examination. He at once decided it to be *Cuscuta Epilinum* of Weihe, a continental species, and very destructive in Germany to the crops of flax, stunting the growth of the stems by enveloping them so tightly. I have sent a dried specimen, (with description), to Mr. Sowerby, to be figured in his 'Supplement to English Botany'; but as this may not appear in time for the present season, it may be as well to insert this notice in the forthcoming number of the 'Magazine of Natural History,' that botanists may have an opportunity of searching for the plant. Sir W. Hooker suggested to me that all the *Cuscutæ* found *on flax*, will prove to be this species; and this my friend W. A. Leighton, of Shrewsbury, and myself, have found to be the case, on examination of specimens in our respective *herbaria*.

*C. Epilinum* may be distinguished from *C. Europæa*, by its simple, not branched, habit, and by its very pale, (nearly white) *capitula* or heads, which are without any of the rosy tinge of the latter. These heads consist of fewer flowers than in the latter species, (about five), and these are large, fleshy, and succulent. Both the heads and their component flowers are more decidedly sitting than in *C. Europæa;* the heads are subtended by a membranous, obovate, reflexed *bractea*, of a reddish brown colour; but there is no *bractea* under each individual flower. This is at variance with Sir J. E. Smith's generic character, and with Reichenbach's specific character, —"*glomerulis ebracteatis*,"—heads without bracteas,—which is wrong, because the *bractea* is only wanting to the individual flowers. Indeed the general *bractea* is not easily seen, being partly concealed and enveloped by the globular sessile head. The *calyx* is large and spreading, its segments thick and deltoid, almost as long as the *corolla*, which has very acute segments and a globose tube, even before the enlargement of the *germen*. The filaments are also very short and very acute; beneath each of which, at the base of the *corolla*, is inserted a broad membranous scale, (perceived with difficuly from being in close contact with the tube), whose jagged tips do not reach so high as the insertion of the stamens. The capsule is globose, 2-celled, the cells 2-seeded, and the seeds sub-triquetrous from compression as they swell, covered with chaffy granulations and deeply pitted.

In common with its congeners, the stems of *C. Epilinum* twist upwards from west to east, often binding together many contiguous plants of flax, and strangling them as it were with a tight cord. Its roots and the lower part of the stem also wither away, as soon as it has firmly fixed itself upon the stock by means of its wart-like suckers, through which it supports itself on the juices of its foster-parent. Strictly speaking, no station can be given for this parasite, as it can only come to perfection where flax is cultivated. Though ripe seeds which have been shed upon the ground may germinate the ensuing spring, the young plants soon die if the flax be not at hand on which to fix themselves. Accordingly I could not find a single specimen in the same field, the ensuing summer, 1837, the crop having been changed. This may account for a circumstance which occurred many years ago, and which puzzled me at the time, and also confirms Sir W. Hooker's opinion, that it will only grow on flax. I had sown some purchased flax seed in a back border in my garden, the plants from which were infested with *C. Europæa*, (as I believed). I sowed some of the dodder seeds among nettles, in the corner of a field, and was disappointed at their not producing a single plant; though I now think it probable that they germinated, and died away for want of their proper food. If botanists would search in fields of growing flax, or among purchased seed in spring, they would probably be rewarded by finding either living plants or seeds of this troublesome parasite, which I suspect is not uncommon; and it would well repay the farmer to rid his flax seed of this worst species of *Tares*, before sowing it. The seeds are large, nearly round, and would easily be detected among the flax.

If any botanist, being fully satisfied that he has found the true plant, would kindly forward good growing specimens to

Mr. J. De C. Sowerby, 62, Pratt St. Camden Town, it would enable that gentleman to give a better figure than it will be possible to do from dried ones; and while I am making this request, I may as well include my friend Curtis, who has signified his desire on the covers of his unrivalled 'British Entomology,' to be favoured with specimens of new and rare plants, free of expense, to be figured in his truly beautiful and splendid work.—*J. E. Bowman*, (*late of Gresford, Denbighshire*).—*Elm Place, near Manchester*; 15*th May*, 1838.

*Improvements in the Microscope.*—Perhaps it may not be considered out of place in '*The Magazine of Natural History*,' to notice some improvements and simplifications on *that most important aid to the naturalist—the microscope*, made by myself.

These consist in producing the two *crossing motions* of the stage, and in regulating the light, in the following most facile modes. My microscope has a square stem, with a rack and pinion, the latter having a milled head, recently added by myself, 2¾ inches in diameter, in order to obtain readily *a tolerably accurate* adjustment of the *focus*; but the *minute adjustment* is effected by a fine screw, with a milled head, recently fitted to it by *Mr. Andrew Ross*, who has likewise furnished me with a new body, three of *his admirable achromatic compound objectives*, and three astronomical eye-pieces; and thus it is as perfect in these respects, as, I believe, any microscope now in existence. It is likewise now indeed *very greatly improved* by the exceedingly pleasant mode of examining objects, effected by the simplification and improvement of the stage by myself. The stage was originally mounted upon a bracket, proceeding from the upper sliding socket upon the stem, and had a *steady-pin* in addition to the screw, by which it was fixed to the socket, and expressly designed to prevent any side motion of the stage, as usual. Now, I had only to remove the steady-pin, and thus obtained the *sideway movement* of the stage in a most simple and effectual manner. This was a very great improvement, and afforded much facility in viewing the different objects; still, however, the opposite motion, to or from the observer, was wanted, and this I have also been able to effect in as simple and useful a manner, as the motion sideways. Mr. Ross had fitted to my stage his valuable *speculum* for *illuminating opaque objects sideways*; and for this purpose had mounted a pipe or socket to receive the stem of the carriage of the *speculum*, in a small plate of brass, which he fixed by screws to the underside of the stage, on the left side of it. This gave me the opportunity of employing another cylindrical metal stem, to fit his pipe or socket, with a flat circular head to it, nearly equal in thickness to the stage; and of cementing to it with shell lac, a plate of glass, which lies upon the stage, and swings or turns upon that as a centre, and thus affords the *opposite crossing movement required*, in a most complete and effectual manner. I believe that such valuable results were never before attained in so facile a way. And indeed it would seem as if everything had been expressly provided for the occasion, and only needed my wish to be possessed of this truly desirable property of moving an object, even of considerable size, in every direction, with the utmost freedom. I have cemented a small flat ivory button upon the right hand corner of the glass plate, by way of handle to move it by.

I have likewise effected the important object of *graduating* the light from the plane or concave *specula* which slide upon the stem, in a most simple and efficient manner. This I have lately accomplished as follows; a double convex *lens*, mounted in a screwed cell, was formerly slidden upon the stem upwards and downwards, to concentrate or diffuse the light from the *specula*. I however had laid this aside as useless. I now have fitted a short tube, with a diaphragm, or circular hole, at its upper end, a quarter of an inch in diameter, into a metal cone which used to be fixed upon the cell, under the stage, to lessen the light occasionally; and this cone, so altered, is now fixed to the screwed ring of the condensing *lens*, (but which *lens*, as before mentioned, I had laid aside), and can be slidden up and down on the stem, nearer to or farther from, the plane or concave *speculum* and the stage, at pleasure; and thus graduate the light cast by them upon the objects, in a most complete manner. The length of the tube fixed within the cone is three quarters of an inch; and the aperture in the cone below it, is three eighths of an inch: the diameter of the cone itself being an inch and a half; and the whole is well blackened with a dull coat of varnish. And thus the passage of the light from the *specula* below to the stage, is effected only through the short tube, and its upper and lower apertures, *the central rays only* being suffered to pass; an advantage I need not dwell upon.—*Thomas Gill*.—125, *Central Strand, London; March 23rd*, 1838.

*Bones of Mammalia in the Crag.*—Your worthy correspondent, the Rev. W. B. Clarke, has, by his communication at p. 162 of the number for March, reminded me of some bones which I obtained from a person who told me he took them out of the crag cliff at Felixstow, on the Suffolk coast.

This was in November last. I have since visited that locality, and the spot was pointed out to me; in making further search, I have obtained more bones from the identical spot which contained those first found. This time I found two fragments of bone, one of large size, of that kind so frequently met with in the neighbourhood of the "red crag." To the latter fragments are attached numerous fossil *Balani*, and it is worthy of remark, that I did not find these on the beach, but took them immediately from the crag. There is no gravel over the crag at this place; and if there were, it is impossible that these fragments of bone could have been deposited with it, and that the delicate *Balani* could have survived the transporting action that brought from great distances the hard substances which compose the gravel of this part of England, and after this transportation be found in that perfect condition in which they appear on these bones.

I have also obtained bones from the "coralline crag," not only in the quarries of Sudburne Park, but also from an adjoining parish. That the bones found in the crag at Felixstow, are those of *Mammalia*, I think there is no question; and the bones found in the "coralline crag" are so analogous in structure, and other particulars, that there appears very little doubt of their identity, but this point can be easily set at rest. A fragment or two of bone of similar structure I have also taken from the "red crag" of Orford.

I take this opportunity of informing you of the above circumstance, as from what you have said on this subject, it is probable you may feel some degree of interest in it, being acquainted with the geological features of this part of England. —*John Brown.*—*Stanway*, *April*, 1838.

[In all probability the bones alluded to by Mr. Brown will prove to be those of *aquatic Mammalia*, which are known to occur in the red crag; but should they appear, upon examination, to belong to land animals, we shall not fail to notice the circumstance.—*Ed.*]

*Woodcocks breeding in Ross-shire.*—Residing in a part of the country remote even from Edinburgh, I received Nos. 5, 6, 7, 8, and 9, of the Magazine of Natural History altogether, and therefore could not sooner reply to Mr. Fairholme's strictures in the number for July, p. 537, *et seq.*

Mr. Fairholme unaccountably says that I speak of woodcocks breeding in *Selkirkshire*, which is an oversight. I only mention having seen them in Ross-shire. Mr. Fairholme's statement as to the breeding of woodcocks, as far as it goes, agrees with my own repeated observations, excepting what regards the low croaking sound, which has hitherto escaped me. As Mr. Fairholme describes it as being not unlike the purring of a cat, or the noise of a spinningwheel, it exactly agrees with the peculiar sound made by the *Caprimulgus*, a bird very common in the Highland woods, and which begins generally after sunset, the time that I have observed the woodcocks to commence flying about: but as this anomalous sound is heard only as the breeze rises or falls, it is only heard by a good ear. The cry of the woodcocks as they fly about, does not seem to me to be like *whistling*, but, as I observed, like the cry of the young redbreast, but sharper, and in two notes.

Your learned and excellent correspondent Mr. E. Blyth, says in No. 8, p. 439, that he is ready to concur with Mr. Fairholme in the opinion that this increase in the number of woodcocks that now breed in Britain, is owing to the number that are annually wounded by sportsmen, and cannot remove at the usual season, and so,—as they seem to suppose,—meet together, male and female, and are content to remain and breed in our climate.

This is all very plausible and ingenious, and may partly be true. But why did not the woodcocks do so long ago? And moreover, it seems that the *fieldfare* has likewise become a native. Have they also begun to breed by wounded birds?

Mr. Fairholme is so kind as to correct a mistake that he thinks I have fallen into, by saying "without reservation," that no *minnows* or *pike* were to be found to the north of Perth, but plenty of *sticklebacks*: and no pike in those streams that fall into the west sea, or in the lakes from which they flow. I by no means think these circumstances very astonishing. I believe that the minnows were introduced into the river *Don*, as I know they were into the Ness a few years ago, for the purpose of bait;—but I still hold myself correct. The whole subject is curious, but I cannot now enter into it, nor encroach much longer on your indulgence. Only allow me to observe that there has been more than time for any one of the multitude of sportsmen and naturalists who are constantly perambulating the western Highlands, to have denied the statement, and yet no one of them has given Mr. F. any reason to think that he has been right in objecting to there being no pike in the western rivers.

As to continuing to write anonymously, I have little more to add to what you allowed me to say in No. 8, pp. 144 and 145; and it will very much depend on whether or not my too irregular and unlearned communications are considered worthy of insertion.—*W. L.*

[As the foregoing communication from W. L. relates to an article in a former volume, we have given it insertion; but we must in future adhere to the principle mentioned on our wrapper in preceding numbers, respecting anonymous communications.—*Ed.*]

*Docility in a Rook.*—I send you the following account of remarkable docility in a rook, thinking it may not be unacceptable to some of your readers. A few years back, when residing with Elliston Allen, Esq. on whose estate at Ballingdon Grove there is a fine rookery, I procured at the annual rook-shooting, several young rooks, and attempted to rear them. They all however died, except one. This I fed at first on raw flesh, taken from the breasts of the young rooks, his companions, which had been shot; but afterwards accustomed him by degrees to relish bread moistened with water. 'Jack,' (for so I called him), soon grew a fine bird, and became strong of wing. This, however, so far from inducing him to fly away, was only the means by which he attached himself more closely to my society; and he would frequently follow me over the fields, far from home. His ear was so nice that he could distinguish my voice from all others, and whenever I called, 'Jack' would immediately answer me, by his well-known note. He persisted however in the most obstinate silence, whenever he was addressed by others, and all efforts, not excepting the offer of food, were vainly used to induce him to approach them. His fondness for mice was excessive, and he shewed great dexterity in catching them. Occasionally I would take him into an open space, and there let loose some of these little animals for him to catch, taking care however that they had about fifteen yards 'law.' He was very quick in seizing them, which he always did by the neck, holding them at the extreme point of his bill. This, I presume was to prevent their biting him. Jack, like all other pets, acquired a number of amusing actions, too numerous to mention; one of which was calling me every morning by tapping at my bed-room window with his bill.

As the rookery from which I had taken him was only a short distance from the house, where Jack was always loitering about, it might naturally be supposed that he would have associated with his fellows; this, however, he sedulously avoided: and although he would frequently feed in the same field with the whole flock, he always took care to keep at some distance from them. I could always distinguish him from the rest, by several white flight feathers in his wings, occasioned by having had them pulled before he was fledged. I kept Jack till nearly the following breeding season, but just as I was beginning to wonder whether he would choose a companion from the flock of wild ones, he was missed; and though I made many enquiries, I could hear no tidings of him, nor have I ever been able to ascertain whether he became the prey of some prowling animal, or fell a victim to the wanton cruelty of some juvenile sportsman.—*Fred. Wyatt—Camberwell.*

*New method of setting up Fishes.*—Having tried all the common methods of stuffing fishes, with which I was acquainted, without producing anything like nature, I at length hit upon the following plan, which, as far as I have tried it, has more than answered my most sanguine expectations; and being attended with but little expense or trouble, it promises to make a collection of fishes, (at least of many species), as easily attainable as one of birds, always excepting the colours, which fade more or less, but the size and form are perfectly retained.

If the fish has scales, secure them either by drying in the air, or by applying a coat or two of tissue paper, to retain them in their places whilst removing the skin.

Open the fish in a straight line from the pectoral fin to the tail; and with a bone knife separate the skin from the flesh on each side, to the back, snipping the fins just inside the skin, with scissors; remove the viscera, and snip the ribs close to the back-bone; then remove all the flesh, and scrape the bone as clean as possible, leaving it attached to the head, back-fins, and tail; remove the gills, brain, and eyes, from the inside, leaving the outer membrane of the latter, which may be stuffed with cotton, and when dry, have the figure of the eye painted on it. Open the cheeks when necessary, stuff with cotton, and sew them with a fine seam. Now, beginning at the head, carefully sew up the skin with close stitches, and if necessary, touch over the whole with preservative, introduced at the mouth, with a long-handled brush. The fins and tail should next be spread between pieces of paper, which will soon dry, and keep them in position. Suspend the skin by the head, and fill it at the mouth with fine dry plaister of Paris, well shaken in, introducing a stick to fill out every part, and mould to shape with the fingers; the plaister setting immediately effectually prevents shrinking, and renders the outside as smooth as life; let it remain suspended till the skin and fins are perfectly dry; then reversing its position, with the assistance of a stick or wire to loosen it, shake out all the plaister, remove the papers, brush the skin perfectly clean, and give it a coat or two of Canada balsam thinned with spirits of turpentine, which will restore its original transparency.

To fix it in a case, I would propose, previously to sewing up, to fasten a thin slip of wood on each side the backbone, twisting a couple of wires firmly round it; these should project either through the back or belly, as it may be wished to suspend or support the specimen.—*Clement Jackson.*—*East Looe.*

# THE MAGAZINE

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# NATURAL HISTORY

## JULY, 1838.

Art. I. *Analytic Descriptions of the Groups of Birds composing the Order, Insessores Heterogenes.* By Edward Blyth, Esq.

No. I.—*Rollers, Bee-Eaters, and Kingfishers: Todies, and Jacamars.*

Since committing to paper my article of last month, it has occurred to me that none of the *Heterogenes*, (so far as I have seen), are in the habit of swallowing gravel for the purpose of triturating their food, as appears to be the case, universally, with the *Cantrices*. I am unaware, moreover, that any of them are known to drink, unless the suctorial species of *Trochilidæ*, and nectar-feeding *Psittacidæ*, be regarded as exceptions: indeed the *Psittacidæ*, which we have already seen to differ in so many particulars from all the rest, and which, to judge from their entire structure, compose a group equivalent to that of the whole *Cantrices*, may possibly form a general exception also to this rule. In some groups of the series of *Heterogenes*,—as the rollers, bee-eaters, and kingfishers, the hornbills, and the hoopoes,—the extreme shortness of the tongue, particularly as compared with the great developement of beak, renders it almost physically impossible for them to take up water. So that we have here, apparently, two other general characters of this little-conformable series, in accordance with the *Rapaces*, and at variance with the immense group of *Cantrices*.

When generalizing on the *Heterogenes*, I should have repeated the remark, that it is only in this series of forms, throughout the class *Aves*, that the number of caudal *rectrices* ever falls short of twelve.

With regard to the *Cantrices*, I would particularly insist on the relative or mutual independency of those structural characters which I have indicated as constant: viz. the peculiar sternal conformation, and complex vocal apparatus, the small intestinal *cœca*, and high cerebral developement: either of the two first of which characters is only found accompanied by all the others. These coincidences in different systems of organs, which in no degree necessitate each other, furnish the most satisfactory and conclusive proof of the naturalness of this comprehensive division.

I proceed now to treat on the successive groups of *Heterogenes;* which, for the avoidance of unnecessary repetition, I prefer to commence with the rollers, bee-eaters, and kingfishers,—three nearly allied, but separate and distinct families, which combine several characters of the todies and jacamars, with others of the hornbills and of the hoopoes.

We perceive in the skeletons of these three families, a very close affinity; though each has nevertheless its peculiar characters, which are as obvious as those apparent in the external structure: the skeleton of the roller is in many respects intermediate to those of the two others.* In each, the *sternum* has four unossified posterior emarginations, the outer of which extend almost half way up the bone, and nearly twice as far as the inner: in the bee-eaters, the thin slip of bone which separates these emarginations, is inclined inward, converging toward the medial plane; a structure which is farther carried out in the jacamars: in the rollers it is less noticeable; and not in the kingfishers, old specimens of which have sometimes the outer notch reduced to a *foramen*, by the gradual deposition of bone: the keel is well developed; its anterior angle being sharp in the halcyons and kingfishers, less so in the rollers, and comparatively obtuse in the bee-eaters; in which last, however, the projection is continued farthest forward: the coracoids are shortest in the bee-eaters, and most elongated in the kingfishers; and the *furcula* is broad and thin, forming a wide arch, which, in the rollers, is rather more lengthened than in the others, and exhibits a slight enlargement at the junction of the clavicles of which it is composed, but no regular appendage analogous to the vertical one observable in all the *Cantrices:* the bee-eaters have a rib less than the others. The sternal apparatus of the genera *Nyctiornis* and *Eurystomus* remain to be described; but probably

* A skeleton of the European bee-eater is in Mr. Yarrell's valuable collection; and those of two species of roller in the museum of the Royal College of Surgeons.

differ very little, if at all, from that of the true rollers and bee-eaters.

It will be sufficient to add that the rollers are more stoutly framed than the others, only in this resembling the crows: the bee-eaters have the leg-bones, in particular, extremely slight; and the general form is more elongated than in the kingfishers and rollers. The *crania* of the roller and bee-eater are very similar.

With respect to the soft parts of the genera *Merops* and *Coracias*, it is only from cursory and incidental remarks that I have obtained any information concerning them, but it would appear that they resemble closely those of the kingfishers.—The muscular coat of the stomach is much attenuated; intestine rather short; and *cœca* doubtless absent in all, as I have found to be the case in several *Halcyonidæ*, both piscivorous and insectivorous, which circumstance is indicated by no diversity in the conformation of the digestive organs. The simplicity of the vocal apparatus is remarked by Cuvier: and the tongue of each has been described as very short and heart-shaped; insomuch that the rollers, like the hornbills and hoopoes, and various other birds which have this organ either minute, or of a form unfit to assist in deglutition, are consequently obliged to throw their food into the air, and catch it in the throat.

Externally, these birds have a thick and tough skin, and generally firm plumage, which is brightly coloured. They have a wide gape, and large and strong bill: powerful wings; but short legs, ill adapted for progressive motion: the toes, in the *Halcyonidæ* and *Meropidæ*, are typically syndactyle.—They subsist exclusively (I suspect) on living prey,* which is mainly or wholly seized from the wing, but often watched for sitting: and the beak only is made use of in capturing and securing it. The whole of the species breed invariably in holes, and always retire to roost to them, frequently during

* Bechstein asserts that the European roller "also eats bulbous roots, acorns, and grains of corn;" but he subsequently remarks of it, when in captivity, that "I have even brought it to eat bread, vegetables, and softened oatmeal; though it always prefers animal food." Temminck is silent about its devouring any description of vegetable matter: but Le Vaillant, who labours to show that the rollers are nearly related to the *Corvidæ*, also states that they are partially frugivorous. I believe that the European roller has been reported to rob other birds of their eggs, which is not improbable, and would be an interesting fact to ascertain: but, if its stomach, as described, "resembles that of the kingfisher," it would consequently seem unfitted for digesting vegetable substances; even taking into consideration the membranaceous character of this organ in the bustards and coursers, where a more detailed description of it is required.

the day-time, when the weather is unpropitious for obtaining food; those with syndactyle feet burrowing to a considerable depth in banks, the others resorting to hollow trees: they collect few or sometimes no nest-materials; and produce generally more than six very polished white eggs, of an almost globular form, as in the *Rapaces:* only one brood is ever raised in a season, and the young are excluded in a very rudimentary condition; these are fed for some time on partially digested food, disgorged by their parents, and remain extremely long in the nest-hole, where they slowly elaborate a plumage, adult in its appearance and texture, and which, scarcely differing from the brilliantly-tinted garb of the mature bird, is retained,—as in the *Falconidæ*,—till the second autumn: the sexes differ slightly in the rollers and some *Halcyonidæ*, wherein the young resemble the adult female, the males, (as we learn from Bechstein in the instance of the roller), not acquiring the distinguishing characters of their sex until more than a year old, *i. e.* till their second autumn, when they moult: they present little or no seasonal difference of appearance, although a few, (particularly the younger *Halcyonidæ*), shed the extreme tips of most of their clothing feathers towards the season of propagation: the greater proportion of them exhibit splendid colouring, but red is of unfrequent occurrence. It may be added that the voidings of the young are not enclosed in a film, as in most other *Insessores;* in consequence of which the nest-holes are apt to become extremely fetid, and the site of them to be rendered very conspicuous: the same is noticeable in the hoopoes and in the hornbills.

These birds have little voice, which is of course incapable of inflection: or rather, the cry of most of them is seldom heard. That of the European roller is a reiterated *cha-cha-cha;* and of the British kingfisher, a loud *chwite:* certain of the large Australian *Halcyonidæ*, however, which have acquired the strange name of "laughing jack-asses," may be consequently inferred to be, at times, extremely noisy. The *Nyctiornis Athertonii*, (one of the species belonging to a good second genus of *Meropidæ*), is described to inhabit the thickest jungles of the interior of India, and to feed only by night, at which time it is very noisy, repeating frequently the short cry of *cur, cur*.

Of their external differences, it is unnecessary to say anything. The manner of flying differs in each family; and varies from the smooth sailing of the bee-eaters,—high in air, or low over the surface,—resembling the *skim* of the swallow, to the meteor-like direct propulsion of the kingfishers, performed by continuous rapid beating of their short wings. In each it has, of course, reference to the peculiar prey. Thus, the bee-eater glides aloft, in pursuit of insects, which it crushes with its powerfully compressive beak, and so is enabled to prey on the most venomous: the roller chases swift-running lizards or mice, through all their abrupt turns and meanderings: the *Dacelo* traverses the most arid districts of New Holland, in quest of snakes: the halcyons dart upon the larger insects, which they seize in the manner of a fly-catcher; some of the stronger species, it has been said, also preying on crustaceans: and the kingfisher whisks along over shallow water, —is arrested instantaneously, in its most rapid flight, at sight of a fish,—poises itself for a moment,—then plunges with impetuosity upon its victim, which it carries in its beak to a perch, and beats it to death, by knocking it repeatedly, with violence, against whatever it stands on, a habit which is likewise noticeable in the roller: all of them gulp their prey without dividing it, and disgorge the indigestible parts in pellets, which in course of time accumulate in their holes, and form the bed on which their eggs are deposited. Bechstein, who kept rollers in confinement, expressly remarks that he never saw them drink. The bee-eaters are, furthermore, social birds, which breed in society, and range to immense distances in quest of food: the rollers are ordinarily seen in pairs, or in families: and the halcyons and kingfishers are birds of solitary habit, of which those only which have bred are seen accompanied by their mates, the young remaining unassociated through the first winter. With a very few exceptions, the distribution of all is confined to warm latitudes; and the extensive kingfisher family (*Halcyonidæ*) only, is feebly represented in America by a few piscivorous species: all the remainder being peculiar to the eastern hemisphere.

When reared in captivity, these birds manifest little intelligence, and do not appear to be capable of attachment to individuals: they can only be tamed, that is, rendered fearless, but not familiar. A brood of kingfishers which I once raised, were more active in the cage than I had anticipated, leaping from perch to perch without difficulty, and sometimes for a long while together: on a broad surface, they rested on the entire length of the tarse; and could advance only by short waddling steps. Their expression of countenance strikingly resembled that of the heron; and they often raised the loose occipital feathers. All their movements were accompanied by a singular jerk of the head, as if troubled with the hiccoughs: and they signified hunger by emitting sharply their cry, *chrite*. I fed them entirely on raw meat, which they took from a pan of water, invariably knocking each piece with much force against their perch, for the purpose of *killing* it, before they attempted to swallow it. In a specimen of the *Dacelo*, which has lived for some years in the zoological gardens, I could never discern any jerking motion, analogous to that of our native kingfisher.—Bechstein attests the irreclaimableness of the captive roller.

From the foregoing details, it will sufficiently appear that these three families are very intimately allied; composing a distinct natural group, which, as such, should be recognized by a systematic name. I propose for it, therefore, that of *Cylindrirostres*, as the best I can devise at present: the system of nomenclature which I have adopted requiring that groups of this value should be designated from the beak, in order that their terminology should be in accordance. I shall be glad, however, to substitute any better name that may be suggested.

The two families of jacamars and todies claim our next consideration, as being most nearly allied to the preceding. I am unaware that they have ever previously been especially approximated: nor, perhaps, is the relation between them quite so close as in the instance of the rollers, bee-eaters, and kingfishers; but it is nevertheless evident, and particularly manifest in the structure of the tongue, and of the digestive organs.

As compared with the previous group, the birds now under consideration present a slighter conformation, obviously incapable of violent and protracted exertion. The skin is very thin and delicate: the plumage soft: and the habits are precisely those of the weaker fly-catchers. I make the latter qualification, because certain of the larger *Tyrannidæ*, (American tyrant fly-catchers), have been seen to plunge after fish;* affording thereby additional proof,—if any were required,—of the insufficiency of habit alone to indicate affinity: these large *Tyrannidæ* also throw up their food, and catch it in the throat.† The skeleton of the tody approximates that of the kingfisher, except that the *sternum* is shorter, with its keel considerably less developed: yet the pectoral muscles (of the specimen I dissected) were remarkably full, the bird being heavy, fleshy, and compact. The jacamar's *sternum* approaches nearer to that of the bee-eater; but is also very much shorter, weaker, and with a shallower keel: the curving form of its four bony projections, caused by the double emargination of its hinder edge, imparts to it a peculiar character: these projections first tend outwardly, then narrowing, incline toward the medial plane, and again slightly diverge from it, the outer expanding at their tips: divested of them, the front view

* Swainson. † Nuttall.

of the *sternum* is nearly heart-shaped, terminating in a point backwards.* The tongue in both these families is much lengthened, tapering, and extremely thin; a fleshless *lamina:* the stomach, a tolerably muscular gizzard: intestine, shorter perhaps than in any other bird whatever, and furnished with large cœcal appendages, resembling those of the owls. In the stomachs of both I have found only the remains of insects.

Externally, the todies and jacamars differ in the disposition of the toes, which in the former resemble those of the kingfisher, and are similarly joined; but in the jacamars, although the inner toe is connected to the next, the outer one is reversed, as in the *ordinary* zygodactyle foot observable in the toucans, &c.† Both have the mandibles much elongated, and very slight; and in the todies, and jacamars pertaining to the division *Jacamerops*, they are remarkably wide: the nostrils are exposed, and not quite basal; and around the beak are the five sets of *vibrissæ* so conspicuous in some barbets, but small and little noticeable. The wings are rounded: and the feeble texture of their feathers intimates that the moult is probably effected early, in which they would differ from the *Cylindrirostres*.

I shall now proceed to consider them separately: premising, however, one more general remark; namely, that while the preceding tribal group is all but confined to the eastern hemisphere, the present is quite restricted to tropical America. It even appears, that as the *Simiadæ* of the old world are represented by a different and distinct group in the new, so the kingfishers are represented by the todies, and the bee-eaters by the jacamars; the rollers also, less directly, however, by the motmots; while the motmots and toucans, and even ani, together may be said to represent the hornbills; and the hornbills and touracos, together, inversely, the toucans. Thus it is, that, if we attempt to follow up these vague and fancied relations,—here and there seemingly perceptible,—in the geographical distribution of forms, we very soon become involved in a maze; whence there is every reason to doubt whether they can be regarded as implying anything, being merely, (if I may so express it), fortuitous coincidences. In the case of the hoopoes, we can discern no new world representative whatever; and the very extensive family of king-

* A skeleton of the *Galbula viridis* is in the museum of the Royal College of Surgeons, and another in that of the London University: a specimen of *Todus viridis* in spirits is in the first-named collection.

† In one or two jacamars, the inner or ordinary opposable toe is absent, as in some woodpeckers; not the analogous toe, however, to that which is deficient in certain kingfishers, brought together under the name *Ceyx*.

fishers would appear to be most inadequately replaced by the limited group of todies: indeed, in the instance of the *Halcyonidæ*, we find that some species occur on the American continent. It is familiar to all that numerous groups are more or less confined to particular regions; and where one is represented or replaced by another, it matters little how dissimilar are the types on which they are respectively modified, inasmuch as it is in *adaptive* characters, rather than intrinsical physiological agreement, that the representation is manifested: for example, the *Trochilidæ*, which have the intimate structure of the swifts, are represented in the tropical and southern regions of the ancient continent and its islands, by analogous groups of nectar-feeding birds, which differ from them in every detail of their anatomy, being genuine *Cantrices*.

It has always appeared to me remarkable, that, since the time of Linnæus, not a single accession has been discovered to that series of forms on which I am now engaged; though, in some instances, as that of the tody, only one species was known to that indefatigable enquirer; and it is only within the last twelvemonth, that two more have been added by Mr. Gould. They are birds of diminutive size, with much of the general form of the halcyons, but a longer tarse, enabling them to leap from spray to spray with facility. Their plumage is very soft and full, vividly coloured, and glossless; wings, short and rounded; and "flight," according to a writer in the 'Field Naturalist's Magazine,' "always extremely short, hardly ever farther than from bush to bush." "It may be easily," continues this observer, "knocked down; and I used to procure them by striking them down with a switch, having a few leaves not stripped off at the end of it." Mr. MacLeay, who has also personally studied the *Todus viridis* in its native locality, informs me that the various accounts representing this bird to sing, are erroneous; as the absence of a complex muscular apparatus to the lower *larynx*, of itself indicates. I am indebted to him for the following interesting communication. "While riding amidst the luxuriant vegetation which coats the banks of the rivers in this noble island, [Cuba], I often am amused by the bird which the Spaniards call by the homely name of *Peorrero*. Perched on a twig close to me, he views my motions askance, and makes a whirring noise to his female, as he now and then picks up an insect. His flight is short, rather slow, and principally among the foliage, where, accompanied by his mate, he seeks his insect prey. Brown, in his 'History of Jamaica,' where this bird is called the "tom-tit," says that 'it keeps much about houses in the country parts.' I did not see the bird myself during my stay in that island, but in Cuba it is never seen about houses, unless they be near to rivers. M. Vieillot states that in St. Domingo it has obtained the name of "*Perroquet de terre*," from its habit of resting almost constantly on the ground. Now this is certainly wrong, for I never saw a *Peorrero* on the ground, common as this bird is near Cogimar; nay, from the formation of its feet, I do not see how it could conveniently rest on the ground. I never, moreover, could see that remarkable mode of carrying its head, which M. Vieillot both mentions and figures in the 'Nouveau Dictionnaire d'Histoire Naturelle.' This bird carries its head in the usual way, and that figure is, in fact, as unnatural and as unlike the *Todus viridis* as any can possibly be."* The same writer that I before quoted remarks, that "the only sound which I ever heard it [the *T. viridis*] utter, was a sort of purr, or murmur, when approached, a sound invariably an intimation of its rising on wing. It is essentially insectivorous."

I quote the following passage in detail from the 'Familiar History of Birds,' published some time ago by the present Bishop of Norwich: the fact which it states will probably be new to most readers, as regards the green tody. "Herodotus asserted that there was a certain small bird, which, as often as the crocodiles came on shore from the river Nile, flew fearlessly within their jaws, and relieved them of a peculiar kind of leeches which infested their throats. This ancient historian added, that although other birds invariably avoided the crocodile, it never did this bird any injury. So extraordinary a story was treated as fabulous by the naturalists. It is, notwithstanding, strictly true. M. Geoffroy St. Hilaire, an eminent and accurate French naturalist, confirms the fact beyond doubt. The bird alluded to is the Egyptian plover, (*Charadrius Ægyptiacus*), which sometimes enters the mouth of the crocodile, attracted thither, not, according to his account, by leeches, but by a small insect like a gnat, which frequents the banks of the Nile in great quantities. When the crocodile comes on shore to repose, he is assailed by swarms of these gnats, which get into his mouth in such numbers, that his palate,—naturally of a bright yellow colour,—appears covered with a blackish brown crust. Then it is, that the little plover, which lives on these insects, comes to the aid of the half-choked crocodile, and relieves him of his tormentors; and this without any risk, as the crocodile, before shutting his mouth, takes care, by a preparatory movement, to warn the bird to be off. This singular process is, moreover, not con-

* Extract from Diary.

fined to the crocodiles of Egypt; it has been noticed in those of the West Indies, where, when attacked in a similar manner by small flies called "maringouins," a little bird, (*Todus viridis*), which lives chiefly on flies and insects, performs the same kind office."*

M. Drapiez asserts, of the green tody, that "it establishes its nest in the ground, or rather in the crumbly earth on the edges of ravines, at such a height as may not endanger it from inundations, and that the cradle of the young family may be perfectly sheltered from rain. This nest, or rather subterranean lodging, exhibits a rounded apartment, to which the approach is by a winding gallery. The lining of the nest consists of bits of straw, covered with down, upon which the female lays four or five eggs, of a grey colour spotted with brownish," or, according to M. Chevrain, "with deep yellow." The latter observer states additionally, that "they often nestle in the low galleries of houses, yet always on the ground. They make an excavation with their bill and claws, give it a round form, hollow out the bottom, and place pliant straws, dry moss, cotton and feathers, which they *artfully arrange*." (I doubt whether they *interweave*). The young have been raised in captivity, in which state they evince the same obtuseness of faculty which has been remarked of the kingfishers.

It is, perhaps, superfluous to observe, that I have opened several of the small broad-billed *Tyrannidæ*, which have sometimes been ranged with the todies: their internal anatomy offers no approximation to them whatever; but exhibits every character of the *Cantrices*.

The jacamars are divided into two groups;—one in which the beak is straight and compressed, (*Galbula*), and another in which it is slightly curved, and for two-thirds of its length very broad, (*Jacamerops*). The ridge of both mandibles is sharp and angular. Their plumage is light and loose, with a brilliant metallic gloss on the upper parts and generally across the breast: on the throat or fore-neck is a white patch, in the male, which in the other sex is rufous: the tail is lengthened and much graduated; and the clothing feathers are single, or without accessory shafts, whereas in the todies, a distinct supplementary plume is present, of a peculiar narrow form. The legs and feet are short, ill-adapted for progressive motion. There are many species, inhabitants of the damper forests of South America.

"The jacamar," says Mr. Waterton, "frequently sits on the

* This reminds me of a species of roller, (*C. nuchalis*), which has been stated to perch familiarly on the horn of the rhinoceros.

trees over the water; it feeds entirely on insects; it sits on a branch in motionless expectation, and as soon as a fly, butterfly, or moth, passes by, it darts at it, and returns to the branch it had just left. It seems an indolent, sedentary bird, shunning the society of all others in the forest. It never visits the plantations, but is found at all times of the year in the woods." They are further described to perch in a stiff attitude, almost perpendicularly; and to be very silent birds, except at the season of propagation, when they frequently emit piercing cries. Le Vaillant was informed that they breed in the holes of trees, and lay about four blue eggs; but this part of their history remains in much obscurity. M. Natterer, who has lately returned from a long residence in the region which they inhabit, will, it is hoped, elucidate all that is yet doubtful concerning them.

For the tribal group of todies and jacamars, I hesitatingly propose the name *Angulirostres*, which is little applicable to the former.

*June 7th*, 1838.

ART. II. *On the Naturalization of* Dreissena, *(Vanbeneden)*, polymorpha, *(Pallas)*, *in Great Britain.* By HUGH E. STRICKLAND, Esq., F.G.S., &c.

THERE are several interesting facts connected with the history of this mollusc, which deserve to be recorded. The recent date at which it has been introduced, and the rapidity with which it has become diffused over the country, afford some valuable data for scientific inquiry. The zoologist will be led to speculate on the means by which species are transported to distant localities, and on the greater capabilities for emigration possessed by certain species and genera, in consequence of being more tenacious of life, more accommodating to circumstances, and more prolific, than their congeners.—And although the *Dreissena* has unquestionably been introduced into this country by human agency, yet it might be worth while to enquire how far the same result might have been effected by natural causes alone, such as the drifting of a piece of timber with these shells attached, down one of the European rivers, and across the German Ocean, into some brackish or freshwater estuary on our own coasts. The geologist will see the importance of this inquiry, as connected with the distribution of organic remains, and the sudden appearance and disappearance of particular species in a given *stratum*.

The *Dreissena polymorpha* is admirably figured in this Magazine, vol. ix. p. 573. Among the various names which have been proposed for this genus, the term *Dreissena* is the least to be commended, being chosen in compliment to an individual, instead of expressing any fact with regard to the genus itself. Nevertheless, the term *Dreissena* has the clear right of priority in point of date, and ought therefore to be permanently adopted.

Mr. Sowerby first noticed the introduction of this species into Britain, in a communication to the Linnean Society, dated Nov. 2nd, 1824; (see Lin. Trans. vol., xiv. p. 585). He states it to have been introduced into the Commercial Docks, Rotherhithe, whither it had probably been brought attached to Baltic timber. On visiting these docks a few months ago, I observed multitudes of these shells in the depôt for bonded timber. It appeared that at least one generation had passed away since 1824, for myriads of the dead shells were scattered over the bottom of the water, and served as points of attachment for the *byssi* of the living.

This shell was next noticed in the Union Canal, near Edinburgh, by Mr. Stark, in 1834. In November, 1836, the Rev. M. J. Berkeley communicated to this Magazine his discovery of the *Dreissena* in the river Nen, in Northamptonshire. I have further to add the following instances of its occurrence, which have come to my own knowledge.

From the year 1828 to 1834 inclusive, I was frequently in the habit of conchologizing in the Avon, near Evesham, during which period, if the *Dreissena polymorpha* had inhabited that river, I could scarcely have failed in detecting it. Not the slightest vestige of it however occurred to me during that time. An interval of two years elapsed, in which I was absent from England, and in the beginning of 1837, I was much surprized at finding several specimens of this shell among the refuse on the banks of the river. On further search I found that the *Dreissena* had become completely established on the beds of gravel in the river; and in the course of an hour I collected several hundred full-grown specimens. There is therefore clear evidence of the recent introduction of this mollusc into the Avon, and of the rapidity with which it has reached maturity and multiplied.

I have since observed it in the canal between Warwick and Birmingham, and it has also been found in the canals near Wednesbury in Staffordshire.

In all the cases hitherto cited, this shell has been found in navigable waters, where its transport has doubtless been effected by means of timber. I only know of one instance to the contrary, which is that of the Leam, at Leamington, where it has been found of a large size by Dr. Lloyd of that place. But though the Leam itself is not navigable, yet it is in the immediate vicinity of the canal, from which the *Dreissena* has probably been introduced. I have further to add that this shell has lately been *planted* by Mr. Stuchbury of Bristol, in some of the waters near that place.

It appears desirable to record these particulars, because it may interest some of our field-naturalists to watch the gradual spread of this species over the kingdom. Its propagation is so astonishingly rapid, that it will probably become, in a few years, one of our commonest British shells.

I lately kept some of these molluscs, of different ages, alive for some time in a basin of water. The full-grown individuals, though they had been torn from their native bed, soon secreted a fresh *byssus*, and became anchored to the bottom of the basin. It is evident from this that the *byssus*, when first secreted, must be in a highly glutinous state, which enables it to become attached to the smooth surface of glazed earthenware. The young individuals still retained the power of locomotion, and crawled like gasteropods over the bottom.—They effected this by protruding their foot in advance of the anterior or cardinal end of the shell, and advanced by alternate expansion and contraction of this foot, dragging the shell after them. They indulged their wandering propensities for a few weeks, and then wisely followed the example of their parents, by selecting some convenient nook, to which they attached themselves contentedly for life.

I further remarked that these molluscs, acephalous though they be, have still an evident perception of light. When in a quiescent state, they kept the shell partly open, with the siphuncular and branchial apertures exposed; but if any object was suddenly brought over them, they immediately receded, and partially closed their valves, although care was taken that no concussion should be given to the basin.

I have only to add that I have examined numerous specimens, without detecting any of the crystals mentioned by Mr. Sowerby, 'Mag. Nat. Hist.' vol. ix., p. 643, and figured p. 573. Irregular pearly concretions are, however, of frequent occurrence.

*Evesham, June* 18*th*, 1838.

ART. III. *On the Flower-Gardens of the Ancients.* By JAMES MACAULEY, Esq. M.A.

IT is always asserted by modern writers on gardening, that the ancients did not cultivate flowers as a source of amusement. In the descriptions, it is said, of all the most famous gardens of antiquity which have come down to us, we read merely of their fruits and their shade; and when flowers are mentioned, they are always reared for some special purpose, such as to supply their feasts, or their votive offerings.

Considered merely as a useful art, gardening must be one of the earliest cultivated, but as a refined source of pleasure, it is always one of the latest. It is not till civilization and elegance are far advanced among a people, that they can enjoy the poetry or the pleasure of the artificial associations of nature. Hence this question is interesting, as illustrating the manners and the tastes of the times referred to.

Negative proofs are not sufficient to determine the point. To show that the gardens of the Hesperides contained nothing but oranges, or that of King Alcinous, (Odyss. vii.), nothing but a few fruit-trees and pot-herbs, does not disprove the opinion that others cultivated flowers as a source of pleasure.

Before speaking of the Roman flower-gardens, I would offer a few remarks on those of Greece and the east.

From the little mutability of oriental customs, their ancient gardening did not probably differ much from that of modern times. The descriptions given by Maundrell, Russell, and other travellers, agree with what we read in the Scriptures of the Hebrew gardens three thousand years ago.

Solomon, who had so extensive a knowledge of the vegetable kingdom, that he knew plants from the cedar of Lebanon to the moss on the wall, enumerates gardening among the pleasures he had tasted in his search after happiness.—"I made me great works; I builded me houses; I planted me vineyards; I made me gardens and orchards."—Eccles. ii. 14.

From Xenophon and other writers we have a few notices of the Persian gardens. Xenophon relates that Cyrus was much devoted to the pleasures of gardening, and wherever he resided, or whatever part of his dominions he visited, he took care that the gardens should be filled with everything both beautiful and useful, which the soil could produce. These Παράδεισοι were sometimes only hunting parks, or enclosed forests, but there were also flower-gardens among them. Cicero ('De Senectute') relates the following anecdote of Cyrus. When Lysander the Spartan came to him with presents, to Sardis, Cyrus showed him all his treasures and his gardens. And when Lysander was struck with the height of the trees, and the arrangement and fine cultivation of the grounds, and the sweetness of the odours which were breathed upon them from the flowers, ("suavitate odorum qui afflarentur e floribus,") he said that he admired not only the diligence but the skill of the man who had contrived and laid out the garden: and Cyrus answered,—"Atqui ego omnia ista sum dimensus; mei sunt ordines; mea descriptio; multæ etiam istarum arborum meâ manu sunt satæ."

One of the earliest and best known of all the Grecian gardens is that of King Alcinous, described in the Odyssey.—"What," says Sir Robert Walpole, "was that boasted paradise with which

> ———"the Gods ordained
> "To grace Alcinous and his happy land?"

Why, divested of harmonious Greek and bewitching poetry, it was a small orchard and vineyard, with some beds of herbs, and two fountains that watered them, enclosed within a quickset hedge!" Of course the whole scene is a mere romantic creation of the poet, but in describing it, he would be guided by what actually existed in nature, and perhaps took his idea of the garden from some particular spot with which he was acquainted. It is described as consisting of *four acres*, surrounded by a fence, and adjoining the gates of the palace.—It contained a few trees for shade and for fruits, and two fountains, one for the palace and the other for the garden; but then he ends the simple and beautiful picture of the place with these lines,—

> "Ενθα δὲ κοσμηταὶ πρασιαὶ παρὰ νείατον ὄρχον
> "Παντοῖαι πεφύασιν ἐπηετανὸν γανόωσαι."

—"And there are beautiful plots of all kinds of plants at the extreme borders of the garden, flowering all the year round."

The Athenians always had flower-gardens attached to their country houses, one of which Anacharsis visited. "After having crossed a court-yard, full of fowls and other domestic birds, we visited the stables, sheep-folds, and likewise the flower-garden; in which we successively saw bloom narcissuses, hyacinths, irises, violets of different colours, roses of various species, and all kinds of odoriferous plants."*

There was at Athens a public flower-market, and there were persons whose trade it was to make bouquets, and to construct letters with flowers symbolical of certain sentiments; as is still done in oriental countries.

The gardens of Epicurus and the other philosophers were

* For authorities see 'Voyage d'Anacharse,' tome v. p. 20.

mere groves and shaded walks, where the disciples were wont to listen to the lessons of their masters ;—

"Atque inter sylvas academi quærere verum."

We are not to look for ornamental gardening in the early history of the Romans, as the soil of their little *horti* was cultivated merely for the sake of procuring the necessaries of life. Excellence in war and in agriculture were the chief virtues as well as duties of the citizens, and we find *bonus agricola* and *bonus colonus* used as synonymous with a good man. Some of the noblest families of Rome derived their names from particular grains, such as the *Lentuli*, *Pisones*, *Fabii*, and many others. The story of Cincinnatus being found by the messengers of the senate at the plough, is well known; and Curius, after triumphing over the Samnites, the Sabines, and Pyrrhus, spent his old age in the labours of the field. So late as the Punic wars, Regulus, in the midst of his victories in Africa, wrote to the senate, that his steward had left his service and stolen his implements of agriculture, and begged leave of absence from the army, to see about his affairs and prevent his family from starving. The senate took the business in hand, recovered his tools, and supported his wife and children till his return.

It was not till they had come much in contact with the Greeks, that the Romans would be anxious about pleasure or elegance in their gardens, for it was thence they derived their taste for all the arts of peace :—

"Græcia capta ferum victorem cepit: et artes
"Intulit agresti Latio."

Even in later Roman authors the allusions to gardening often relate more to the general pleasures and occupations of a country life, than to the special cultivation of flowers. But this is the richest theme in all ages, inasmuch as the subordinate display of human art in gardening is eclipsed from the eye of the poet by the beauties of nature even there displayed. The scene of the 'Song of Solomon' is laid in a garden, but the finest allusions which it contains, are to the general appearance of nature. For example; "Arise my love, my fair one, and come away; For lo, the winter is past, the rain is over and gone: the flowers appear on the earth; the time of the singing of birds is come, and the voice of the turtle is heard in our land; the fig tree putteth forth her green figs, and the vines with the tender grapes give a good smell: Arise my love, my fair one, and come away." And again "Come let us go forth into the field, let us get up early to the vineyards, let us see if the vine flourish, whether the tender grape appear, and the pomegranates bud forth: there will I give thee my loves."

Our own poets, when they paint a modern garden, dwell most on its shade and freshness, its verdure and music, without descending to particular description. Examples of this must occur to every one. The garden of the Corycian old man described in the fourth Georgic, and other similar classical scenes, are sometimes quoted, as proving the absence of flowers as part of the ornaments of an ancient garden. But we must not thus judge from negative or detached instances. We might as well argue the poverty of that of Horace, merely from what he says in his invitation to Phyllis:—

———" Est in horto
" Phylli, nectendis apium coronis:
" Est hederæ vis
" Multa, quâ crines religata fulges."

He mentions only what was connected with his drinking invitation, the parsley being supposed to ward off intoxication, and the ivy being the sacred plant of Bacchus.

Nor is the garden of Lucullus, which is so often referred to, to be regarded as a specimen either of the art or the taste of his time. We are told of its terraces and fish-ponds, its statues, and sumptuous temples, and not of the cultivation of flowers; but this was alluded to by his own contemporaries. Cicero records that Lucullus was often blamed for the vast extravagance displayed in his Tusculan villa, and says that he used to excuse himself by pointing to two neighbours, a knight and a freedman, who tried to vie with him in the splendour of their gardens. "Non vides, Lucullo," he adds, "a te id ipsum natum ut illi cuperent? quibus id, si tu non faceres, non liceret;" shewing it was from Lucullus they had derived their taste and desire for this splendour. Varro who wrote on agriculture during the time of Augustus, expressly says, "Hortos Luculli non floribus fructibusque, sed tabulis fuisse insignes," evidently implying that other pleasure gardens were "insignis floribus."

In Latin authors the word *Hortus* seems to have four distinct significations. First, a garden, analogous to the gardens of the Tuilleries and the Luxembourg, at Paris, composed chiefly of shaded walks, with statues, water-works, and other ornaments. Such were the gardens of Lucullus, Cæsar, Pompey, Mæcenas, and the rich Patricians, who used to seek popularity, by throwing them open to the people. The second signification is, a little farm, or any place for the cultivation of esculent vegetables. Perhaps the garden of the Corycian old man was only one of these, but they seldom contained such a variety as we find there. In the laws of the twelve tables *hortus* is always put for a farm or a villa. The third sort of *hortus* was devoted to the cultivation of those flowers which were used at festivals and ceremonies, and for similar special purposes. Such were the "*biferi rosaria Pæsti,*" and gardens of this sort surrounded the city to supply the markets. It is to these three species of *horti* alone that modern authors refer, but there are many allusions in the classics, shewing that the Romans had flower-gardens for pleasure as well as utility. Such were the "*delicati horti,*" the "*venusti hortuli*" of private individuals, which we read of in Tibullus, Phædrus, Martial, and other authors who occasionally refer to the domestic manners of the Romans. If they cultivated their flowers for the purposes alluded to, a single dinner-party or a few chaplets would have stripped bare the whole garden.

As as example of such allusions, Tibullus compares the surpassing excellence of a beautiful woman to that of a hyacinth over the other flowers of a garden:—

"Talis in rario solet
"Divitis domini hortulo
"Stare flos hyacinthinus."—Carm. 61.

Again, in another song, (20):—

"Mihi corolla picta vere ponitur,
"Mihi rubens arista soli fervido,
"Mihi virente dulcis uva pampino,
"Mihique glauca duro oliva frigore."

The same garden supplying fruit in the autumn, and a variegated banquet in the spring.

There was always a statue of Priapus in the centre, as he was the tutelary deity of gardening among the Romans: (Virgil, Geor. iv., Martial, viii. 40: &c.) And the principal flowers mentioned are narcissuses, violets, hyacinths and lilies, under which name many different plants are included.

The citizens of Rome used to cultivate plants in the balconies of their houses, (Hor. I. Ep. x. &c.); and to rear flowers in boxes and flower-pots, which were called '*Horti imaginarii*' (Pliny). It is not likely that the rich would do this, merely to procure materials for their votive offerings, or to supply the ornaments for their entertainments, when these could be easily purchased at the public markets. It shews that a taste for their cultivation as objects of amusement, did prevail, which followed them even amidst the "fumum, et opes, strepitumque Romæ."

There are also small garden-grounds attached to the houses in many of the streets of Herculaneum, which, from their size and their position in a great city, could not have been used either for the cultivation of the festal flowers or of esculent vegetables, and probably contained only a few beds of flowers for ornament.

The description which the younger Pliny gives of his own garden, with its straight walks and fantastically cut box trees, is certainly repugnant to modern principles of taste; but a few reigns back it would have applied to many of the gardens even in this country. Sir Robert Walpole, in his Essay, contrasts this garden with the glorious architecture of the same time, and remarks that nothing but a parterre is wanting, to make the description of a garden in the reign of Trajan, serve for one in the reign of King William. Pope's well-known account of the villa and Garden of the Duke of Chandos, ('Moral Essays,' Ep. iv.), would stand for that of an ancient Roman, and he says less than even Pliny does, of the cultivation of flowers, or any lesser ornaments. No one would deny the existence of a taste for flower-gardening during the Dutch epoch, when the same style as that of King's time prevailed. Yet if, by some strange revolutions, we could conceive the greater part of our literature to be lost, as has happened to that of Rome, and only a few standard authors to survive, such as Pope and Dryden, future gardeners and botanists could argue with great plausibility, against our ancestors having flower-gardens at all. There is certainly no record of any great floral epidemic, synchronous with the box-tree era of Roman gardening, such as the *tulipomania* of modern times, but we must not hence conclude that the cultivation of flowers as a source of amusement was then disregarded. And as Flora and Priapus are not invoked by any of the poets who have come down to our times, we feel all the more regret in reading these lines, where Virgil longs to sing of the gardens of his native country.

> "Atque equidem, extremo ni jam sub fine laborum
> "Vela traham, et terris festinem advertere proram;
> "Forsitan, et pingues hortos, quæ cura colendi
> "Ornaret, canerem."

## Art. IV. *On Spontaneous Generation.* By W. Weissenborn, Ph. D.

The ancient doctrine of *generatio spontanea seu æquivoca*, as opposed to that expressed in the tenet, "*Omne vivum ex ovo,*" has, within the last few centuries, as often had the suffrages of eminent natural philosophers, as it has been the object of the most determined opposition from others. After Harvey, Vallisneri, Redi, and even the great Linnæus, had voted against it, as regards plants, it was, for some time, considered as entirely exploded; but the discussion was actively renewed, towards the middle of the 18th century, by the zoologists, when Needham, Wrisberg, O. F. Müller, &c. supported the doctrine against Spallanzani, Bonnet, Trechowsky, and other opponents. Among botanists, the question was not agitated at that time, and Willdenow treated the *generatio æquivoca* as an opinion which could only have been entertained during the infancy of science. About the beginning of the present century, however, Treviranus, Oken, and their followers, allowed that spontaneous generation was possible as to organisms more or less perfect; but in 1823, Professor Schouw, of Copenhagen, in his 'Journal Tidsskrift für Naturwidenskaberne,' tried to invalidate the observations of Mr. Hofman of Hofmansgave, that were favourable to that doctrine; and the Society of Natural History at Görlitz, in Silesia, has just published in its 'Transactions' a long article, by which the "*omne vivum ex ovo*" is again to be exalted to the throne, as the only legitimate ruler. Thus, it would appear, the subject requires to be once more treated "*ab ovo.*"

In attempting to do so in an unprejudiced manner, we ought to discard from our minds such preconceived notions as must needs prevent us from arriving at the truth, as far as we able to perceive it in this mysterious matter. Though this remark be self-evident, it is not uncalled for, in times when a man may incur the imputation of *atheism*, for presuming to observe the spontaneous generation of the *Acarus horridus*, several thousand years after the Mosaic creation; or when books containing passages like the following, are eagerly read and implicitly believed by many. "*In this ark of safety, such of the animal world as were intended to replace the genera that would perish, also found a shelter; and when these provisions for re-peopling the earth with its animated races, in the new state and course of things that were ordained to succeed this calamity, were completed, the tremendous revolution occurred.*"* Similar attempts, however, at distorting what may be

* See the last page of Mr. Sharon Turner's 'Sacred History of the Globe,' fourth edition, 1833. This page, the only one which I have read in that work, put me in mind of a manuscript, which I saw a few years ago, in the possession of an English lady, and upon which she set great value. It was '*A Treatise on the Species of Jonas' Whale*,' which had been written during a course of lectures delivered before an auditory of ladies. The conclusion at which the learned Professor had arrived, was, that it was the *Physeter macrocephalus*. Bochart, ('Hierozoicon,' P. I. lib. i. c. 7), made out, two hundred years ago, that it was an immense specimen of the *Carcharias ca-*

read in the book of nature, so as to make it agree with the short-sighted interpretation of a symbolical tradition, must be rejected by all sober minds. The vitality of the simple and elevated truths of our religion, does not, I trust, require the protection of such an insipid shell, for the benefit of the souls of the natural philosophers of the present age. Though it may be thought prudent to leave it untouched, as to such as are yet exoteric to science, yet the attempts of those who wish to make it thicker, in proportion as the season advances, and the sun of science rises higher, ought to be denounced as injurious to the regular developement of our species. If positive theology encroach upon the territory of natural philosophy, which latter can never become detrimental to the truth contained in the former, it must act the part of a despot, who wishes to subdue a free nation; and if it raise the outcry of "*hic niger est*," against any one who publishes facts or reasonings, which do not exactly coincide with one of its stationary systems, it lowers itself to the level of the popish infallibility of the middle ages.

Were it in my power to convince those who think otherwise, that the progress of religion altogether depends on that of science, and that the former places itself in a very questionable position, if it force the latter to deviate from its true bearing, I should doubtless be entitled to more merit, than by what I have to say on the spontaneous generation of animals and plants; for I should contribute towards making the human mind itself a more congenial ground for the spontaneous generation and propagation of *truth*.

The question of spontaneous generation may be considered in two different points of view. We may *firstly* ask, whether all the organic beings which have peopled the globe during different epochs, did, in the first instance, originate in that manner; and *secondly*, whether that principle is in occasional or extensive operation still, when the great creative period of our epoch is long gone by.

As to the former part of the question, this is a mere matter of speculation, which I think, however, admits of a solution, in which we may acquiesce, provided we do not wish to go

sis. The stupendous learning of that author had probably weakened his common sense, or he would have seen at once, that, by giving a wide throat to Jonas' whale, he only lessened the merit of the miracle, without explaining it. But how our orthodox theologians, who cannot always plead the same excuse, can think it their duty, or even useful, to cram the brains of ladies with such stuff, is to me quite inconceivable.

farther than we can, nor prefer to seek for more positive certainty in gratuitous assertions. No one, I hope, will suppose for *each* of the geological epochs, which had a creation of its own, subsequent to the general incandescence and oxidation of the globe's surface, a *Deus ex machinâ*, or a sort of *Prometheus*, who manufactured the different animals and plants severally by mechanical means. But unless we thus create God in our *own* images, or make unto us graven images, we feel compelled to suppose that there was a period in each geological epoch, when most of their respective organic beings took what is called a spontaneous generation, from the re-action of different kinds of matter upon each other, in consequence of the inherent qualities and powers with which they were invested, through the omnipresence of the Creator.—This view appears to be not only the most rational one, but its perfect accordance with what is still going on in nature may be amply proved.

This leads us to the latter part of the question, for the solution of which we may draw upon human experience, though the remote causes of the phenomena be quite as unfathomable and mysterious, and in short the same, as those of the former. We may, however, here trace the effects we observe, with more precision, to their immediate causes. But before I communicate a number of facts, which may contribute to establish our conviction as to what has passed and is still passing on the surface of the globe, I shall try to establish the general truth of the principle, by what we observe in the most perfect of its productions.

Man has been most appropriately called the microcosm, and as to the subject here under consideration, this qualification may be vindicated to him as fully as in any other respect. His organism is most productive of spontaneous generations, answering to the three kingdoms of nature. Some of these productions make their appearance in consequence of his natural and regular developement; others only appear in certain human bodies, or at no particular stage of man's progressive developement, and may be considered as anomalous or incidental. To the former belong the following animals: the *Pediculus capitis humani*, because their spontaneous generation is avoided only by the cleanliness employed by man in a civilized state. All savages are covered with this parasite, and if any healthy person be confined to his bed, by some local accident, as a broken leg, for a period exceeding five or six weeks, and under circumstances which prevent him from adhering to those habits of cleanliness to which he may be accustomed, his head will be *at once* covered with adult

*Pediculi*; there are also the *Pediculi corporis et pubis humani*, &c. The following plants or growths, as the hair of the head, and other parts of the body. The teeth and hollow bones may be compared with lithophytes. To the anomalous or incidental productions belong the *Acarus scabiei* and *scab. senilis*, the one which forms the most striking symptom of the disease called *phthiriasis*, intestinal worms, the animalcules which have been observed in many morbid secretions; as for plants or growth, different eruptions of the skin, which complete a regular circle of developement, and have a stage of fructification, which proves either capable of propagating the species, (the pustules of the small pox, &c.), or abortive, (boils, &c.); moreover growths that are less defined in their developement, as the polypous and fungous excrescences; lastly, minerals, as the *calculi* found in different organs, the anomalous ossifications of arteries, &c. Most of the animals thus spontaneously generated, afterwards propagate their species by *ova*, and some of the growths by seeds or sporules, by which they may be transmitted to any other human organism that may be favourably predisposed for their reception. Here therefore we observe a little world of natural productions, the possibility of whose spontaneous generation is offered by any human body called into existence.

The analogy between what we observe in man, and what must have happened, and still occasionally happens, on an extensive scale, on the surface of the globe, which no philosopher of the present day would consider as a dead and random aggregate of matter, is, I think, quite striking. The earth since the general incandescence of its surface, has had a number of stages of developement, the latest of which are marked by the organic creations of the transition, secondary, tertiary, and the present series. Each of these stages or epochs had, probably, a period when the creative power was most active, and which gave rise to the great majority of the organic beings of each series, by spontaneous generation. But *accidental* or *incidental* circumstances, to which, in the present epoch belong the changes which the free operations of man effect on the surface of the globe; have, I think, at a much later period given rise to the partial and local *generatio spontanea* of organisms, either coinciding with some already existing, or presenting a specialization of their own. Where, for example, the stratified rocks of any epoch were first pierced by a volcanic eruption, the decomposition of the plutonic rocks, thus brought to the surface, probably gave rise to the existence of new organic beings. How could we otherwise account for the peculiarities of the floras of volcanic districts, in different climates, which are like so many islands amidst wide tracts of neptunic formations. Could the seeds of plants characteristic of these localities, have been brought there from the ignited bosom of the earth? Or can the more recent volcanic localities have received theirs from others, with which they have no hydrographic communication? When the bottom of the sea, or of a lake, was laid dry, either by sudden elevation or gradual exsiccation, there were likewise created breeding-grounds for the spontaneous generation of animals and plants peculiar to those localities, according to the nature of the ground and climate. Even some of the modifications of matter effected for the first time by man, may, within the historical times have given rise to animals and plants not existing before. But as volcanic eruptions, piercing through the *strata* of the present epoch, the change of the localities of seas and lakes into dry land, as well as the other incidental modifications of the surface of the globe, are, at the period in which we live, for the greater part, if not altogether, repetitions of what has happened many times before; as, moreover, we are so distant from the great creative period of our epoch, we cannot expect to see *new* species of animals or plants rise from the ground, though many circumstances appear to prove that the spontaneous generation of plants of the species already existing, is still actively going on; whereas the series of the organic creation of the present epoch, may be considered as complete, or perhaps very nearly so.

With the undeniable cases of spontaneous generation in the human body before us, we shall not hesitate to ask any unbiassed man, whether he can better understand how the *Pediculus capitis humani* is generated from the integuments of the human head, than how an elephant could spring from the materials of the earth and atmosphere, of which he is composed, under all the predisposing circumstances? The answer will be unanimously in the negative, but at the same time everybody, I think, must allow, that the two cases are perfectly analogous, and the conclusion to which this must necessarily lead, is, that even if no direct proof can be brought forward for the *generatio æquivoca* being a general law of nature, the denial of it would be altogether unphilosophical.

That the aboriginal organisms of each locality owe their existence, and peculiar type and structure, to the local conditions of each part of the surface of the globe, becomes sufficiently clear from the strict adaptation of the animals and plants to their habitats, and to each other in each habitat; which principle is the more evident, the better any locality is defined and insulated. There are countries where the similarity of the types of the two kingdoms of nature is quite striking, which has often been observed with regard to New Holland; and if there still be philosophers who are inclined to think that the *Casuarina* was planted, and that the *Casuar* walked about in the garden of Eden, and was afterwards received into Noah's ark, I wish they would tell us how a bird that can neither fly, nor likes to go into an element where it would soon be drowned, has got to New Holland after the deluge, or why this bird is not found at a reasonable distance from mount Ararat, or on the old continent at all. The number of the species, moreover, bears a direct proportion to the extent, climate, and variety of soil, of any particular country; wherefore Du Petit Thouars found only 113 phanerogamous and cryptogamous plants on the island of Tristan d'Acunha, and De Buch observed that the flora of the Canary islands is comparatively poor, which is sufficiently explained by the little variety of formation in these volcanic islands. That the nature of the soil is the great agent in determining the spontaneous generation of plants, and that the climate acts only a subordinate part, within certain limits, may be proved by the instance of the birch, whose natural breeding-ground appears to be alluvial quartz-sand, strongly impregnated with humic acid. Now, though this tree can bear a greater degree of cold than any, we find it in the Alps of Tyrol very far below the line of perpetual snow, immediately below the Scotch fir, above which appear the pine, (*Pinus Abies*, L.), and larch; whereas in the north of Scandinavia, where its congenial soil reaches up to the snow-line, it is above the Scotch fir, after which follows the pine lower down.* The nature and order of the respective soils no doubt fully accounts for this curious inversion of the order of vegetation.

Among the many observations made within the last twenty or thirty years, which may be brought forward as proofs of the *generatio æquivoca* still going on, on a large scale, with respect to plants, and which the opposers of that doctrine have, with great self-complacency, laid hold of to prove their assertion that the surface of the earth swarms with seeds, deposited there many thousand years ago, I shall select a few, and support them by observations of my own.

Where a new *alluvium* is formed, or an *ancient* one laid dry, the ground soon covers itself with plants exactly adapted to its nature. A fish-pond having been drained near Fredericksberg, Mr. Holböll found on that spot *Carex cyperoides*,†

* Blocke in die östlichen Alpen, &c. von Canstein, Berlin, 1837.
† Viborg, im Magazin der naturforschenden Freunde zu Berlin, 1808.

a plant not otherwise met with in Denmark. In the same country, Mr. Hofman of Hofmansgave made a very curious observation in 1821 and 1822. An arm of the sea having been laid dry, by the construction of a dyke, the whole of the 500 acres of ground thus obtained was covered, within two years, with *Arenaria marina*, which even during the first year had made its appearance on the most favourable spots. This phenomenon, though interesting in our point of view, was less so than the one offered by a single spot of that drained area, where fresh water oozed through the ground. There, and there only, grew *Juncus bulbosus*, *Scirpus lacustris*, *Ranunlus sceleratus*, *Cineraria palustris*, *Epilobium hirsutum*, and *Chenopodium album*; plants otherwise not found on sea-ground laid dry. Professor Schouw, of Copenhagen,* tried to explain all these phenomena by supposing that the seeds of some of the plants, being furnished with a *pappus*, had been brought to the spot by the wind, others by birds, others again by the fresh water oozing through the ground. I make no doubt that wind, birds, and water, act an important part in conveying the seeds of plants to spots where the respective species have not been observed before; but these agents are quite inadmissible in many cases. Leaving the seeds furnished with a *pappus*, and their vehicle, the air, out of the question, there are many not enveloped in berries, &c. of which every single grain is crushed by the birds which feed on them, before they are swallowed, and yet we see their species growing at once on spots, whither they cannot have been carried by water, because they do not grow on any more elevated ground of the same hydrographical district, as soon as those spots have undergone an appropriate change. To prove this, I shall refer to an observation which I had an opportunity of making many years ago, and which I believe may be verified in many localities. A road was constructed† along the northern slope of a limestone hill, containing *Ammonites*, &c. and overlaid up to the middle with plastic clay. The road was cut through this clay, and in one spot opened a small vein of water, which before could not make its appearance above ground, on account of the impermeable nature of the clay.—The water formed a long pool in the narrow ditch on the upper side of the road, in which, the year after, grew in great abundance, *Veronica Beccabunga* and *Festuca fluitans*. The nearest localities for these two plants, are to the right and left of that spot, at the distance of about half an English mile,

* See Tidsskrift for Naturwidenskaberne, N. 1 & seq.

† Near the town of Waltershausen, in the duchy of Gotha.

where the same sort of water forms natural puddles, and the clay ends over a *stratum* of sandy loam. But they are not found higher up the limestone hill, nor on the sand-stone mountains in any part of the alpine district, which is farther behind. Their seeds cannot, therefore, have been floated to the new locality by the water, nor can I conceive how they could have been carried there by birds.

I have, without exception, found *Hypericum humifusum* growing first on the circumference of that circular mound, *elevated above the level of irrigation* of the adjacent district, where coal-burners had charred resinous wood, provided the mound consisted of that sandy soil which naturally covers itself with heather. I cannot state the precise time when the *Hypericum* first appears, after the mound has been left by the coal-burners; but it always first shows itself on the limits of the black disk formed by pieces of charcoal that have been left, after the clamp has been removed, therefore on the spot where the decomposition of the charcoal first takes place, and as that decomposition proceeds towards the centre, the plant overruns the whole mound. As long as the clamp, or charcoal kiln, is in operation, there is no trace of the *Hypericum*, and it afterwards first shews itself on spots that have been exposed to a heat sufficient to kill any seeds that may have been in the ground. The water from the neighbouring ground having no access to the spot, and the seeds of the *Hypericum* not being furnished with a *pappus* or wings, I do not see how we are to account for this phenomenon, except by the *generatio æquivoca*, and this being granted, can we be accused of speculating too wildly, if we venture the opinion, that the original generation of the plant took place under analogous circumstances, for instance, when in a temperate climate, a fir wood, growing in a sandy locality, had been set on fire by lightning, and partially consumed?

Similar considerations lead me to suppose, that certain plants which are mostly and almost exclusively found on spots where ruins are mouldering, or buildings have formerly stood, and where the rubbish of human constructions is mixed with the natural constituents of the ground, have been first generated within man's existence. Even admitting this, it would doubtless be difficult to point out exactly the species to which such an origin may be ascribed, as they must have spread to other localities, not capable of effecting their spontaneous generation, but capable of developing their seeds into perfect plants. *Hyosciamus niger*, *Senecio viscosus*, and *Echium vulgare*, have struck me as possible instances, but this origin appeared to me probable as to a rare plant, *Asperugo procumbens*, which throughout Thuringia I have only found on the space between the foundation walls of ruined castles and the ground.*

Eighteen years ago Major Beatson wished to introduce into England, a new system of manuring with burnt clay, as exposed in his work, 'A new system of cultivation, without lime or dung,' 1820, which he himself tried, on an extensive scale, at Knowle Farm, in Sussex. If my views be not without some foundation in fact, we should suppose that other weeds, as those found on the neighbouring farms, must have made their appearance on Knowle farm, by spontaneous generation.

It is true that a great number of seeds are annually carried away by the water, and floated to other localities, both above and under the ground. But they are, of course, carried to lower localities, where they are decomposed, because the soil does not suit their nature. But for that, the collectors of botanical specimens need only go to the lowest locality of any hydrographical district, to find there the whole of its flora; whereas for the seven years during which I was employed in collecting such specimens for a school, I met with but few instances of the translocation of plants, besides those which were favourable to spontaneous generation, inasmuch as a notable change had been effected in the ground itself, or the vegetation which covered it before.

Those seeds, however, which are floated by water underground, must likewise lose, in their muddy mediunm, the power of germinating, long before they can be deposited in places where they are hermetically sealed up to keep for an indefinite length of time. I know an instance† in which the snow water, which collects in a valley enclosed by mountains of granite, porphyry, sandstone and limestone, in due succession on each side, forms, every spring, a temporary lake on a meadow, which was formerly an artificial lake, but which has become drained, and can never again be permanently submerged, on account of the water having broken through the superficial *strata*, into a sort of natural tunnel, into which the snow water empties itself within a day or two, carrying down with the other *detritus* of the mountains, innumerable seeds of all sorts; the same water forms swamps about two English miles lower down the valley, but as might be expected, not one of

* I may here refer to an interesting observation made by Dr. Retzius, of Lund, who, eighteen years ago, kept a solution of muriate of barytes in distilled water, in a well-stoppered glass bottle, for six months; after which time a *Conferva* had formed in it, which Professor Agardh declared to be quite new.

† Near the ancient abbey of Romhardsbrunn, in the duchy of Gotha.

the mountain plants ever grows in those morasses, and who would venture to assert, that these seeds are kept for a future period, to mislead the supporters of *generatio spontanea*?

The society of Görlitz, who take for granted "that millions of seeds of all species of plants, lurk everywhere in the ground, awaiting the favourable moment when their turn shall come to shoot," have communicated a great many well-known observations, that are all much more in favour of *generatio æquivoca* than of the "*omne vivum ex ovo*," among which is one of their own, which I shall not withold from my readers.

The town of Görlitz is situated in the neighbourhood of tracts covered with Scotch fir and heather. The plants which grow there spontaneously in the glades opened by felling the Scotch firs, are first, *Spergula pentandra*, secondly, *Senecio sylvaticus*, and last of all appears *Epilobium angustifolium*.

This spontaneous generation is quite as scanty as we ought to expect to find, in the natural rotation of plants on a poor sand, which has produced before only Scotch firs and heath. In the glades of the red fir woods, (*Pinus Abies*, L.) which grow on richer soil, and in those of the white deal fir, (*Pinus picea*, L.) the natural soil of which is far more fertile, I have universally found the spontaneous generation more varied and luxuriant. In those of the former grow up tolerably good grasses, such as *Poæ* and *Airæ*, besides *Senecio sylvaticus*, *Epilobium angustifolium*, *Hypericum quadrangulum* and *dubium*, &c. but their chief distinguishing feature appears to be *Digitalis purpurea*, which covers large tracts of ground with a luxuriant crop, and in the forest of Thuringia its leaves are collected by the poor people, and sold to the tobacco-manufacturers, who use them to adulterate the inferior sorts of tobacco. The glades of the white deal fir offer a great many more spontaneously-growing plants, among which *Verbascum Thapsus*, *Solanum Dulcamara*, and *Atropa Belladonna* are the most striking.

To the many well-known instances of the natural rotation of vegetation, Dr. Pöppig has lately added one in the account of his journey in different provinces of South America. It refers to the Andes of Anturo, in the southern part of Chili. He says, "In the lower part of the valley the wood had been on fire; all the trees had lost their bark; some were even partially charred. In the uninhabited parts of the Andes the woods are often set on fire from unknown causes, and are consumed up to the snow-line, where a dwarfish beech (called 'Nirrhe') takes the place of the stunted Scotch firs of most of the European mountains. After the conflagration, the ground doesnot again produce tall timber, but thick underwood, which fills the intervals between the solitary trees that have escaped destruction. The new vegetation which replaces the former, in every part of America, is uncommonly interesting. In Pennsylvania the few ancient woods, untouched by either the fire or the axe, are like a park without underwood; but scarcely has the fire devastated a tract, when there springs up, especially in the more elevated places, a beautiful *Rhododendron*, forming an impenetrable thicket. Where no tree has escaped the general conflagration, the scrub oak, (*Quercus ilicifolia*, Wangenh.) shoots up, presenting great obstacles to the hunter and the farmer, as it is very difficult to extirpate its roots, which continually give rise to new shoots* However, the consequences of the combustion of the woods are still more striking in the hot parts of America. In Cuba the tree nettle, (*Urtica baccifera*, L.), which burns most severely, the ugly *Psychotriæ*, *Piper*, and other unseemly shrubs, quickly shoot up, and where cultivation does not successfully struggle against the spontaneous vegetation, there is formed an impenetrable thicket of hook-thorned smilax, *Ipomœa*, and other climbers. In Chili the first plants which grow in such places are the severely-burning *Loasæ*, the stems of which are either upright or stoloniferous; then follow shrubs whose seeds are prickly, and attach themselves to every object coming in contact with them, such as *Acænæ*, *Auciniæ*, and many others. Soon after the *Colliguë* takes root, which is an arborescent grass, as characteristic of many districts of Chili as the bamboo is of the hotter countries of Asia, or the silerias of the tropical parts of America. Numerous stalks of this grass shoot from a creeping root, and in rich soil they grow to the height of 12 or 18 feet. They are studded, throughout their whole length, with tufts of juicy green leaves, and covered with a polished yellow cuticle, which is so hard that it resists the knife, and is elastic to a high degree, so that they recoil with violence against him who incautiously bends them. From the sea-shore up to the elevated parts of the Andes, this plant finds habitats adapted to it; but near the snow-line it becomes a low shrub, and presents great obstacles to the traveller, to whom its smooth procumbent stalks cause many a fall. It is as useful to the natives of Chili as the bamboo is to the Hindoo; and many parts of the houses are constructed of the *Colliguë*. It is however a great nuisance, for on ground newly brought into cultivation, it springs up among the crops in the first spring, and in autumn its

* In the Canadas &c. when fir-woods are burnt, they are replaced by poplars &c.

stalks are so strong that the reapers are much hindered by them. Its extirpation is scarcely ever effected, for where the least particle of root is left, new shoots will grow."

I think this natural description decidedly favourable to the *generatio æquivoca.* The seeds of the plants which spring up after the combustion of a forest, could hardly have been preserved for thousands of years, so near the surface of the ground as to have been accessible to atmosperic influences; and the means by which they would have been transported to the spot directly after the conflagration, cannot, in many cases be pointed out, with any degree of probability.

Though, therefore, the "*omne vivum ex ovo*" may now-a-days be considered as presiding over the great majority of cases, yet there are many, in my opinion, which form an exception to it,—a sufficient number to exclude it as a general rule, and to lead us, from what we may observe even now, to the same conclusion as I before arrived at by analogical deduction, namely, that there was a time to which that rule did not at all apply.

*Weimar, April 4th,* 1838.

Art. V. *Some Observations on the Lancelot,* (Amphioxus lanceolatus). By Jonathan Couch, Esq. F.L.S.

So little is known of that singular little fish, the lancelot,

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*Amphioxus lanceolatus.*

*Amphioxus lanceolatus*, (Yarrell's Br. F. vol. ii. p. 468), that even a small addition to what is contained in the 'History of British Fishes' may be regarded as interesting: the more especially as there is reason to suppose that our further acquaintance with its habits will be the result rather of accidental opportunity than research.

A narrative of the circumstances attending my first acquaintance with this species, will be found in Mr. Yarrell's work above referred to; but a slight correction of that account is necessary, not only for the sake of that accuracy which it is no less Mr. Yarrell's wish than my own, to observe,—but also because the error is connected with what, from the circumstances under which I have had the good fortune to discover two other specimens, I am led to believe a characteristic habit of this fish.

The discovery of my first specimen is thus related in the original notes. "It was found on the 21st of December, 1831, the day succeeding stormy weather. On turning over a stone in a cove of the harbour at Polperro, at about 50 feet from the edge of the receding tide, at nearly low water, my attention was attracted to the tail of a fish that appeared on the surface; the body lying buried in a small accumulation of sand. On removing it from this hiding place, and placing it in a pool, I soon ascertained that it was new to me, though its extreme activity for a time prevented me from distinguishing the head from the tail; but when these exertions ceased, it always fell to the bottom and lay still. It is probable that its usual residence is in the sand, and perhaps in deep water, from which the late gales had dislodged it." I find it also necessary to add a slight correction of the printed description, which was taken from the specimen after it had undergone some change from the spirit in which it was preserved; whereas my notes had the advantage of being made from the fish while yet alive, and immediately after its death. "The vent is at the length of one third of the body from the tail; and at this point begins the anal fin, which is joined with the dorsal to encircle the tail, as in the eel. And at this part there is a curious peculiarity; for though the fin here is more developed than further forward, the singularly arched rays," (of which more presently), "were not visible," the texture being merely membranous at this part. The colour of the body when alive was yellowish, tinted with green and yellowish reflections towards the tail.

We owe our knowledge of several peculiarities in the structure of this fish, and the station which it occupies in the system of nature, to Mr. Yarrell; and a desire to elicit some other circumstances connected with its form and habits, which still continue obscure, was a sufficient inducement to me to make frequent and diligent search, in every situation supposed likely to afford it concealment, but without success, until the 26th of February, 1838, when my wishes were again gratified.—Two days previously we had suffered a severe and destructive storm; when the waves, rolling with fury into the harbour, and tearing up the bottom, had killed many kinds of animals, as *Octopus vulgaris*, and *Holothuria pentactes*, numerous specimens of which lay on the beach; and among the rest my eye was attracted by two specimens of the lancelot, —one of them too much injured to be worth preserving, but the other of fine size, being $2\frac{3}{10}$ inches in length, and only a little bruised on the side. No other evidence than the place and circumstances in which they were found, was necessary to convince me that their residence had been in the ground of the harbour, at no great distance from the spot where they lay.

A minute and frequently-repeated examination of the more perfect specimen above referred to, has enabled me to add the following remarks to what is already known of the structure of this fish; and that some further particulars were not ascertained, must be ascribed to my wish not to injure the specimen, that it might be presented, according to a promise formerly made, to the national collection in the British Museum.

That process of the cartilaginous skeleton which may be judged to answer to a cranial *vertebra*, passes from the first cervical to the anterior extremity; and after the specimen had lain for a day or two in a weak mixture of spirit and water, I could discern in that part some slight marks of separation, as if the vertebral structure existed, but less decidedly than behind. The number of lines that may be judged to mark the number of *vertebræ*, was sixty; and between each and the next were five perpendicular fin rays, with two or three anterior to the first line. The anal fin has these rays also, but they become shorter, and then disappear, in both the dorsal and anal fin, at about one fifth of the whole length from the tail; beyond which the structure of the fin is that of a simple membrane, as in the corresponding part of a lamprey. I was not able to count the number of these fin-rays, but their structure appeared to be of a most extraordinary nature; not rising from a single root, as in most fishes, but standing in the form of a transverse bow or arch, the curve forming the support of the fin, while the pillars rest on what probably will be found to be two somewhat transverse spinal processes.—These rays are raised or depressed but little, and in a longitudinal direction; and the fin, when not greatly expanded, has the appearance of being thick, so far as these rays extend.

The tendrils of the mouth are represented in Mr. Yarrell's figure; but in their natural position in this specimen, they appeared to cross each other at the orifice, and to lie along the cheeks and *fauces* in a direction obliquely forward, as represented in the figure at the end of this article, (*fig.* 19). After a few days these fibres hung dependant externally, from the jaws or sides of the mouth. I counted ten of them, but there might be one or two more.

The abdominal cavity was long and narrow, and without any mark of the grains or *ova* so conspicuous in the first specimen; but the stomach was capacious, and filled with a substance resembling yellowish mud, in lines or pellicles, probably decomposing animal matter, which Mr. Yarrell had previously judged to be the food of this creature. Before the diluted spirit had penetrated so far as to stop the further decomposition, several bubbles of air were extricated, that escaped through the mouth.

[The Zoological Society possess two specimens of this singular fish, which were sent by the late Dr. Leach from the Mediterranean, but the particular locality at which they were collected was not stated.—*Ed.*]

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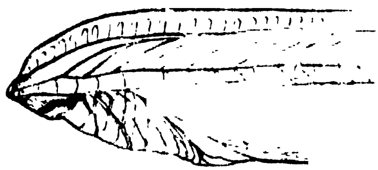


Magnified view of the anterior portion of *Amphioxus lanceolatus*.

## REVIEWS.

Art. I. *Fauna Boreali-Americana. Part the fourth and last.—The Insects;*—By The Rev. William Kirby, M.A. F.R.S. F.L.S. F.G.S. &c. Norwich: Fletcher. And Longmans. 1837. 4to. 325 pp. with 8 coloured plates.

We are at length permitted to see the completion of the beautiful work, published under the direction of Dr. Richardson, of the various objects of natural history collected in the late northern land expeditions, under the command of Captain Sir John Franklin, R.N., and of which the three preceding parts, containing the quadrupeds, birds, and fishes, have been long before, and duly appreciated by, the public.

The present volume comprises the insects, and exhibits in a striking manner the talents of the distinguished leader of British Entomology, who, for nearly half a century, has been so indefatigable in forwarding his favorite science. The volume comprises notices of 447 different species, all of which are carefully described, (the greater portion being new); of which number 343 are *Coleoptera*, 3 *Orthoptera*, 2 *Neuroptera*, 2 *Trichoptera*, 32 *Hymenoptera*, 17 *Hemiptera*, 1 *Homoptera*, 32 *Lepidoptera*, 14 *Diptera* (and *Homaloptera*), and 1 *Aphaniptera*. The great preponderance of the coleopterous species may readily be explained by the facility with which both their capture and preservation are effected. In order to make the work as complete an index of Arctic Entomology as possible, the various species described by Fabricius, Curtis, Children, and himself elsewhere, are enumerated.

Leaving the details of mere technical specific and generic descriptions, we shall call the attention of our readers to what may be rather considered as the philosophy of the volume.—In doing this we are convinced that they will regard with as high a degree of respect as ourselves, the views now first introduced by the veteran entomologist, although, in common with us, they may peradventure not entirely coincide with them. Coming from the pen of a writer who has not looked upon nature with the mere superficial eye of the specific describer or collector, every suggestion, being the result of deep thought, and careful research, is entitled to the most serious consideration.

After some introductory remarks upon the advantages derivable to natural science, from expeditions having science alone for their object, the author makes some observations upon the *natural* arrangement of the objects of nature, which are completely opposed to the modern views of several of our most eminent naturalists. "Whoever," he observes, "considers the infinite ramifications of the animal and vegetable kingdoms, the vast number of groups, differing in rank and value, and rolling, wheel within wheel, almost *ad infinitum*, of which each consists; may readily conceive that the formation of a numerical system, whether the number assumed as the regulator be *two*, *three*, *four*, *five*, or *seven*, is a labour of no very difficult accomplishment: but to construct it so that the groups of each section, from the primary to the ultimate, shall be equal or nearly equal in value, which alone can prove that it is the system of the Creator,—*hic labor, hoc opus est.*" And in a subsequent page he continues:—"Whether we consider the productions of our globe, in all their affinities, as best represented by a branching tree, a net, or a sphere formed of an infinity of larger and smaller orbits, connected on every side, and placed, *ad infinitum*, wheel within wheel;—if we set ourselves to arrange and describe upon paper the individuals composing any department of the three kingdoms, we shall find that it is above us, either to conceive or delineate it, so as to maintain all its connections undisturbed and unbroken. We *must* do it in a *series*, which can only be a series of mutilations and dislocations. It will be like cutting off every branch and twig of the tree, to place them end to end; like tearing up the net, to place all the meshes one after the other; like blowing up the sphere, and unravelling, as it were, all its orbits, great and small, to make a continuous thread of them. So that it is a hopeless case to attempt an arrangement according with nature in all its parts; vain man, with all his boasted powers of intellect, cannot conceive, much less utter and embody it."

This view of the relations and concatenations of natural objects has evidently been produced by a very extended observation of the relations of animals, as ***drawn from their structural peculiarities.*** Our readers are aware of the old theory, that the various members of the animal and vegetable world were ***naturally*** arranged in a straight line,—from which it would necessarily result, that no object could have more than two relationships,—namely, with the one immediately preceding, and the one immediately following it. This theory was opposed by MacLeay, who maintained that although the series of nature was linear, yet the line was circular, whereby some of the members of one circle were brought into contact with some of the members of the adjacent circles. The views of Mr. Kirby are a still further extension of the opposition to the old theory, being evidently founded upon the idea, that there exist numberless relations, by each of which one animal is allied to others. Thus, taking the *Staphylinidæ*, for example, we have one close relation with the sexton beetles, (*Necrophorus*), another with the water-beetles, (*Dyticidæ*), the *larvæ* of these two families having the greatest possible resemblance; another with the *Carabidæ*, by means of *Lestera;* another with the *Cicindelidæ*, by means of *Stenus;* another with the *Nitidulæ*, by means of *Micropeplus;* another with the *Scydmænidæ*, by means of *Pselaphus*. Now it must be evident that a far greater degree of attention and minute investigation than has hitherto been devoted to the subject, will alone enable us to discover the greater or less value of these various relations, but which are, however, evidently so numerous, that a linear series cannot be maintained. Mr. Kirby therefore says, "it has been my endeavour principally to make my groups as near to nature as possible, but with regard to the series and concatenations of them, for the reasons above assigned, it was not possible to place them upon paper, as they are inscribed by the GREAT AUTHOR of nature in her pages."

Mr. Kirby has adopted the primary division of insects into the mandibulated and haustellated sub-classes, commencing the series with the *Coleoptera*, at the head of which the *Cicindelidæ* or tiger beetles are placed, with this observation. "Amongst the higher animals, the lion, chief of the predaceous quadrupeds, is usually accounted the king of beasts; a similar reason will justify modern entomologists for regarding the above tribe of beetles as the typical and most perfect form amongst insects, especially *Coleoptera*, instead of the lamellicorn beetles, which Linnæus had elevated to that rank." Rejecting the tarsal system of Latreille, as well as the representative theory of MacLeay, he divides the order *Coleoptera* into thirteen primary groups: namely, 1, *Adephaga*, (*Cicindela*, *Carabus*, *Dyticus*, and *Gyrinus*, L.); 2, *Brachelytra*, (*Staphylinus*, L.); 3, *Entaphia*, (the single modern genus, *Necrophorus*); 4, *Necrophaga*, (*Silpha*, *Dermestes*, &c.); 5, *Philhydrida*, (*Hydrophilus*); 6, *Lamellicornia*, (*Scarabæus* and *Lucanus*); 7, *Sternoxa*, (*Elater*, *Buprestis*); 8, *Xylophaga*, (*Cucujus*, *Cerambyx*, *Bostrichus*); 9, *Rhynchophora*, (*Curculio*); 10, *Phytophaga*, (*Chrysomela*); 11, *Aphidiphaga*, (*Coccinella*); 12, *Heteromera*, (in its Latreillian extent); 13, *Malacoderma*, (*Telephorus*, &c.).

One novelty in the work is the introduction of an immense number of new *families*, or rather, we should say, the cutting up of the old families into many minor groups, to each of which the family termination *idæ* is applied. For instance, the eighty-four species of *Carabidæ* described, compose no fewer than twenty families, such as *Agonidæ*, *Calathidæ*, *Pæcilidæ*, *Amaridæ*, *Harpalidæ*, &c.—the types of which will be familiar to English entomologists. No descriptions are, however, given of these families, so that the reader will have to search in the works of Latreille and other authors, for the characters of the sections which Mr. Kirby has transformed into families. We are, however, decidedly averse to the plan which has been thus adopted: the Linnæan genera are in general so many admirably constituted groups, that nothing could be more advantageous than to preserve them entire, and to regard them, as Latreille first proposed to do, as so many natural families, ("familles naturelles"); which idea Mr. Kirby in fact originally adopted, (in his 'Century'), merely adding the termination *idæ* for uniformity, to the Linnæan names. That these great groups require subdivision, is not to be questioned; only let us give to the subdivisions some other names and terminations, so that we may have some groups, at least, firmly established. These family names, as well also as the different specific names, Mr. Kirby has invariably anglicised. Thus, the *Cicindelidæ* are *Cicindelidans;* the *Harpalidæ*, *Harpalidans;* *Vanessidæ*, *Vanessidans.* *Cicindela hirticollis* is the "hairy-necked *Cicindela;*" *Oiceoptoma (Necrophila) terminatum*, the "terminated *O. Necrophila*." Although however we are adverse to the would-be-science which must always talk in Latin or Greek, and which cannot speak of a common animal or plant otherwise than in its scientific technical name, we do not exactly perceive the advantage of giving more than a Latin technical name to animals which, in ninety-nine cases out of a hundred, will never be seen or thought of except in the cabinet of the collector, neither should we deem it advisable to anglicise the names of the sectional groups below those equivalent with the Linnæan genera, because it is not to be supposed that the generality of persons will ever become acquainted with the groups of an inferior rank to these.

We perceive, likewise, that Mr. Kirby has unhesitatingly pronounced many of the species described in his work, as absolutely identical with the natives of Europe. Thus, we have *Platynus angusticollis*, *Omaseus orinomum*, *O. nigrita*, *Curtonotus convexiuscula*, *Nothiophilus aquaticus*, &c. We believe, however, it is a question by no means decided by geographical naturalists, whether the animals of North America are not the geographical representatives of distinct European species. In one of the early volumes of the 'American Transactions,' there is a long memoir as to the specific identity of the European and American hive bee; and we happen to know that the specific identity of the species of European and American domestic flies, is a subject which has attracted the attention of one of the best American entomologists.

We have been especially interested in the remarks with which Mr. Kirby commences the descriptive portion of his work. They are those of a profound observer, and have for their object the description of a portion of the structure of the predaceous beetles, which has been too much neglected by entomologists, namely, the nature of the dilatation of the *tarsi* in the males, and the different kinds of clothing upon their under surface, or sole. A more extended examination than Mr. Kirby has devoted to it, would most probably prove that the characters to be obtained from this structure, are of greater service in the arrangement of this difficult tribe than any hitherto employed.

This work has evidently been written several years, and we have therefore to regret that in several instances, the labours of different recent authors have not been noticed, and that, consequently, some, both of the generic and specific names, must sink into synonyms.

The numerous coloured figures with which the work is ornamented, are beautifully executed, being from the pencil of Mr. Charles Curtis. We however miss the numerous outline structural details, which are now required in entomological drawings, and which so materially facilitate the acquisition of a knowledge of the different generic groups.

Art. II. *Jardine's Naturalist's Library.—Ornithology.—Muscicapidæ or Fly-catchers.*—By W. Swainson, Esq. Lizars, Edinburgh; Highley, London.

We have watched with interest the progress of the series of works which compose Sir W. Jardine's 'Naturalist's Library.' The success which has attended this attempt to make scientific Zoology accessible and interesting to the community, is a sufficient proof that authors may remunerate themselves, and at the same time benefit the public, by conveying information at a much cheaper rate than the price usually affixed to works on natural history. Here is a book containing more than thirty plates, beautifully engraved, and accurately, if not elaborately, coloured, selling at six shillings,—not one third of the price at which many works of no greater scientific value have been and are still published.

The object of the volume is to exhibit Mr. Swainson's views of the arrangement of the *Muscicapidæ*, or fly-catchers. We shall not here enter upon those theoretical notions which pervade all Mr. Swainson's writings,—the circular and quinary progression of affinities, and the system of analogical representation. These are subjects upon which many of our best naturalists entertain directly opposite opinions, and which it would be impossible to discuss, without entering into greater detail than is consistent with our present limits. But whatever may be thought of Mr. Swainson's theories, that gentleman's labours have been of great benefit to Zoology, especially by drawing the attention of naturalists to many minute, yet important, variations of external structure, and by introducing into his descriptions of species an accuracy of detail, which is worthy of all imitation. Of this we have numerous examples in the work before us, as well as in Mr. Swainson's former volumes on the 'Birds of Western Africa.' Many of the specific descriptions in the present volume are, however, deficient in one point of great importance, namely, the *habitat*, which is often omitted entirely, and in some cases only to be gleaned with difficulty from the context.

This work would have been rendered of greater scientific value, if Mr. Swainson had prefixed to each genus a careful and exact *definition*, for which his general dissertations are a poor substitute. For want of such definitions, it would be difficult for a person by the help of this book *alone*, to refer to its right genus any species except those which are here described or figured. If also to each genus there had been appended a list of all the species which are known to belong to it, it is needless to say how much the value of the work would have been enhanced. Indeed it cannot be considered as a complete synopsis even of the genera, for several important generic forms, (such for instance as the white-headed tody, and the so-called *Muscicapa leucocilla*), are wholly omitted, possibly because Mr. Swainson has not succeeded in making them square with the quinary arrangement, or the theory of representation.

We must also notice the very numerous errors and misprints which occur, not only in this, but in all the other recent publications of Mr. Swainson,—especially in the orthography of the Latin names. Thus we have, at pp. 99 and 105, '*Fluvicolina*' for '*Fluvicola*;' at p. 140, '*Monacha*, Horsf. and Vig.', for '*Monarcha*,' (a mis-spelling which also runs through the whole of Mr. Swainson's 'Classification of Birds'); at p. 162, '*flat-bellied*' for '*flat-billed*;' &c. &c. Whether these *errata* originate with the author or the printer, we know not; but surely a little less haste in writing, or a little more care in correcting the press, would obviate them.

We congratulate Mr. Lizars on the great improvement which has lately taken place in his style of engraving birds. Instead of that elaborate *scale-like* pattern, which makes the figures in some of Sir. W. Jardine's former works on Ornithology resemble fish rather than birds, we have here a delicate *hair-like* touch, far better adapted to express the softness of plumage. There is however room for improvement in the *beaks* of Mr. Lizars's figures. Artists are not so well aware as ornithologists of the extreme importance of this organ; they are apt to attend solely to the attitude and plumage, and are too often indifferent to the precise shape of the pointed protuberance which stands for a beak. The fact is, however, that it requires almost as much care and attention to depict this member accurately, as to figure all the rest of the bird. The figures in the present volume are better in this respect than in the volumes on the 'Birds of Western Africa,' but are yet far from perfect.

## SHORT COMMUNICATIONS.

[The following note on the *Bos urus*, referring to p. 254, was received from Dr. Weissenborn after his article on that animal went to press.]

After the above had been sent to England, the public has been put in possession of the valuable information which Mr. de Nordman, Professor of Natural History at the Odessa Lyceum, has collected respecting the aurochs of Mount Caucasus, during his late travels in Caucasia, where he was often obliged to make his scientific excursions under the protection of a strong military escort, and a few field pieces. I do not learn, however, that his observations ought to modify the view which I have taken, as to the specific difference of the aurochs of the Caucasus and the zubr of Lithuania. They are as follows.

"This animal, though no longer occurring near the high road from Taman to Teflis, &c. is not very scarce in the interior of Caucasia. On my arrival at Gelendshik, I obtained information, on good authority, that in a few districts by the river Kuban, the aurochs was found in herds. Farther to the south, in Abchasia, at Bambori, I found the horns of that animal in general use as cups, in the houses of the chieftains. At a banquet given by Prince Lewan Dadian, of Mongrelia, to General Rosen, and at which I was present, I saw from 50 to 70 of these drinking-horns together. In Imerethi, Honi, and Guriel, I observed these horns richly ornamented and inlaid with silver: they had been obtained as presents from the princes of Circassia and Abchasia. When late in the autumn of 1836, I returned into Abchasia, I learned that in consequence of much snow having fallen on the mountains, a number of these oxen had descended into the valleys inhabited by the tribe of Psoeh; but being too much weakened by fever, and short of provisions, I was unable to go into that district. The demand of the Abchasians for procuring a specimen for me, was 150 silver roubles. The aurochs is found on Mount Caucasus from the Kuban to the source of the Psib, a distance of about 200 werst, (115 English geographical miles). Near the Kuban it is met with, in swampy places, all the year round. In the country of the Abazechians (Abchasians?) it repairs to the mountains in summer, and is then frequently killed by the

Psoehs and other Caucasian tribes. Late in autumn it descends from the mountains, to visit the pastures in valleys never yet trodden by the foot of any European, except prisoners of war. It is particularly numerous in the district of Zaadan. Lieutenant Lissowski, who studied at Wilna, and possesses a perfect knowledge of the zubr of Lithuania, assured me at Bambori, that the latter animal was *not very* different from the aurochs of Caucasia."—May, 1838.—*Weimar, May* 16*th*, 1838.

*New species of Popillia.*—Since my notes on the genus *Popillia* were read at the Entomological Society, I have met with a species totally different from any previously described, and I shall feel obliged by your inserting the following notice of it in your valuable journal.

*POPILLIA sandyx*, Newman.

Brunneo-picea, nitidissima; clypeus, prothoracis latera, et podex, purpureo-rubri; podex pilis albis bisignatus; elytra striata, utrinque prope suturam profundè foveata. Corp. long. .35 unc. lat. .25 unc.

*Colour* brown, inclining to pitchy red, very shining; the *clypeus*, the sides of the *pro-thorax*, and the *podex*, are red, the latter has two small white spots; the legs are pitchy red. *Sculpture:* head very thickly punctured; the *pro-thorax* is punctured throughout; the punctures on the sides and anteriorly are closer together, and also deeper, than those on the disk; the *scutellum* is deeply punctured at the base, but is nearly without punctures at the apex; the *elytra* are irregularly punctate-striate; on each is a deep *fovea* near the suture, just below the *scutellum*.

This species inhabits the island of Sumatra, whence I believe it was brought to this country by the late Sir Thomas Stamford Raffles. There are three specimens in the cabinet of the Zoological Society, of London.—*Edward Newman.—Leominster, May* 26*th*, 1838.

*At a Meeting of the Entomological Society on the 4th of* June, Mr. Westwood exhibited a series of drawings in illustration of the natural history of a species of saw-fly, which resides, in the *larva* state, in galls upon willow trees, (*Nematus Gallicola*, Westw.); and of *Balaninus Salicivorus*, which is also a resident of the same galls: together with the history of a new species of *Eulophus*, which is parasitic upon the former insect, of which the following are the specific characters.

*EULOPHUS Nemati*; Westw.

*Eulophus*, aureo-viridis, alis hyalinis, antennarum flagello et tarsorum apice, nigris.

*Mas*;—pedibus albidis femoribus omnibus versus basin, abdomine nigroviolaceo interdum macula basali sub-pellucida alba: antennarum basi nigro.

*Fœm.*;—pedibus albidis, femoribus versus basin subfuscentibus, abdomine aureo-viridi, antennarum articulo basali nigro, subtùs flavo.

Variat mas pedibus obscurioribus.

Syn. *Eulophus pecticornis*, Fonscol. in Ann. Sc. Nat. July, 1832, p. 25. Nec Linn.

This beautiful species is parasitic, in the *larva* state, upon the *larvæ* of *Nematus Gallicola*, Westw. Steph.; the female piercing the gall with her ovipositor, in order to lay her eggs in the centre, where the young *larva* of the *Nematus* resides.

*Gynandromorphous* Hymenopterous Insects.*—In the last number of Mr. Curtis's 'British Entomology,' (June, 1838, pl. 632), is figured an interesting specimen of the common *Tenthredo angulata*, the right hand half of which is feminine, and that on the left masculine, with this observation.—"Never having seen any other hymenopterous insect of this kind, I have been induced to figure the *Tenthredo* in the annexed plate: and as the sexes vary in the colour and markings of the *abdomen* &c. they are rendered conspicuous in the figure." It is indeed only very recently that gynandromorphites have been discovered in this order of insects, none being recorded in Burmeister's 'Manual,' but there are now several on record. The Baron de Romand has figured a gynandromorphous specimen of *Scolia 6-maculata*, Fabr. ('Ann. Soc. Ent. de France,' 1835, pl. 4, C.); M. C. Wesmael has figured a double-sexed *Ichneumon*, in which the anterior portion of the body is that of *Ich. extensorius* female, and the posterior part of the body that of *Ich. luctatorius* male, thus proving that these supposed species are but the sexes of one. ('Bull. Acad. Bruxell.' 1836, No. 10). Mr. F. Smith captured a singular double-sexed specimen of *Anthophora retusa*, of which he has communicated a drawing to the Entomological Society, and which Mr. Shuckard has noticed in the 'Entomol. Magazine' for July, 1836; in which he also mentions a specimen of *Cimbex Griffinii*, having the left anterior leg only, female; and a specimen of *Andrena fulvescens*, in which the sexual characters are intimately intermingled.—*J. O. Westwood.*

*Mr. Newman's Remarks on the Antennæ of Insects.*—I was amused, a few years ago, by observing the operations of wood ants, (*Formica rufa*), passing up the trunk of a fir tree in considerable numbers. I kicked the tree, and instantly, as if by enchantment, every vagrant ant suspended its operations, and fantastically leaned forward with the *antennæ* por-

* M. Lacordaire has proposed this term for monstrosities in which the sexes are unnaturally blended, retaining that of hermaphrodites for those which are naturally double-sexed, as the *Mollusca*.

rect, as though they were listening to discover the cause of the annoyance:—there was as much uniformity of posture as in a company of soldiers at their exercise. In a few seconds they resumed their avocations, and "caressed" each other as they passed on their upward or downward progress. I repeated the blow;—they assumed the same posture as before; and this incident, simple as it may seem, led me to believe that they were possessed of the power of distinguishing sound.

A short time since I placed a *Necrophorus Humator* under a wine-glass, about noontide; it soon became quiet in its prison, and the plates forming the club of the *antennæ* closed. A few minutes afterwards, raising the glass and suspending it about half an inch above the insect, I struck the edge with my penknife; the *antennæ* were then moved about with rapidity, the club dilated, and the insect sought to make its escape; thus evincing that it was conscious of the sound produced, and also partly indicating that its *antennæ* were the organs by which the sound was conveyed to the brain.

So far anecdotal inference, but we will proceed to test our deductions by an appeal to fact. Mr. Newman says these "cranial feelers" are "SOLID." The instant I read the passage proof was at hand. Taking one of these "tactors" from the head of a *Trichiosma Lucorum*, I cut it into two parts with a pair of fine scissors; placing the lower portion under a manifier, I found it HOLLOW,—I COULD SEE DOWN IT AS A TUBE.—Increasing the magnifying power by adding another glass, and afterwards a third, the fact became more apparent. I then proceeded to examine in succession, several insects, among which I may mention *Phryganea grandis*, *Silpha opaca*, *Geotrupes stercorarius*, *Dyticus marginalis*, *Gomphocerus bigustatus*, *Creophilus maxillosus*, *Bombus terrestris*, *Pontia rapæ*, &c., and in every instance the *antennæ* were hollow in the centre. Being so far satisfied with my test, I imagined it better to proceed to dissection. Taking a head of *Carabus nemoralis*, I remeved the lower part; then extracted the first ganglion as far anteriorly as possible, without destroying the muscles connected with the *antennæ*. On taking away the upper jaws, the power of the organ was perceptible, and beautifully distinct. There was a hollow distended fibre, the *tympanum*, at the base of the *antennæ*, connected with nerves that unite in the principal ganglion, or nervous centre,—the brain, or *focus* of sensation;—the auditory nerve expanding from the *tymprnum*, penetrating and lining every annulation of the *antennæ*, from the base to the apex. Was this an optical deception ?—a *phantasmagoria?* No! It is a fact, to shiver to atoms the delusions of theorists. Numerous other insects were subjected to the same trial; and in every one of them an auditory mechanism is manifest; this we may all confirm by examining for ourselves.

During the investigation appearances presented themselves from which I think I shall be able to prove to Mr. Newman, that even *if* there be no communication directly with the atmosphere, the *structure* of the *antennæ* is of the very best possible kind, for the creatures possessing them to use as organs of hearing. At my leisure I shall resume the enquiry, and either make the result public, either through the medium of your pages, or by some other convenient channel. In my next I shall point out the method by which I proceed, and illustrate it with outline sketches. But the subject is of so much importance to zoologists, that I deem it better not to postpone this notice of it.—*Leonard W. Clarke, Hon. Entomological Curator to the Birmingham Royal School of Medicine, &c.*—*June 9th*, 1838.

*Adult plumage of the female Smew.*—Your correspondent Mr. Skaife is mistaken in supposing his female smew, (p. 331), to have attained its mature or final livery.

Great numbers were brought last winter to the London markets; but during the severe weather, none occurred in the state of plumage of his specimen, which is the second dress of the species, and common to both sexes. In their first garb —that which immediately succeeds the down,—the feathers are of looser texture, and the tertiaries, (I perceive in some that have not quite completed their moult), have conspicuous terminal pale spots: this first change is mostly perfected, however, before their arrival, and in ordinary winters, the majority of specimens occur in the garb of the first winter, which remains till the succeeding autumn: the males then acquire their elegant brilliant white livery, and the females that correctly figured by Mr. Gould, wherein the markings of the wing become purer and better contrasted, and the black on the sides of the face is assumed invariably. I have seen a dozen females together, all in this state of plumage.

As in many other birds, the adult smews are commonly seen in pairs, and are more shy and difficult to procure than immature specimens. Hence it is, that the old females are not commonly obtained; for when a pair of the adults have been approached within gun-shot, the superior beauty, size, and conspicuousness of the male, are sure to engross the attention, so that his mate escapes on almost every occasion.

*Pomarine Skua*: (p. 338).—A very considerable number of birds of this species, both alive and dead, were brought to the London markets during last November: all in their first plumage, which is retained till the second autumn. Most of these were procured on the eastern coast; but they likewise occurred on the southern, and rather plentifully in Devonshire.

*Native Woodcocks.*—In reference to the remarks of W. L. (p. 348), I have to observe, that it is a general law for the young of migratory birds to return to the place of their nativity: from which I inferred that the increasing number of woodcocks which now propagate in Britain, is owing,—not to there being more wounded birds than formerly, (which appears to be his apprehension of my meaning),—but to the presumed circumstance of our home-bred woodcocks being the posterity or multiplying descendants of wounded birds in the first instance, which would pass the winter further to the south.—*Edwd. Blyth.—June 5th*, 1838.

*Observations on Chrysosplenium alternifolium.*—Since the publication of my 'Flora of the Neighbourhood of Reigate,' I have had the gratification of seeing this rather rare species growing in that neighbourhood, in greater profusion and luxuriance than I had ever before witnessed; and having made a few observations upon it, in what may truly be termed my "*Horæ Botanicæ Subsecivæ*," I have here strung them together, in the hope that even if they offer nothing new, they may at least afford a little amusement to some of the readers of the 'Magazine of Natural History.'

The locality is an alder copse, on a rich, black, boggy soil, forming part of 'the Moors,' at Littleton, near Reigate Heath; *Corydalis claviculata* is plentiful on the trees in the northern part of the copse, while *Rubus idæus* and *Cardamine amara* abound in the southern portion. This part of the copse is intersected by a small rivulet, on the banks of which, and in various other parts of the copse, are numerous large patches of *Chrysosplenium oppositifolium*, in a very luxuriant state, owing to the richness of the soil. Many of these patches are thickly studded with *C. alternifolium*, considerably overtopping its more common congener, and rendered very conspicuous by the pale hue of the whole plant, but more especially by the bright yellow-green colour of the upper leaves, and the pale yellow flowers, contrasting with the much darker green of *C. oppositifolium*. There is indeed a most striking difference even in the colour and general aspect of the two species; but this difference is quite the reverse of what is stated in both Smith's and Hooker's Floras, where *oppositifolium* is said to be the paler plant, which it may be in some situations. But the specific distinctions are greater than the difference of colour, and are much more striking, even at first sight, than are exhibited by the figures of the two plants in 'English Botany.' That of *C. alternifolium*, *tab.* 54, (plate 593, second edition), conveys but a very imperfect idea of this really elegant plant, and must have been drawn from a miserable stunted specimen, or from an unusual variety. In all the specimens of *C. alternifolium* which I have ever seen, (and they have not been few) the lower leaves are truly radical, and on *very* long, slender, footstalks, as correctly described in the Floras above mentioned; indeed, the footstalks are hardly ever shorter than half the height of the stem, which is generally *slightly* decumbent at the base, but always perfectly erect in the upper part, and usually bears two, and sometimes three, alternate leaves, while several others are crowded under the terminal, corymbose, flowers. In the figure, the lower leaves can scarcely be called *radical*, and are represented as on very short petioles.

That the greater length of the petioles of the radical leaves in my specimens from the above locality, is not occasioned by the rich nature of the soil in which they grew, may, I think, be inferred from the fact, that the length of the footstalks of these leaves bears the same relative proportion to the height of the stem, in very weak specimens in my *herbarium*, which were collected in another locality where the soil is not so rich and rather stony.

Sir J. E. Smith observes that the leaves "are rough on both sides with scattered, tubular, jointed hairs;" this I have observed to be the case with the radical leaves only, those on the stem being perfectly smooth on both sides.

I have not been able to find the early, central flower otherwise than four-cleft and octandrous, in any of the specimens which I have examined; and the character of the central flower being five-cleft and decandrous appears to be by no means constant in either of the species.

I cannot feel quite satisfied as to the propriety of including this genus in the natural family *Saxifrageæ*, although it is undoubtedly very closely allied to the rather heterogeneous genus, *Saxifraga*; but on this point I do not at present feel competent to offer an opinion.

I may add that the figure of *Chrysosplenium alternifolium* in 'Flora Danica,' *tab.* 366, is tolerably expressive of my plant, as is the figure of Petiver, 'Hortus Britannicus,' *tab.* 6, *fig.* 10. The other figures quoted by Sir J. E. Smith in his 'English Flora,' I have not yet had leisure to examine.

I shall feel grateful to any botanist who will be kind enough to inform me, through the medium of this Magazine, whether

*Chrysosplenium alternifolium* be much subject to variation, and if it be frequently met with in the state figured in 'English Botany.'—*G. Luxford.—London, May 3rd*, 1838.*

*Plumage of the Smew.*—A correspondent in your last number, in his remarks on the smew, expresses a doubt respecting the female of that bird possessing the black mark round the eye, and supposes the birds so marked, to be young males; from my own observation I am able to say, that young males obtain this mark, some time previously to their assuming the adult garb. I can with confidence assure you, that the adult females also possess this mark. During the past winter, I collected upwards of twenty smews, and I can safely say that I have examined four times that number, the greater part of which were young birds; out of the twenty collected by me, nine were adult males, and four adult females. That the sex of these birds, as well as of the other species of *Merganser* common to this country, is easily ascertained without dissection, will be admitted by all who are aware of the different forms of the *trachea* or windpipe. On passing the thumb and finger along the throat of the male birds, a considerable enlargement will be felt about the centre; but in the females, the *trachea* is simple throughout. Notwithstanding this, I invariably dissect all the specimens I obtain, and in every instance have found the above statement to be correct. I have now before me two females, possessing the black mark; in one it is much more distinct than in the other. That which is the most distinctly marked is the oldest bird; the tip of the bill being much more hooked, and the crest feathers of a darker colour, and much longer; the white markings on the throat and wings are also more distinct, and the back darker. —*A. D. Bartlett.—47, Museum Street, June 20th*, 1838.

* Since writing the above, I have met with the following passage in an interesting article on the Natural History of Lexden [near Colchester] and its neighbourhood; signed J. G. 'Magazine of Natural History,' Vol. vii., p. 18. The description would almost serve for the locality at Littleton.— "The boggy ground, in which the springs have their rise, is covered with alders, and produces much that is interesting to the botanist. The raspberry, (*Rubus idæus*), abounds in it, and, when the fruit is ripe, presents a temptation to venture on the soft and treacherous soil. In spring, the brilliant *Chrysosplenium oppositifolium*, with its yellow flowers and shining foliage, forms large beds of green and gold; the lowly wood-sorrel, (*Oxalis Acetosella*), hangs its pale and modest head beneath the stumps of the decayed alders;" &c.

# THE MAGAZINE

# NATURAL HISTORY

## AUGUST, 1838.

Art. I. *Observations on some of the Domestic Instincts of Birds.* By The Rev. Dr. Brehm, of Renthendorf, in Saxony.*

Birds present in their habits an interesting feature which distinguishes them from almost all other animals, viz., that most of them not only live in *monogamy*, but *in a union which ends only with the death of one of the parties*.† Moreover, the union of birds is distinguished by the circumstance, that *the males of almost all the species living in monogamy, interest themselves in their progeny*, whereas in the *Mammalia*, man alone excepted, it is only the female who takes charge of the young. This is partly a natural consequence of their being suckled by the female parent; but even after they have been weaned, the dam alone feeds or guides them, whereas the male does not even know or acknowledge his progeny.

In the lower animals, both vertebrated and invertebrated, even the female is released from the obligation of taking care of her offspring from the time that they are separated from her, except in those insects which form well-regulated societies, where the progeny are the objects of particular attendance. Faber states that the male of the *Cyclopterus lumpus* squats down near the eggs and eyes them with great satisfaction; but this dwindles into insignificance in comparison with the care which the males of most species of birds bestow on their progeny.

* Read before the German Natural Philosophers and Physicians, assembled at Jena, in the autumn of 1836. Communicated by Dr. Weissenborn.

† Among butterflies there is a Mexican species, the *Papilio Teucer*, which lives in monogamy, according to the statement of Mr. Friedrich, of Altenburg; a condition not otherwise observed in Lepidopterous insects.

This care is evinced about the period when the building of the nest begins; for *it is the male that maintains, with great obstinacy, the place where the nest is to be constructed.* This has been ascribed to the jealousy with which they assert their rights as legitimate husbands; and it is true that the male birds of many species do not tolerate any of their own species and sex within a certain district; but the females are never seen to contend for the building place as the males do.

A starling had this year built its nest in a box, fixed on a tree near my house. The young had scarcely left it, when a couple of house-sparrows, who had before made several vain endeavours to build in the same box, took possession of it. A few days after, the young starlings being so far advanced that they no longer required the incessant attention of their parents, the latter appeared again, and dislodged the sparrows; but only the males fought. The male starling cleared the box of the feathers carried there by the sparrows, and by making use of both beak and wings, drove the vociferous cock sparrow to a good distance from the box. On the third morning the hen sparrow had laid an egg in the box; the male starling arrived, entered the box, brought out the egg in his beak, and dropped it. The cock sparrow now, for the first time, furiously attacked the starling, but was so ill received that it made a precipitate retreat. After this the starling no longer disputed the place with the sparrows, which built in the box and reared their young. In a similar manner are conducted all struggles for building places; the males fight it out, while the females remain passive spectators.

I shall now treat on birds of prey. We as yet know too little of the genera *Cathartes*, *Sarcorhamphos*, *Gypogeranos*, and *Vultur*, to be able to state anything satisfactory with regard to the manner in which the males behave to their progeny. As to *Gypaëtos*, we are likewise deficient in good observations. With reference to the eagle, however, we are better informed. The great sea eagles, for instance, hover *in pairs* over their eyries, and both parents take a share in rearing their young. Nay, the male feeds and guides them, in common with the female, after they have left the nest, until they can provide for their own subsistence and safety.—The same applies to the true eagles, (*Aquila*), and the river-eagles, (*Pandion*). The serpent-eagles and rough-legged buzzards, (*Circaëtos* and *Archibuteo*), probably behave in the same way. As to the true buzzards, (*Buteo*), I may refer to numerous observations of my own. The male not only feeds the female while she is sitting, but takes care of the young with great fondness.

In 1834 I found a nest of the species called by me *Buteo medius*, not far from Renthendorf. The male paid great attention to the female as long as she was sitting, but after she was able to take longer flights from the nest, he did not trouble himself much about the young, there being but one, which was reared without difficulty by the dam. The female was shot on the 4th of June, in the afternoon. We waited two hours for the male, but he did not make his appearance until early next morning, when, as I was watching under the tree, he flew screaming through the neighbouring part of the forest and was shot. The young one was taken from the nest; it had not been fed that morning. The male's affection for it had not induced him to brave the danger.

In the same year a pair of the *Buteo murum*, Brehm, bred near Auma. The male not only fed the female while sitting, but the young also when hatched. The female being shot, the male came directly to the nest, and was also killed.

A third pair of the same genus, the *Buteo septentrionalis*, Brehm, bred near Weida; the male was as assiduous as the female in rearing the young, and both parents were taken in a net on the nest.

The male of the honey-buzzard, (*Pernis*), presents the only instance known among birds of prey, of not only assisting the female in rearing the young, but *also in hatching*. They relieve each other regularly. Mr. Mädel of Gotha shot a male upon its eyrie, and found that it had been sitting upon the eggs. I lately obtained an uncommonly large specimen during the breeding season, which was so bare on the abdomen, that at first sight I thought it was a female, presenting the colours of the male; but on dissection I found it to be a male As far as I know the sub-genus *Pernis*, which is so remarkable in other respects, is the only instance among the whole order of birds of prey in which the males hatch. I need scarcely observe after this, that these males are likewise very eager to supply their young with food, such as the *larvæ* of wasps, caterpillars, chaffers, and other insects, as well as with frogs and mice. I think it also very probable that this kind of food undergoes a previous preparation in the craw of the male, as it does in that of the female, before it is presented to the young.

The male of both the russet and blackish-brown species of *Milvus*, Briss. behave to their progeny like other birds of prey; but they show such caution in the exercise of their parental affection, that when they apprehend any danger, they will soar over the eyrie beyond the range of guns, and let the food fall into it from that height.

The males of the noble falcons evince about the same kind of affection for their young as the hawks. That of the peregrine falcon (*Falco peregrinus*, L.), is but two-thirds the size of the female, but he feeds her whilst she is sitting, and assists faithfully in rearing the young. He clings so much to the favourite rock on which the eyrie is built, as to remain there even after the female and young have been destroyed. The male of the *Falco Æsalon*, Linn. acts in precisely the same manner; but that of *Falco Subbuteo* presents peculiar features It feeds its sitting mate, *but does not carry the food to the eyrie itself.* When it has caught a bird, it flies round and round the nest, shouting *glee, glee, glee.* Upon this the female, uttering a similar cry, leaves her eggs or tender young, flies to meet the male, and takes the prey from him, carrying it to the eyrie, there to eat it in comfort. It is delightful to observe the affectionate meeting of these noble falcons. In feeding the young the same forms are observed; the male soars round the nest with his joyous call, until the female arrives to receive the prey and carry it to the young. It is only when the female has been killed that the male extends his functions, and carries the food to the eyrie, where he often feeds the young with insects from his craw. It is also very interesting to observe how the male trains the young to hunting.—At first they are taught to seize some prey which the male presents to them when both parties are on the wing. When they are able to do this with sufficient precision, they catch dead birds &c. which the parent lets fall; and this instruction is continued until the young are skilful enough to catch living birds.

The behaviour of the kestrel, (*Cerneis*, Boje, *Falco Tinnunculus*, L.), is very different. The males of this sub-genus, like those of *Falco Subbuteo*, are so much attached to their females, that *they keep together even after the breeding season.* They migrate with their respective mates to distant countries, and return with them. During the breeding season the attentions of the male become more marked, even before the first egg has been laid. When the female is resting near the newly constructed eyrie, especially towards nightfall, the male will often carry to her a mouse &c., and in arriving he utters a very tender call, which is returned by the female. When she has begun to sit, she may safely trust to the faithful care of her mate, who never fails to provide her with choice morsels. The food which he carries to her consists chiefly of mice, (*Hypudæus arvalis*). When he arrives he enters the eyrie with great eagerness, and appears to delight so much in seeing the female feasting, that he often stays a considerable time, during which the couple exchange many tender sounds. It is only after the female is duly provided for, that the male thinks about satisfying his own appetite; and this having been done, he perches on the pinnacle of an old tower, or a neighbouring tree, to keep watch over the female. He afterwards contributes his due share in rearing the young, to which he gives the food previously prepared in his craw. There is no eyrie where there is more bustle than about that of the kestril.

As to the nests of the *Falco Subbuteo* and *Falco Nisus*, they are commonly visited by the parents only at intervals of two hours. With the kestrel the case is quite different. When the young are nearly fledged, we may see one or the other of the parents arriving every quarter of an hour. Their young are also much more clamorous than those of other birds of prey. It is true, however, that the prey which is carried to them each time, is of small size, mice being generally the largest animals they catch; they often obtain much smaller prey, as lizards, and the old ones will take the trouble to fly to the nest with no more than a grasshopper, or a caterpillar of the *Sphinx Euphorbiæ*: they are therefore constantly going backwards and forwards. On the other hand, when the young have left the nest, they require much less care than those of the *Falco Subbuteo* or *F. Nisus.*

In 1835, I shot a pair of the *Falco Tinnunculus* near their eyrie, and then sent up a man to take the young. They were however so full-fledged, that they flew away, and could not be caught. The next day I went to the spot, with a full conviction that I should be able to find them by their calling for food; but I could neither hear nor see them, though a herdsman had observed them in the thick underwood: they were afterwards seen high in the air. It may therefore be taken for granted that they had subsisted on insects &c., and trained themselves to hunting by their own unassisted exertions, which is the only example of the sort I know of; consequently their male parent, if he had lived, would have had very little trouble in instructing them. In the common course of things, however, the male, either alone or with the female, brings them out with great care, and whilst they are flying about, he is usually perched on the top of a tree, to guard them from danger, warning them, when he sees anything suspicious, by crying *glee*, *glee*, *glee*, upon which the whole family betake themselves to some safer spot.

We know nothing about the breeding of the *Falco erythropus*, except what my friend Mr. Petenye, in Hungary, has communicated to me, viz., that it constructs its nest in hollow trees, or avails itself of old magpies' nests, and that its eggs are similar to those of the *Falco Tinnunculus*. It is, therefore, impossible for me to say how the male behaves to his progeny. With the genus, (*Elanus* Sav.), we are still less acquainted. We have, however, interesting information respecting the peculiarities of the hawks belonging to the subgenus *Astur*.

The male of the species *Astur palumbarius*, *A. gallinarius*, and *A. brachyorhynchos*, appears to be altogether changed in disposition during the breeding season. At other times he is an unsociable, fierce and wary bird, evincing *no affection* for his congeners, but *great hatred against the Strix Bubo*.—During the breeding season he is quite changed. He joins his former mate, which may be concluded to be the case from the circumstance of the eyrie being always built in the old place),* and becomes extremely tender and attentive to her. Though the male is but half the size of the female, he supplies her with food while she is sitting, and assists her in rearing the young. At that time a pair of hawks becomes a real nuisance to the neighbourhood. The philoprogenitiveness of the little male renders him bold and fearless to an astonishing degree. He catches the squirrel, without caring for its bites and scratches; he kills the well-armed jay; takes the sitting partridge from her nest; destroys young hares; and steals the young of the *Falco Nisus* and *F. Tinnunculus*! He takes the *Anas crecca* and *A. circia* from the pond, as well as the pigeon from the roof and the hen from the yard. Though so extremely wary at other times, *he will feed his young in the presence of man*, and is not even afraid of the iron trap which is set to catch him. Because the bird is so very injurious, the game-keepers are proportionably eager to destroy it. They take the young from the nest, bind them fast in the back part of a little hut or passage, which they construct of bark or branches, and set an iron trap before it. With the genus *Buteo*, the species of which are likewise very fond of their young, this method of catching the old ones does not always succeed; but with *Astur* it never fails. As soon as the young are heard calling, the old ones will alight with the prey, and one after the other is caught, as they walk fear-

*Though the translator would not invalidate Mr. Brehm's statement, taking into consideration the general habit of birds of prey to remain faithful to their former connexions, yet he must think that the reason given above does not prove anything as to the point in question. For the predilection of certain species of birds of prey, and many others, for certain breeding places is such, that the latter are always occupied by other couples, however often their predecessors may have been killed, or they themselves deprived of their young.

lessly over the trap. The male is not unfrequently caught first; and even when he has seen the female writhing in the trap, he does not hesitate to follow her example. It is wonderful, indeed, what effects love can work even in the stout heart of a hawk.

Many are the peculiarities to be observed in the three species of sparrow-hawk which are indigenous in Germany, viz. *Nisus elegans*, *N. fringillarum*, and *N. peregrinus*. Even during the breeding season, the male perseveres in that stubborn and *insidious* disposition which is peculiar to the subgenus, and which the female loses about that period. These species show a boldness when near their eggs or young, which is perfectly ridiculous. Instead of retreating when a man approaches the nest, they fly to meet him, perch before him in the most open place, and will even sometimes make a rush at the great enemy of all other creatures. On one occasion, a *female sparrow-hawk* would have taken my cap from my head if I had not parried her off with my gun. The male does not act so openly. He supplies the female with food, as long as she is sitting or warming the young; but he proceeds in a very secret manner in performing the business. It is difficult to catch a glimpse of him when carrying food to his nest; and except at that time he is not to be seen at all. When the female of other birds of prey has been scared from her eyrie, and utters her anxious call, the male appears at once, joins her in her lamentations, and is ready to do all in his power to defend their progeny. The male of the sparrow-hawk behaves in a very different way. Let the female call ever so loudly and piteously, her mate will *not* make his appearance, at least so long as the young are not far advanced in growth. I am able to bear full testimony to the truth of this, having closely watched these birds near five different nests. It is only when the young are become larger, and the parents are obliged to make unusual exertions, that the male shows himself uncommonly active. He is then heard screaming about the eyrie, and seen carrying the prey to it. Four young ones, when nearly fledged, require a daily allowance of from sixteen to twenty small birds; and one or the other of the old birds arrives at the nest with food, at least once an hour, in case the neighbourhood abounds in such young birds as have lately left their nests; whereas before, the young were fed only once in two hours. Nay, if the female have been shot, the male makes double exertions, and will himself bring from twelve to fifteen birds daily. In the last nest but one on which I made my observations, the female was killed towards night-fall, and one young bird left in the nest. About

9 o'clock next morning, the male had brought three birds, (an old chimney-swallow, a young house-sparrow, and a young black-throated stone-chat). The nearest spot where the last species is found, is about half an English mile from the nest. These three birds, which were in the nest, had been entirely plucked, and partly devoured, by the old bird; the entrails had been taken from all, and two were without their heads; the clumsy young, though almost fledged, did not know how to dispose of the remainder. Now as the male, though he carried food to the nest, did not tear it to pieces, or help his young to eat it; as, moreover, the young sparrow-hawks require a longer period to learn to eat without assistance, than other birds of prey, it is probable that they always die with hunger when the female has been shot, although plentifully supplied with food.

On an earlier occasion, I found in a nest of the sparrow-hawk, after the female had been shot, every one of the young dead with hunger, though *twenty* small birds were accumulated near them. However, the male sparrow-hawk fulfils his duty so faithfully, that he will even carry food to a *stuffed specimen* of his progeny, placed in his nest. As he does not prolong his stay there, it is long before he becomes aware of the deception.

Of the European day birds of prey there remain only the gledes, or glede-kites, on which, however, I can offer but few remarks, as they do not breed in the neighbourhood of the place where I reside.

I know that the male of the reed-kite, (moor-buzzard, *Falco æruginosus*), feeds his female whilst she is hatching, and assists her in rearing the young. This is also the case with the corn and meadow kite, (*F. cyaneus*). It is remarkable how assiduously the females of the reed-kite are courted. I know an instance in which three males were shot near the same female in two days. The male of the corn-kite appears to take great delight in hovering over his sitting mate. If, in the month of June, we see a male of that species soaring much over one particular spot, we may be almost certain of finding the nest there, in corn, grass, or low bushes. While the young are being reared, the male of the kites hunts very eagerly and boldly, often till after sunset.

ART. II. *Observations upon the Camerated Structure in the Valves of the Water-Clam, (Spondylus varius,* Sow.*).* By RICHARD OWEN, Esq. F.R.S., &c., Hunterian Professor at the Royal College of Surgeons.*

HAVING been led to reflect, while considering the uses of the camerated part of the shell of the *Nautilus*, upon the degree or extent to which that structure might depend upon the mode of growth of the animal and its shell, and how far it was a necessary physical consequence of the increase and change of position of the animal, independently of any special purpose served by the forsaken parts or chambers of the shell, I have caused sections to be made of a great variety of shells, and have examined them in the hope of arriving at the law of the multilocular structure, which results physically from the secretion, on the part of the animal, of a nacreous layer, forming a new basis of support to the soft parts, and cutting off the deserted portion of the shell from the chamber of occupation.

It is well known that this process is not the only mode adopted to suit the shell to the changing form and bulk or other exigencies of its occupant. In the genus *Magilus* the part of the shell from which the body gradually recedes is filled up by a continuous compact secretion of calcareous matter, and a solid massive elongated shell is thus produced, which would be a great incumbrance to a locomotive mollusc, but is of no inconvenience to an univalve destined by nature to exist in a fixed and motionless state, buried in a mass of lithophytous coral, with the growth of which it is compelled to keep pace.

In *Helix decollata*, again, the deserted part of the shell, after being partitioned off by the nacreous layer secreted by the posterior part of the mantle, is broken away by some yet unexplained process, and consequently no chambers nor any solid apex of the shell remains.

The retention of the deserted chambers and the interception of certain spaces of the cell by calcareous *septa*, though not unknown in the gasteropodous univalves, is more common in bivalves.

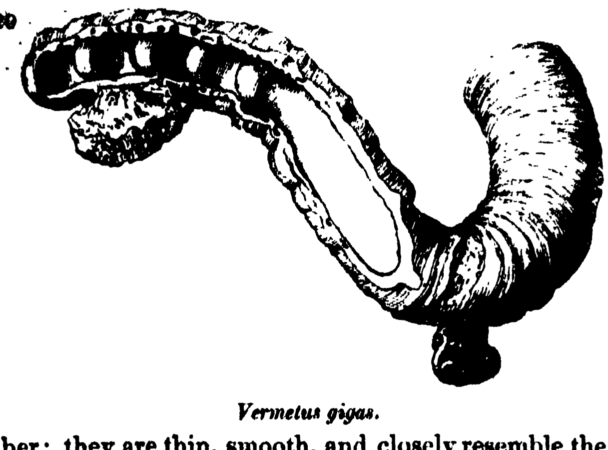
This process is generally consequent on an increase, but

* The greater portion of the present paper from Prof. Owen appeared in the Proceedings of the Zoological Society for June, 1837, but the illustrations and some additional matter have been subsequently introduced, and communicated by the author for publication in the Magazine of Natural History.—*Ed.*

sometimes on a diminution, of the body of the molluscous inhabitant. An oyster kept without food will frequently expend its last energies in secreting a new nacreous layer, at a distance from the old internal surface of the concave valve, corresponding to the diminution of bulk which it has experienced during its fast, and thus adapt its inflexible outward case to its shrunken body.

In the calcareous tube exuded from the elongated mantle of the *Septariæ*, Lam., the closed extremity of the tube is divided into chambers by a succession of calcareous layers, having a regular concavity towards the open or siphonic extremity of the shell. These concave *septa* are composed entirely of the nacreous constituent of the shell. A similar structure is met with in the genus *Vermetus*: in the specimen figured (*fig.* 20). of *Vermetus gigas*, they were six in

20



*Vermetus gigas.*

number; they are thin, smooth, and closely resemble the partitions in the *Nautilus* and *Spirula*, save in the absence of the siphonic perforation.

Among bivalves the *Ostreæ* not unfrequently present shallow and irregular empty spaces in the substance of the shell; the *Etheriæ* again have vesicular cavities interposed between the testaceous *laminæ*; but the most remarkable example of the camerated structure of the shell is presented by the *Spondylus varius*, Sow.

It was first noticed, I believe, in the present species, by Mr. Sowerby, in the 'Appendix to Stutchbury's Sale Catalogue,' but the cameration of the lower valve especially approaches so closely to that of the true polythalamous shells, that I am induced to hope that the accompanying description and figures, with the analysis of the fluid contained in the deserted chambers, may not be unacceptable to your conchological readers.

In order to examine in what manner the camerated structure of this shell was modified by the presence and progressive change of place of the adductor muscle, I had the fine specimen here represented of half the natural size, (*fig.* 21),

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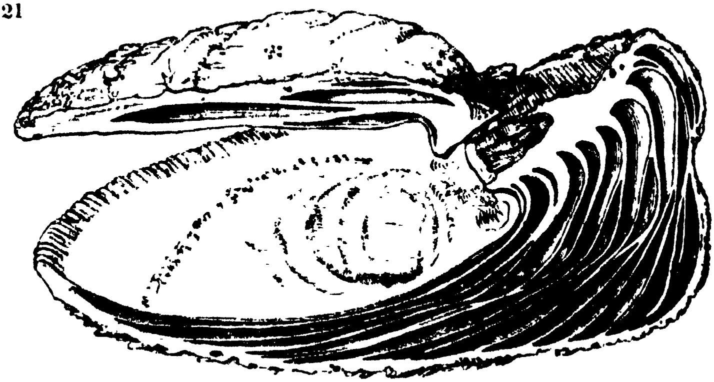

Section of *Spondylus varius.*

sawn through vertically and lengthwise. The length of the concave valve is eight inches; it is two inches one-third in thickness, and includes fourteen chambers, separated from each other by very regularly formed and stout partitions, composed, as in other chambered shells, of the nacreous portion or constituent of the shell. The *septa* are slightly undulating in their course, but present a general concavity towards the outlet of the shell Not any of these partitions are, however, continued freely across the shell, but each becomes continuous at the muscular impression, which is near the middle of the shell, with the contiguous *septa*. In general, also, the *septa* commence singly from the cardinal or upper wall of the valve, and divide into two when about one-fourth of the way towards the opposite or lower wall; the thickness of the undivided part of the *septum* being equal to, or greater than that of the two divisions or layers into which it splits.

We can readily understand why the *septa* must necessarily become united together at the point of insertion of the adductor. The muscle never quits its attachment to the valves; while the lobe of the mantle, except in its circumference, and where it is attached to the adductor muscle, must detach itself from the surface of the plate which is about to be partitioned off, when it secretes upon the interposed fluid the new partition or basis of support. It is obvious, therefore, from the conditions under which the partitions are successively secreted, that they must adhere together, not only at their circumference, which forms the outer wall of the valve, but to the preceding and succeeding *septum*, at the part occupied by the adductor muscle, and for an extent corresponding to its circumference. The progressive change in the position of this muscle by the absorption of the posterior fibres, and the addition of others anteriorly, changes in a corresponding degree the relative position of these sub-central confluent parts of the *septa*, and a beautiful undulated disposition of the whole chambered part results. If the adductor muscle were a tube instead of a solid mass, the central confluent part of the *septa* would of course be perforated, and a siphon would result, the calcareous walls of which, from the proximity of the chambers, would no doubt be continuous, as in many fossil *Polythalamous* shells.

A disposition to form chambers is manifested, but in a much less degree, in the smaller flattened or superior valve of the *Spondylus varius*. In the specimen here figured there are three chambers, with narrower intervals, and much thicker partitions than in the lower valve. These partitions are confluent opposite the muscular impression, as in the lower valve, and each partition expands from this attachment in an infundibular manner, which reminds one of the *emboitement* of the calcareous parts of the siphon in the *Spirula*.

The secreting power of the lower lobe of the mantle in the *Spondylus* seems to be greater than in the upper; it is certain at least that the abundant deposition of calcareous matter upon the margin which forms the hinge of the shell, and which is due to the part of the mantle extended behind and between the cardinal teeth, takes place almost exclusively in the lower valve: and thus the layers of nacre which are successively deposited on the cardinal margin, push forward in a corresponding degree the upper valve, leaving a heel or *umbo* behind the hinge of the lower valve. But this irregularity in the results of the secreting faculty is not attributable, as I once conceived,* to an inherent defect of power in the upper lobe of the mantle, but simply to the circumstance of the corresponding valve being free. If it were fixed by its posterior margin to a foreign body, as in the lower valve, and the same stimulus of necessity were consequently to affect the calcifying organ of the upper valve, it is highly probable that it would manifest the same activity as that of the lower valve.

* 'Proceedings of the Zool. Soc.' June, 1837.

The *laminæ*, which are deposited in a continuous series of superimposed layers at the hinge of the lower valve, are not continued in a like state of superposition throughout; they soon separate from each other, and do not again unite except at the space corresponding to the adductor muscle, and at the circumference of the valve.

The interspaces of these successive layers of the growing *Spondylus* cannot, from the absence of a medium of intercommunication, serve any purpose hydrostatically with reference to locomotion: it is a singular fact, indeed, that the structure above described is not constant in the *Spondylus varius*. I am informed by Mr. Samuel Stutchbury that it occurs only in those individuals which happen to have been developed beneath the overhanging ledge of a coral reef, or in situations where they would be liable to be overgrown by coral if they had not possessed the power, like the *Verneti* and *Magili*, of keeping their respiratory and nutritive apertures on a level with the surrounding zoophytes. A glance at the figure will show at once the process by which the *Spondylus* has, under these conditions, gained the necessary ground. It must be remembered that, like the oyster, it is attached by the exterior surface of the lower valve to some extraneous body; it has no power of locomotion; and therefore, in order to bring the margins of its mantle to the influence of light, and of the free currents of sea water, it is endowed with the power of carrying forwards its dwelling-chamber by a series of new formations. These are not, however, to be regarded as the results of a purely voluntary act, but to the inevitable obedience of the secreting organs of the shell, (as long as the animal has strength and material left), to the stimulus arising from imperfect insolation, respiration, and nutrition. The *septa* of the deserted chambers we can of course only view in the light of mere dermal *exuviæ* still left adhering to the animal, to which, being deprived of locomotion, they can be no incumbrance. It is highly probable that all the chambers are originally filled with fluid, as more or less is found in the outer ones of the specimens brought to this country.

In the *Testaceous Cephalopods* a new structure is added to their camerated shell, viz., the siphon, whereby the exuvial layers and the deserted chambers are converted into a hydrostatic instrument, subservient to the locomotion of the animal.

The fluid contained in the large specimen here described, was carefully withdrawn from the outer chambers before the section was made: and my friend Dr. Bostock, who kindly undertook a chemical examination of it, has transmitted to me the following account of the results of his analysis.

"The fluid was turbid, had an acid saline taste, and a rank disagreeable odour. After standing for twenty-four hours, it deposited a whitish curdy sediment, and became clear and transparent. The clear fluid, amounting to 54m., was poured from the sediment, and was subjected to various tests. It was neither acid nor alkaline; it produced a very copious precipitate with the nitrate of silver, indicating the presence of a large proportion of muriatic acid; the muriate of barytes indicated a slight trace of sulphuric acid, while the appropriate tests of lime, magnesia, and iodine, produced no effect. A portion of the fluid was evaporated by a gentle heat, when a quantity of crystals of the muriate of soda was obtained, amounting in weight to very nearly twenty per cent. of the fluid. After the removal of the crystals, a little brown matter was left in the capsule, but in too minute a quantity to enable me to ascertain its nature and properties, except that it was not soluble in alcohol; we may, however, presume that it gave the fluid its peculiar flavour and odour.

"It appears therefore that the fluid in question consisted almost entirely of a solution of pure muriate of soda, differing therefore, in its chemical constitution, from sea water.

"The sediment mentioned above I returned to Mr. Owen; it appeared to consist of small globular or rather pyriform bodies, probably of an organic origin."

ART. III. *Remarks on Zoological Classification.* By Sir EDWARD Ff. BROMHEAD, Bt. F.R.S. L. & E.

1. THE results obtained in an attempt to arrange the Botanical families in Alliances, and those alliances in natural sequence, without any preconceived views of dignity in structure, or any effort to crowd together families supposed by many to be related, have induced me to adopt the same principles in attempting to arrange the Zoological families.

2. It has not been presumed, that the most striking form would begin a series of structures; naturalists have usually opened with Man, the Lion, the Whale, the Eagle, the Crocodile, the Elephant, the Carnivorous *Coleoptera* or the Scorpion, though it is quite obvious that such marked forms must be gradually approached and receded from, if we expect the group to connect with any other series. Hence instead of a forced subordination of the contents of each group under its most striking and full developement, we should rather attempt

to work from such a form as a centre, in opposite directions. Mr. MacLeay has well laid down this law, and shown a tendency to re-entering or Circulating forms, and has placed the whole Animal Kingdom under five divisions:—

*ACRITA,*
*MOLLUSCA,*
*VERTEBRATA,*
*ANNULOSA,*
*RADIATA.*

The principle is undoubtedly sound, though his Quinary system may be pushed beyond its just limits, and the materials of the circle may not be quite correctly arranged.

3. It would appear moreover, that natural series do not merely tend to re-enter, but that the alliances at equal distances from two extremes, may be in some degree parallel or related to each other, as if the series rose to a certain point, and then descended at the same rate, through analogous structures.

4. In making this attempt, it was impossible to avoid reference to the shape of the developement of other organized bodies, as exhibited in the two parallel botanical races, but it was proper to renounce any expectation of finding the same number of alliances here, and also to leave it an open question, whether the zoological alliances formed one, two, three, or more independent Races. It now appears that these constitute a single re-entering race, of which the alliances at equal distances from the extreme points, offer analogies. I cannot therefore conceal from myself, that the two botanical races may also constitute a single Race, connected by the Rhizanths and some of the Endogens at one extremity, or parting in opposite directions from Fungoid structures at the other.—Such suppositions will not in any way affect the existing arrangement.

5. It was necessary in this investigation to presume the possibility, that certain great divisions recognized in Zoology, might, as in Botany, form the parallel portions of two different series. It seems however that the *Mammalia*, *Aves*, and *Insecta*, are not so divided; and the impossibility of finding four distinct points in each, by which each might connect with some other assemblage, proved their unity. On the other hand it was not difficult to see that the *Amphibia* and *Pisces* are so divisible. The Acephalous *Conchifera* and the *Mollusca proper* have been lately united, but it would appear without sufficient reason. The separation of the *Entozoa* from the *Radiata*, and the Crustaceous families from the *Insecta*

and their allies, will not appear harsh to any naturalist. The Crustaceans resume the station assigned by Aristotle.

6. It has also been necessary to keep out of sight any supposed gradation of dignity in structure; the very existence of any re-entering series forbids this, nor could our views on this point have any basis in practice beyond mere imagination.—Lamarck aims at a kind of intellectual scale, which ought to throw the dog, the elephant, and the ant into proximity, whereas intellect is a matter of very subordinate importance in mere *animal* nature. What makes such an attempt more unfortunate, is the result herein exhibited, that the zoological race not only consists of a single re-entering series, but that this series itself consists of three sub-races, each also forming a re-entering assemblage:—the *Infusoria* swell through the *Radiata* and *Conchifera* up to the *Crustacea*, and then descend through the true *Mollusca* down to the *Polypoid Molluscs;* the series then swells through certain *Pisces* and *Amphibia* up to the *Aves* and *Mammalia*, and descends through other *Amphibia* and *Pisces* down to the *Cartilaginous Fish;* the series then swells from the *Annelida* and *Myriopoda* up to the *Coleopterous Insects*, and then descends through the *Arachnida* to the *Epizoa* and *Entozoa*. For anything we know to the contrary, one structure may be equivalent to another, and a developement in one direction may compensate a non-developement in another; in Botany, a parasitic plant without leaves, may rank with others of apparent high developement. Possibly in zoological structure the whole series may be steadily rising towards an independent aeration, flight, or some other property equivalent to the apparent contraction.

7. Naturalists have been very jealous about the place of man in the system, and some have gloried in the impossibility of placing him any where. He seems to me to stand between *Pithecus* and *Troglodytes*, or between *Troglodytes* and one of the *Cebidæ*, yet to be discovered, and he seems to indicate an approach towards the plantigrade Lemurs. Let us not deceive ourselves; the importance of man does not lie in the formation of his animal structure; in this he is vastly inferior to many other animals; he is not free to use both land and water, nor has he wings, nor the relative strength of the *Termes*, nor the prodigious powers of insect leaping, nor senses as acute nor perhaps as various as many, nor the wonderful powers of manipulation in many, nor the speed of others, nor a shell or other covering for protection, nor independent powers of reproduction, nor independent existence immediately after birth, nor eyes multiplying many thousand-fold, nor independent

means of aeration, nor powers of fasting, nor powers of reproducing limbs. An imaginative person would rather say, that animal nature having left him in many points weaker than others, has in pity given him Reason, to preserve his continuance in creation; imagination would also point to the more perfect insect forms higher in the scale of developement, and to their metamorphosis, as shadowing his condition. It must be admitted, that I expected to find Man in the middle of the animal series, and in the middle of his alliance; it appears however that his dignity is not animal but moral, an immortal Being waiting a change of body and form and powers.

8. I could have wished to avoid the question of a Quinary principle in nature; it is not sought after in the general series, and it is left for others to subdivide the three fundamental subraces, as they please, by breaking down the two extremities of the *Vertebrata* into two supplementary divisions, or otherwise working out their favorite principle. In the alliances a quinary plan is adopted for these reasons:—I found a tendency of this nature in the botanical alliances, and adopted it after a prejudice against it; I have found a similar tendency in Zoology, and have also found it convenient in practice; from natural causes, or from the industrious leaning of zealous disciples, quinary assemblages have very frequently offered themselves ready formed. Possibly nature may not have any defined law in the relative dignity of these subdivisions, nor any uniform scale of rank, and in such case the leaning to any uniform system, even artificial, may tend to prevent wide deviations and inequalities. The alliances were first assembled in groups according to recognized divisions, and have been gradually worked to the present quinary shape, as offering, on the whole, least violence to nature, and as the most convenient artificial plan provisionally.

9. I cannot refer to Mr. Swainson's families of Birds so freely as I have done, without noticing the principle of Representative forms, which he most ingeniously attempts to trace through all zoological nature. If we are justified in conceiving an ideal fundamental form, out of which all animals may be supposed to be constructed by various degrees of developement in the different parts, it is also quite conceivable and not improbable, that five or any other definite number of primary divisions, may arise from the whole force of developement being thrown successively on such five or more fundamental divisions of the ideal elementary structure. It is also quite conceivable, that each of these primary divisions may

contain subdivisions, distinguished from each other by a successive leaning towards developement in the direction of the same elementary structures, nor need there be any limit to the downward operation of such a principle. On the other hand, I do not see any reason whatsoever for expecting that in each sub-division, and in each department of such sub-division, the same *order* should be always followed, and that the force of developement should *always* fall in one unvarying succession upon each of the supposed elementary structures.

10. This research confirms many analogies suggested by ingenious writers, such as those between *Bivalves* and *Diptera*, and between *Arachnida* and certain *Radiata*. An established linear series checked by a parallel series would by gradual progress and comparison of structure, settle many such doubtful points of organization and function. The Table also confirms the suggestion of a late writer, as to the zoological series passing in opposite directions from the *Simiadæ*.

11. The botanical arrangement is exceedingly more difficult than the zoological. Though in Botany some kind of approach has been made towards definite limits of families, a work most imperfectly performed in Zoology; yet on the other hand, in Botany no great recognized natural groups were to be found till very lately, beyond the Cryptogamous, Monopetalous, and Endogenous structures, so that families had to be separately weighed from every possible quarter. In Zoology, the leading structures are much more distinctly marked, except perhaps in the *Aves* and *Pisces*, and even these have, in some degree, passed satisfactorily through the hands of Swainson and Cuvier.

12. The limits of the alliances are not always very definite, and some of them may hereafter require consolidation or subdivision. I have endeavoured to use, as a sort of scale, some obvious natural assemblages, apparently of this sort, such as the *Pachydermata*, *Ruminantia*, *Raptores*, *Natatores*, *Grallatores*, *Chondropterygii*, *Malacopterygii*, *Abdominales*, *Myriopoda*, *Orthoptera*, *Neuroptera*, *Lepidoptera*, and *Echinodermata*. I have also been aided by the presumed parallelism of the alliances at equal distances from the extremities of the series; without such reference to the Crustaceous alliances, it would scarcely have been possible to surmise the comparative rank of the groups in the *Insecta*, and the matter will after all require steady re-examination.

13. The want of some such work as Dr. Lindley's Natural System, puts me under a difficulty in indicating the limits of

the families, of which some few only are my own. Since however each family is named from a genus, the reader will understand it as applying to the usual division containing it, limited by the families between which it stands, and without any reference to the dignity claimed for such divisions by naturalists. I shall hereafter refer to the principal authorities which I have followed. Recognized divisions above families are indicated by a semicolon.

14. I have followed botanists in introducing a uniform termination, for all the zoological families; there is a tendency to use the termination in *dæ*, and it is here made general. — Genera ending in *a* are formed in *adæ;* in most other cases they are formed in *idæ*, except to avoid a termination in *iidæ;* and finally the names are formed from the nominative, where an ambiguity might otherwise be thrown on the generic name. I have also, as in botany, adopted the termination in *ales* for the Alliances, throwing aside entirely all characteristic names. By this very necessary change the memory is unloaded from an incredible number of harsh compounds, perpetually changing, often inaccurate, and often hostile to natural distribution. The use of a generic name for families and alliances, is moreover a direct aid to the memory, and frequently, as has been justly observed, harmonizes with the limits and names of the ancient genera.

15. A table such as this proposed, cannot safely make any pretension to precision in the details, nor will its value at present consist in that. It must require for a long period, many corrections as to the limits of families, their place in the alliance, and the limits of the alliances themselves, and their immediate succession, before the full benefit can be derived from an improved nomenclature, a systematic grouping of families, and a uniform scheme of complete continuous developement through all animal organization.

*a.* Monadæ, cyclidiadæ, AMŒBADÆ; enchelydæ, tracheliadæ,
*b.* Kolpodadæ, vorticelladæ; FLUSTRADÆ, milleporadæ, alcyonelladæ;
*c.* Hydradæ, plumatelladæ, SERTULARIADÆ; gorgoniadæ, coralliadæ
*d.* Ammotheadæ, pennatuladæ; MADREPORADÆ, zoanthidæ, actiniadæ;
*e.* Asteriadæ, encrinidæ, ECHINIDÆ, spantangidæ, holothuriadæ;

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*f.* Physaliadæ, physsophoradæ, MEDUSADÆ, dipyadæ, pelagiadæ;
*g.* Pyrosomadæ, botryllidæ, ASCIDIADÆ; salpadæ; linguladæ;
*h.* Pectenidæ, ostreadæ, AVICULADÆ, pinnadæ, arcadæ;
*i.* Mytilidæ, unionidæ; TRIDACNADÆ, cardiadæ, pholadæ;
*j.* Tubicinelladæ, balanidæ, PYRGOMADÆ; anatifadæ, cineradæ;

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*k.* Maiadæ, canceridæ, GECARCINIDÆ, calappadæ, corystadæ;
*l.* Dromiadæ, raninadæ, HIPPADÆ, paguridæ, porcellanadæ;
*m.* Scyllaridæ, astacidæ, PALÆMONIDÆ; mysidæ, squilladæ;
*l.* Caprelladæ, cyamidæ; HYPERIADÆ, gammaridæ, corophiadæ;
*k.* Byporidæ, cymothoadæ; SPHÆROMADÆ, idoteadæ, asellidæ;

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*j.* Oniscoiadæ; cyclopidæ, CYPRIDÆ; limnadiadæ, branchipodidæ;
*i.* Limulidæ; argulidæ, CALIGIDÆ, cecropidæ, dichelestiadæ;
*h.* Calymenidæ, asaphidæ, OGYGIADÆ, paradoxididæ, agnostidæ;
*g.* Patelladæ; phyllidiadæ; HALYOTIDÆ, fissurelladæ; calyptæadæ;
*f.* Conidæ, volutadæ; BUCCINIDÆ, muricidæ, strombidæ;

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*e.* Trochidæ, turbinidæ, MELANIADÆ, janthinadæ, neritadæ;
*d.* Orthoceratidæ, lituoladæ, ORBICULINADÆ, milioladæ, rotaliadæ;
*c.* Bulladæ, aplysiadæ; LIMACIDÆ, helicidæ, planorbidæ;
*b.* Nautilidæ, ammonitidæ, ARGONAUTADÆ, octopodidæ, sepiadæ;
*a.* Tritoniadæ, glaucidæ; PNEUMODERMONIDÆ, hyalæadæ; pterotracheadæ;

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*aa.* Trichiuridæ, xyphiadæ, SCOMBERIDÆ, chætodontidæ, smaridæ,
*bb.* Sparidæ, sciænadæ, SCORPÆNADÆ, mullidæ, percadæ;
*cc.* Tetraodontidæ, balistidæ; SYNGNATHIDÆ; fistulariadæ, labridæ,
*dd.* Acanthuridæ, anabantidæ, MUGILIDÆ, blenniadæ, lophiadæ;
*ee.* Sirenidæ, ranadæ; TRIONYCIDÆ, testudinidæ; ornithocephalidæ;

*ff.* Alcadæ, colymbadæ, ANATIDÆ, pelecanidæ, laridæ;
*gg.* Rallidæ, tantalidæ, SCOLOPACIDÆ, charadriadæ, ardeadæ;
*hh.* Gypogeranidæ, vulturidæ, AQUILADÆ, buteonidæ, strigidæ;
*ii.* Caprimulgidæ, hirundinidæ, MEROPIDÆ; trochilidæ, meliphagadæ;
*jj.* Sylviadæ, muscicapadæ, MERULADÆ; corvidæ, fringilladæ,

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*kk.* Musophagadæ, bucceridæ; RHAMPHASTIDÆ, psittacidæ, cuculidæ;
*ll.* Columbadæ, phasianidæ, TETRAONIDÆ, otidæ; struthionidæ;

*aaa.* Cysticercidæ; tæniadæ, TETRARHYNCIDÆ; polystomadæ, fascioladæ,
*bbb,* Echinorhyncidæ; strongylidæ, LIORHYNCIDÆ, cucullanidæ, ascaridæ;
*ccc.* Ichthydiadæ, megalotrochadæ, FURCULARIADÆ, rotiferidæ, brachionidæ;
*ddd.* Planariadæ, lernæadæ, LERNEOPENNADÆ, lernentomadæ, lerneopodadæ;
*eee.* Oribatadæ, acaridæ, GAMASIDÆ, hydrachnadæ, trombidiadæ;

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*fff.* Salticidæ, araneadæ, MYGALIDÆ; scorpionidæ; pycnogonidæ;
*ggg.* Hippoboscadæ; muscadæ, ŒSTRIDÆ, conopsidæ, syrphidæ;
*hhh.* Empidæ, asilidæ, TABANIDÆ; tipuladæ, culicidæ;
*iii.* Pterophoridæ, papilionidæ, SPHINGIDÆ, bombycidæ, tineadæ;
*jjj.* Phryganeadæ; termitidæ, MYRMELEONIDÆ; ephemeradæ, libelluladæ;

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*kkk.* Acridiadæ, locustadæ, GRYLLIDÆ; phasmadæ, blattadæ;
*lll.* Forficuladæ; staphylinidæ, OXYTELLIDÆ, tachinidæ; pselaphidæ;
*mmm.*Mastigidæ, silphadæ, DERMESTIDÆ, byrrhidæ, histeridæ;
*lll.* Copridæ; trichiadæ, MELOLONTHADÆ, scarabæidæ; lucanidæ;
*kkk.* Cicindeladæ, brachinidæ, CARABIDÆ; dytiscidæ, gyrinidæ;

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*jjj.* Hydrophilidæ; elateridæ, BUPRESTIDÆ; cleridæ, lampyridæ;
*iii.* Cantharidæ; tenebrionidæ, DIAPERIDÆ, cisteladæ, œdemeradæ;
*hhh.* Curculionidæ, scolytidæ, CUCUJIDÆ, cerambycidæ, sagradæ;
*ggg.* Chrysomeladæ, erotylidæ; COCCINELLADÆ, lycoperdinadæ; stylopsidæ;
*fff.* Tenthredinidæ; ichneumonidæ, FORMICADÆ, vespadæ, cynipsidæ;

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*eee.* Aphidæ, coccidæ, CICADADÆ; notonectadæ, cimicidæ;
*ddd.* Pulicidæ; pediculidæ, RICINIDÆ; poduradæ, lepismadæ;
*ccc.* Iulidæ, polyxenidæ; SCUTIGERADÆ, scolopendradæ, cryptopidæ;
*bbb.* Peripatidæ; nereidæ, EUNICEADÆ, aphroditadæ; sipunculidæ;
*aaa.* Serpuladæ; arenicoladæ, LUMBRICIDÆ; hirudinidæ; gastrobranchidæ,

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*aa.* Petromyzidæ; squalidæ, RAIADÆ; chimæradæ, acipenseridæ;
*bb.* Siluridæ, salmonidæ, CLUPEADÆ, cyprinidæ, esocidæ;
*cc.* Morrhuadæ, soleadæ, CYCLOPTERIDÆ; murænadæ, gymnotidæ;
*dd.* Cæciliadæ, coluberidæ, ANGUINIDÆ; scincidæ, chamæleonidæ,
*ee.* Geckoidæ, iguanadæ, LACERTADÆ, crocodilidæ; ichthyosauridæ;

*ff.* Delphinidæ, balænadæ, MANATIDÆ; phocadæ; lutradæ,
*gg.* Musteladæ, felidæ, CANIDÆ; melesidæ; soricidæ;
*hh.* Vespertilionidæ; simiadæ, HOMINIDÆ, cebidæ, lemuridæ;
*ii.* Didelphidæ; caviadæ; CASTORIDÆ, sciuridæ; kanguridæ;
*jj.* Moschidæ, cervidæ, CAMELIDÆ, bovidæ, antelopidæ;

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*kk.* Anoplotheriadæ, equidæ, ELEPHANTIDÆ, suidæ, hyracidæ;
*ll.* Bradypodidæ; dasypodidæ, MYRMECOPHAGADÆ; echidnadæ, ornithorhyncidæ;

*(To be continued)*

*Thurlby Hall, Lincoln.*

*June 13th,* 1838.

## Art. IV. *Analytic Descriptions of the Groups of Birds composing the Order Insessores Heterogenes.* By Edward Blyth, Esq.

### No. II.—*Systematic Analysis of the Series. Characters of the Motmots.*

In my contribution to the 'Magazine of Natural History' for June last, I specified the various groups of birds which were there brought together (provisionally) under the term *Heterogenes;* and I mentioned a few of their more prominent mutual differential characters. Since then, in a general arrangement of the class read before the Zoological Society, I have endeavoured, by proposing divisions of several degrees of value, to reduce this difficult series to something like order: and have also, while retaining the same ordinal groups which have been indicated in the foregoing numbers of this Magazine, been induced to make an alteration in their nomenclature, by transferring to the divisions of this degree of value, the uniform termination *ores;* whence the *Rapaces*, *Heterogenes*, and *Cantrices* of my previous communications may now be respectively designated *Raptores*, *Strepitores*, and *Cantores*, the parrots being furthermore detached from the second of these, and styled, exclusively, *Scansores*.

Accordingly, therefore, the immense division *Insessores* of the quinary classification may be dismembered into three separate orders, each of which is invariably distinguished by a very distinct structure of the organ of voice, in addition to other peculiar characters. The names *Strepitores*, (screechers), and *Cantores*, (warblers or songsters), have reference to the conformation of the lower *larynx*.

The parrots,—*Scansores*,—I place, for a variety of reasons, at the head of the system; preceding the *Raptores*, as among *Mammalia* the handed animals do the *Carnivora*. It is indeed remarkable, that, in both instances, the highest order should have the foot modified to act as a prehensile instrument, or *hand;* while in the typical *Carnivora*, of the class *Mammalia*, much freedom of action is continued in the anterior limb, the lion striking down his prey (if of moderate size) with the fore paw; and the *Raptores*, also, being enabled to strike out the foot, by means of which, in the great majority of instances, the prey is solely captured. There are, however, much better characters than these incidental analogies to warrant the elevated station assigned to the restricted order *Scansores:* but it will be time to treat in detail of the parrots when the *Strepitores* are disposed of.

My third order,—*Strepitores*, (that is to say, the *Heterogenes*, or those *Insessores* of Mr. Vigors's arrangement which have a simple vocal apparatus),—sub-divides into three principal groups, or *sub-orders*, which may be designated from the *prevalent* construction of the foot,—*Syndactyli*, *Zygodactyli*, and *Heterodactyli*.

The *Syndactyli* next fall into two divisions: those with the hinder edge of the *sternum* singly emarginated, only ten tail-feathers, and sober-coloured plumage,—*Buceroides;* and with a doubly-notched *sternum*, twelve tail-feathers, and generally gay plumage,—*Halcyoides*. Of groups of the next degree of value, the *Buceroides* can be resolved into one only,—*Arcuirostres*, comprising the two *families* of hornbills, (*Buceridæ*), and hoopoes, (*Upupidæ*); while the *Halcyoides* require to be divided into three,—*Cylindrirostres*, composed of the three families of bee-eaters, (*Meropidæ*), rollers, (*Coracidæ*), and kingfishers, (*Halcyonidæ*);—*Angulirostres*, consisting of the todies, (*Todidæ*), and jacamars, (*Galbulidæ*);—and *Serratirostres*, or the motmots, (*Prionitidæ*).

The *Zygodactyli* also range in two primary divisions: the first having a more muscular stomach, no *cæca*, and an accessory plume to the clothing feathers more or less developed, —*Picoides;* the second with a more lax stomach, great *cæca*, and no trace of the accessory plume,—*Cuculoides:* the former are remarkable for the length of the coracoid bones. The *Picoides* then sub-divide into *Levirostres*, or the two families of toucans, (*Rhamphastidæ*), and touracos, (*Musophagidæ*), which latter requires to be farther separated into the sub-families *Musophaginæ*, composed of the plantain-eaters, (*Musophaga*), touracos, (*Corythaix*), and nape-crests, (*Chizhæris*); and *Colinæ*, consisting of the colies, (*Colius*);—and *Cuneirostres*, comprising also two families, those of the barbets, (*Bucconidæ*), and woodpeckers, (*Picidæ*), the latter divisable into *Picianæ*, or the genera piculet, (*Picumnus*), woodpecker, (*Picus*), and wryneck, (*Yunx*); and *Indicatorinæ*, composed of the honeyguides, (*Indicator*): the *Cuculoides*, in my present state of knowledge, I can venture only to range in two families, those of the puff-birds, (*Tamatiadæ*), which perhaps require to be first separated into *Tamatianæ*, or the puff-birds, (*Tamatia* and *Lyporny.x*), and barbacous, (*Monasa*; and *Leptosominæ*, or the courols, (*Leptosomus*);—and of the cuckoos, (*Cuculidæ*), which should range in three sub-families, *Cuculinæ*, or the cuckoos, (*Cuculus* and *Chalcites*), and rain-fowl, (*Scythrops*);—*Centropodinæ*, or the couas, (*Coccyzus*), coucals, (*Centropus*), malkohas, (*Phænicophæus*), &c.—and *Crotophaginæ*, or the ani, (*Crotophaga*).

Lastly, the *Heterodactyli* require to be separated into those with zygodactyle feet, (though on a different principle from any of the preceding groups),—*Trogonoides;* and with feet not zygodactyle,—*Cypseloides.* The former contains only the single family of trogons, (*Trogonidæ*), which may also be termed *Accurvirostres;* the latter consists of the *Parvirostres*, or moth-hunter family, (*Caprimulgidæ*), perhaps separable into two sub-families,—and *Tenuirostres*, or the swifts, (*Cypselidæ*), and hummingbirds, (*Trochilidæ*).

The following tabular view exhibits the foregoing distribution of the successive groups of *Strepitores* at a glance.

| | | | | |
|---|---|---|---|---|
| *STREPITORES.* | *Syndactyli,* | *Buceroides,* | *Arcuirostres,* | *Buceridæ.* |
| | | | | *Upupidæ.* |
| | | *Halcyoides,* | *Cylindrirostres,* | *Meropidæ.* |
| | | | | *Coracidæ.* |
| | | | | *Halcyonidæ.* |
| | | | *Angulirostres,* | *Todidæ.* |
| | | | | *Galbulidæ.* |
| | | | *Serratirostres,* | *Prionitidæ.* |
| | *Zygodactyli,* | *Picoides,* | *Levirostres,* | *Rhamphastidæ.* |
| | | | | *Musophagidæ.* |
| | | | *Cuneirostres,* | *Bucconidæ.* |
| | | | | *Picidæ.* |
| | | *Cuculoides,* | *Curvulirostres,* | *Tamatiadæ.* |
| | | | | *Cuculidæ.* |
| | *Heterodactyli,* | *Trogonoides,* | *Accurvirostres,* | *Trogonidæ.* |
| | | *Cypseloides,* | *Parvirostres,* | *Caprimulgidæ.* |
| | | | *Tenuirostres,* | *Cypselidæ.* |
| | | | | *Trochilidæ.* |

And a more striking contrast cannot be than is afforded by this long succession of mutually distinct forms, as compared with the next order, *Cantores*, which scarcely affords a single character for subdivision, though containing, perhaps, triple the number of species at the lowest rough estimate.

My last communication was devoted to the consideration of the two syndactyle groups of *Cylindrirostres* and *Angulirostres;* and I will content myself, at present, with completing the *Halcyoides*, by treating on the *Serratirostres*, or motmots. The *Buceroides* will form the subject of my next paper.

The family of motmots,—*Prionitidæ*, called also sawbills, and houtous, (which latter name expresses the unvaried cry of one of the species),—is peculiar to the tropical regions of South America, and combines several characters of the kingfishers with others of the toucans.

The species average the size of a small jay; and their proportions resemble those of a common magpie. The foot is syndactyle, yet moderately adapted for progression on the ground; having the tarse of mean length, and the innermost toe short, as in the kingfishers: the claw of the middle toe is rather long, with an expanded inner edge. Beak almost *corvine*, but with the lower mandible also slightly decurved; and the nostrils quite bare, uncovered by incumbent bristle-like feathers; their orifice is a circular perforation in the fore-part of the nasal membrane, and consequently a little removed from the base of the bill, (as in the todies and jacamars): the medial portion of both mandibles is distinctly denticulated. Wings rounded, having the fourth, fifth, and sixth feathers nearly equal and longest: tail very much graduated, its sixth or outermost pair of feathers short, and absent in some of the species. The plumage is loosely webbed, as in the toucans, having also the general appearance of that of the jays, analogously with which it is somewhat lengthened upon the head, where, in most of them, it is finely coloured, the tint resembling that of the more brilliant kingfishers and halcyons; there is also a singular pointed tuft of similar elongated feathers on the fore-part of the neck, which contrasts remarkably with the surrounding plumage: the body-feathers are long, and have a distinct supplementary shaft, as in the aricaris, which is similarly flocculent and downy; their colouring is chaste and unobtrusive: around the beak are the five sets of *vibrissæ* so conspicuous in some barbets, but small and little noticeable.

The sexes are undistinguishable; and the young scarcely differ, except in the more downy texture of their feathers.—They appear to shed the primaries at the first moult.

The tongue is described to be barbed as in the toucans; the eye, also, to be large, as in those birds. Le Vaillant states that the stomach is rather muscular. It is probable that their skeleton considerably resembles that of the rollers, but with the sternal crest less developed: and that the digestive organs accord with those of the toucans, excepting, perhaps, that a gall-bladder may be present, as in the hornbills and kingfishers.

The most remarkable circumstance connected with this group of birds is the unaccountable practice which most of them exhibit of mutilating their long middle tail-feathers: in other words, of nibbling off a small portion of the vanes of them, immediately beyond the extremities of the next pair, leaving, however, the tips barbed and untouched, as also the entire remainder of their plumage. Of so general occurrence is this, that it might reasonably be imagined to be an original conformation, did not the absence of exact conformity in the corresponding webs preclude the supposition; besides which the artificial truncation is at once apparent when viewed with a lens, and newly-moulted specimens are occasionally, though seldom, met with, which display the natural structure.

Now, it has been intimated that the general figure of the motmots is not unlike that of a common magpie; and it particularly resembles those of the sub-division *Dendrocitta* of Mr. Gould, (comprehending the *Pica vagabunda*, auct., and some allied species): and the fact is not a little curious, that the members of that cantorial group further agree in presenting the anomalous habit in question. Both have the central tail-feathers considerably longer than the next; and the common Indian *Dendrocitta vagabunda* has them tipped for more than an inch with black, the portion between which and the extremities of the next pair is frequently so worn by nibbling, as to be rendered sufficiently transparent to read through with the utmost facility:* the unserrated mandibles of the pie being inadequate to cut through the web, as is done by the motmots. It is not, therefore, improbable that by careful observation and comparison of the habits of these two essentially incongruous genera, the intent of so strange a practice may be divined.

In the motmots, however, it is furthermore exceedingly remarkable, that although in the perfect feather of the adult bird there exists not the slightest trace of irregularity, yet, in the immature plumage (of one species at least, as figured by Le Vaillant), a considerable and apparently pristine sinuation occurs, where the artificial excision is practised by the adults: though what inference can be deduced from this, I am a loss to imagine, unless it be, simply, that some object must be attained by the peculiarity.

Motmots are solitary birds, inhabitants of the interior of the forest, though probably of the more open glades rather than the dense entanglement They subsist both on small animals and upon fruit: in this resembling the succeeding group of toucans. Mr. Waterton narrates, of the *P. momotus*, that—"He who wishes to observe this handsome bird in its native haunts, must be in the forest in the morning's dawn. The houtou shuns the society of man: the plantations and cultivated parts are too much disturbed to engage it to settle there: the thick and gloomy forests are the places preferred by the solitary houtou. In those far-extending wilds [Guaiana], about day-break, you hear him articulate in a distinct and mournful tone "houtou, houtou." Move cautiously to where the sound pro-

* I find that the same is sometimes noticeable in our native magpie.

ceeds from, and you will see him sitting in the underwood, about a couple of yards from the ground, his tail moving up and down every time he articulates "houtou." He lives on insects and the berries amongst the underwood, and very rarely is seen on the lofty trees, except the bastard Siloabali tree, the fruit of which is grateful to him. He makes no nest, but rears his young in a hole in the sand, generally on the side of a hill."*

In the 'Illustrations of Ornithology,' by Sir W. Jardine, Bt., and others, we read that the motmots "feed principally on fruits, but occasionally plunder the nests of other birds of their young. They breed in holes of the ground, or in old hollow trees." I suspect that the latter site is a rare exception to the general rule, as the structure of the foot intimates that they are burrowers. The number and colour of the eggs remain to be described; but are probably the same as in the kingfishers, though perhaps less numerous.

We are indebted to the Spanish naturalist Don Felix d'Azara for some interesting details on the habits of these birds, as remarked in a captive state. That excellent observer relates two instances of their entering dwelling-houses, and being taken alive, which enabled him to obtain some insight into their economy. He kept three motmots in captivity for a considerable time, the habits of which, as described by him, are strikingly intermediate to those of the kingfishers and toucans. They were of a fierce and untameable disposition, and passed their time chiefly sitting on a piece of furniture, only descending to the ground to feed. Their gait was stiff and inelegant, by oblique hops; accompanied by a peculiar movement of the head. They preferred animal to vegetable food, but were fond of oranges and water-melons; rejecting maize, however softened and prepared. Small birds and mice were seized with great avidity, and were swallowed entire, and invariably head foremost, after beating them much, with violence, against the ground, and breaking the bones of the limbs by means of the serrated bill: they never divided their prey, but left it if too large to swallow; in this particular deviating from the toucans, and agreeing with the kingfishers and rollers; which latter are further recalled to mind by the practice of beating it against the ground. It is probable that they also strike with their wings, as the bony tubercle near the bend projects sufficiently to give effect to a blow.

About six or seven species of *Prionitidæ* have now been

* 'Wanderings in Demerara and British Guaiana.'

ascertained, all of which are considerably allied, though presenting certain trivial modifications of the beak only, which I perceive have been lately seized upon as characters on which to found generic separation. The distinction of *Galbula* and *Jacamerops*, however, among the jacamars, is of corresponding value: and we might proceed on the same principle to dismember the great genus *Buceros*. Any divisions that may be instituted among the motmots will most likely prove to grade into each other, while the group composed of the whole of them continues thoroughly distinct. It is difficult, indeed, to conceive what could have induced even Mr. Swainson to include them in his family *Trogonidæ!* Yet that astute systematist presumes to sneer at the illustrious Cuvier for approximating the hornbills to the kingfishers.

ART. V. *On the Ornithology of Blackburn and the North of Lancashire.* By JOHN SKAIFE Esq.*

IT may be convenient to preface the following list of birds with a brief description of the localities whence my specimens were obtained, or where they were seen. Blackburn lies in 53' 46" N. lat., 2' 28" W. long., in the county palatine of Lancaster; situated in a valley surrounded on all sides by hills, on the northern edge of the great coal-field of Lancashire. Coal-pits have been sunk and worked, and coal obtained, at a very short distance from the town, almost, indeed, in the very suburbs. There is no coal found to the north of this town, at least on the western side of the island, till we reach Whitehaven, in Cumberland.

One of my principal boundaries is the river Ribble, which, after quitting Yorkshire, directs its course nearly westward, and flows through a beautiful and fertile valley, about six or seven miles north of Blackburn; at that distance is placed the town or village of Ribchester, once a Roman station, and a place of great importance, but now dwindled down to a miserable weaving village, not even possessing a market. It has obtained a little celebrity during the last half century, from a number of valuable Roman antiquities having been discovered there. It is said to have been a sea-port in the

*I must protest against this article being taken as a complete list of the birds of Lancashire; the remarks are merely those of an individual, who, however zealous in the pursuit of his favourite science, must, like all individuals, be liable to error: besides, a large portion of the county I have not visited at all.

time of the Romans; if so, the changes which have taken place in the bed of the Ribble must have been immense, as that river is now fordable in many places below Ribchester, and is not navigable for anything larger than a ferry-boat till we arrive at the large and flourishing town of Preston, some twelve miles down the stream. Below this town the river is navigable for small craft. At the mouth, and on the north bank of the Ribble, is situated the pleasant and fashionable bathing village of Lytham. Following the line of the sea-coast northwards, we arrive at Blackpool, another bathing village; this is placed so close to the margin of the sea, that many parts have been undermined and washed away by the action of the waves. The coast between Lytham and Blackpool is much resorted to by water-fowl, and many specimens are obtained there. Northwards we first arrive at the embouchure of the river Wyre, next at that of the river Lune, which flows past Lancaster, and finally at the Bay of Morecambe, which is the limit of my personal observations northwards.

The Bay of Morecambe, or Lancaster Sands, as it is more usually called, is a vast expanse of land covered by the tide at high water, and left dry at low water. Into this bay the rivers Keer, Kent, Winster, Leven, and Crake, disembogue themselves; and at low water the mouths of these rivers are the resort of myriads of water fowl.

From Preston to Lancaster, going northwards, a distance of twenty-two miles, taking the great north road as a centre, to the left or west lies the Fylde country, a dead level, whilst to the right or east we approach nearly to the foot of the northern range of mountains, which there terminates; from the foot of the hills to the sea being, at a rough estimate, a distance of fifteen miles.

South of Blackburn commence the high moors of Darwen, Anglezark, &c., which extend to the large town of Bolton-le-Moors, the origin of which name is obvious. To the east of Blackburn lies the small town of Clitheroe, at a distance of ten miles; near which town the lofty hill or mountain of Pendle rears its head: this is another portion of the great northern chain above referred to. Still farther to the north-east is the mountainous district called the Forest of Bowland. This district, though the nearest part is scarcely sixteen miles from Blackburn, is in the county of York; it is the most mountainous and most romantic part of this country; is intersected by numerous mountain streams, and traversed by the river Hodder, a celebrated trout and salmon stream, and the largest affluent of the Ribble.

It is now about forty years since the last of the red deer, which formerly roamed at will in these parts, was destroyed; the increase of population, and the enclosure of the lower mountain districts, rendering their existence incompatible with agricultural pursuits. The forest laws, at no very distant date enforced with great severity, are now in a great measure suspended or forgotten. At Brewsholme Hall, the residence of the bough-bearer, is still kept an iron stirrup or ring; all dogs that could not pass through which ring, were destroyed, in order to ensure the safety of the deer.

Having been somewhat diffuse on the topography of these parts, a few words will suffice on their geological formations. At the termination of the coal measures, to the north and west of Blackburn, the red sand stone commences, and continues following the coast line up to Lancaster. Once more taking the great north road as a centre, to the left the formation is entirely red sand-stone; to the right is a large district of millstone grit and limestone shale, till we pass high up the mountains, where we meet with the carboniferous or mountain limestone. On the northern extremity of Morecambe Bay lies the isle of Walney, which, with a narrow strip of the mainland, is composed of the old red sandstone; this is succeeded by the mountain limestone.—The forest of Bowland is composed partly of millstone grit and partly of mountain limestone. Near Clitheroe the limestone district commences; close to that town are extensive lime-kilns, whence all the immediate neighbourhood of Blackburn is supplied with lime.

About three and a half miles west from Blackburn, on the millstone grit and limestone shale formation, is situated, in a romantic and well-wooded glen, an immense mass of rock called the 'Alum Rock,' or 'Scarr.' At this spot extensive alum-works were carried on for many years, but were abandoned about forty years ago, not from any unproductiveness in the soil, but simply from the fact that the receipts barely covered the outlay.

In the arrangement of the following list of birds, I have adopted that of Mr. Eyton's published Catalogue; and I am the more readily induced to do so, as it has already been followed in your Magazine by Dr. Moore, of Plymouth.

## ORDER I.—*ACCIPITRES.*

### Division i.—*Diurnæ.*

**Gen. FALCO.—Sub-gen. 1. *Falco.***

1. ***Falco peregrinus.*** **Peregrine Falcon. This bird is very rare, though I possess two specimens, one caught in a trap in the Forest of Bowland, several years since; and a second shot near Preston, in the winter of 1836-7.**

2. *Falco Æsalon*. Merlin. This bird is far from being uncommon; two or three specimens generally coming under my observation every year.
3. *Falco Tinnunculus*. Kestrel. This is the most common species of hawk with us, and is especially abundant. I seldom take a walk of a few miles into the country, but I meet with a few specimens hovering in the air in their peculiar style. A fact connected with the natural history of this bird, I have several times had an opportunity of verifying; which is, that it never preys on the starling. In the fissures and crevices of the Alum Scar vast numbers of starlings build their nests and rear their young, totally regardless of several pairs of kestrels, their neighbours, which likewise build their nests and rear their young in the crevices of the same rock. I have at different times lain concealed with my gun, in order to get a shot at the kestrels, but so situated that I could command a full view of the face of the cliff. The starlings would pass in and out, chattering, whistling, and screaming or croaking, taking no notice whatever of the kestrels, which would issue from holes, I am sure not ten yards from the habitat of the starlings, whom they never appeared to molest, there being a perfectly good understanding established between them; but the moment one of the sparrow-hawks (which build in the trees in the woods below) came in sight, there would be a general shriek of alarm, and the poor starlings, in a state of the greatest agitation, would hurry for shelter to their holes and crevices in the rock.

Gen. Astur.

4. *Astur Palumbarius*. Goshawk. Very rare, though shot or caught occasionally in the Forest of Bowland. A relative of my own has a beautiful pair, male and female, caught in a trap there a few years since.

Gen. Accipiter.

5. *Accipiter fringillarius*. Sparrow-hawk. Very common, and next in frequency to the kestrel. It is singular how diversified is the plumage of this bird; amongst numerous specimens I have seldom found two alike.

Gen. Milvus.

6. *Milvus regalis*. Kite. I have never been able to meet with this bird, though I have occasionally heard of one having been shot in this neighbourhood.

Gen. Buteo.

7. *Buteo vulgaris*. Common Buzzard. Very rare, though a specimen or two has been shot in the mountains east of Blackburn.

Gen. Circus.

8. *Circus Pygargus*. Hen Harrier. Equally rare with the two latter genera. I have a beautiful specimen of the male, shot in the neighbourhood of Lancaster.

Division ii.—*Nocturnæ*.

Gen. Strix.—Sub-gen. 1. *Otus*.

9. *Otus vulgaris*. Long-eared Owl. Very rare. I have one specimen shot near Preston last winter.
10. *Otus brachyotus*. Short-eared Owl. Rather more plentiful than the preceding, at least specimens are more frequently met with; still the bird is very rare. I possess a splendid specimen of the female, caught in one of the streets in Manchester; with this ex-

ception all the specimens I have heard of were taken on the moors.

Sub-gen. 2. *Strix.*

11. *Strix flammea.* Barn Owl. Very common.

Sub-gen. 3. *Syrnium.*

12. *Syrnium Aluco.* Wood Owl or Brown Owl. In these parts now become rather scarce, though specimens are procurable occasionally by using a little extra exertion. I learn from the game-keepers, (their bitterest persecutors), that within a few years they were very numerous in the woods towards the Ribble.

The above are all the species of owl that have come under my own observation, but I heard of two specimens of a small owl being shot in the neighbourhood of Blackpool last year, which from the description must have been *Scops Aldrovandi.*

## Order II.—*PASSERES.*

### Fam. i.—*Dentirostres.*

Gen. Lanius.

1. *Lanius Collurio.* Red-backed Shrike. This is by no means a rare bird, several specimens being procured every year.

Gen. Muscicapa.

2. *Muscicapa grisola.* Spotted Fly-Catcher. Very common.
3. *Muscicapa atricapilla.* Pied Flycatcher. Extremely rare. I never saw or heard of but one specimen, which was shot a few years back in the woods at Feniscowles, 3½ miles W. of Blackburn, the seat of W. Feilden, Esq. M.P.; and is now in the possession of Mr. Cunningham, brewer, of this town.

Gen. Bombycilla.

4. *Bombycilla Bohemica.* Waxen Chatterer. Equally rare with the preceding, as I never heard of more than one specimen, which was shot a few years back near Ribchester, out of a small flock.

Gen. Turdus.

5. *Turdus Merula.* Blackbird. Common in gardens, orchards, thickets and plantations.
6. *Turdus torquatus.* Ring Ouzel. Frequent on the Moors. It breeds in all the mountain districts described in my topographical sketch. It is remarkably wild and shy in its manners, and owing to its extreme wariness, specimens are procurable with difficulty.
7. *Turdus viscivorus.* Missel Thrush. Common.
8. *Turdus pilaris.* Fieldfare. Common.
9. *Turdus musicus.* Song Thrush. Common.
10. *Turdus iliacus.* Redwing. Common.

Gen. Cinclus.

11. *Cinclus aquaticus.* Water Ouzel. This bird is plentiful with us; it has been shot within three miles of Blackburn. It is found in all the mountain streams, I have also seen it in the larger rivers, --Hodder and Ribble.

Gen. Sylvia.—Sub-gen. 1. *Saxicola.*

12. *Saxicola rubicola.* Stonechat. Not very plentiful; it is the rarest of the *Saxicolæ.*
13. *Saxicola Rubetra.* Whinchat. Abundant in every meadow.
14. *Saxicola Œnanthe.* Wheatear. Common, though not so much so as *S. Rubetra*, probably owing to its affecting particular localities, as old quarries, walls, and stony places generally. I have found it most plentiful amongst the mountains in Bowland.

Sub-gen. 2. *Ficedula.*

15. *Ficedula Rubecula.* Redbreast. Very common.*
16. *Ficedula Rutacilla.* Redstart. Not very plentiful, though specimens may always be obtained in the summer.

Gen. CURRUCA.—Sub-gen. 1. *Salicaria.*

17. *Salicaria arundinacea.* Reed Warbler. Rare.
18. *Salicaria Phragmites.* Sedge Warbler. Tolerably plentiful, being the most common of the *Salicariæ*, and found about almost every old pit or pond, chattering in its peculiar way.
19. *Salicaria Locustella.* Grasshopper Warbler. Rare, though a few specimens may generally be procured every summer: last summer, however, not one was to be found. At that time I was anxious to complete a small case of the British warblers; after the most diligent search for many days, both by myself and several agents, and that too in localities where they had been, for this bird, tolerably plentiful, not one was either seen or heard. I have only heard it twice this summer.

Sub-gen. 2. *Curruca.*

20. *Curruca atricapilla.* Blackcap. Rather a scarce bird with us.
21. *Curruca cinerea.* Whitethroat. Not an uncommon species, though not abundant. As to the *Curruca garrula*, notwithstanding the most diligent search and enquiries, I have never been able to meet with it.
22. *Curruca hortensis.* Garden Warbler. Very common.

Gen. ACCENTOR.

23. *Accentor modularis.* Hedge Accentor. Very common.

Gen. REGULUS.

24. *Regulus auricapillus.* Golden crested Wren. In certain localities very plentiful.

Gen. SYLVICOLA.

25. *Sylvicola Trochilus.* Willow Wren. Common.†
26. *Sylvicola sibilatrix.* Wood Wren. Plentiful.
27. *Sylvicola rufa.* Chiff-chaff. Abundant.

Gen. TROGLODYTES.

28. *Troglodytes Europæus.* Common Wren. Abundant.

Gen. MOTACILLA.—Sub-gen. 1. *Motacilla.*

29. *Motacilla alba.* White Wag-tail. Very abundant.

Sub-gen. 2. *Budytes.*

30. *Budytes flava.* Yellow Wag-tail. Common.
31. *Budytes boarula.* Grey Wag-tail. Much more restricted in numbers than its congeners.

Gen. ANTHUS.

32. *Anthus trivialis.* Tree Pipit. Common.
33. *Anthus pratensis.* Meadow Pipit. Especially abundant.
34. *Anthus aquaticus.* Rock Pipit. Very rare. Specimens met with occasionally on the coast.

* I am in possession of a robin which many persons would call white; but it is of a dusky cream colour, the marking on the breast being of a lighter hue than the rest of the plumage.

† A few years back, a friend of mine shot a white willow-wren in the Forest of Bowland, where he resides. It was one of the most lovely little birds I ever beheld. Unfortunately the gentleman who shot it knew nothing of the art of bird-mounting, nor even of skinning a bird; and when I saw it, it was in a state of decay. The colour was not pure white, but had a slight tinge of yellow.

Fam. ii.—*Conirostres.*

Gen. ALAUDA.

35. *Alauda arvensis.* Skylark. It is singular that though the skylark is one of our most common birds, its congener the woodlark is never met with. I once had a specimen brought to me as a great rarity. I saw by the state of the plumage that it was a cage bird, and on enquiry it turned out that the bird had been brought in a cage, from the south of England.*

Gen. PARUS.—Sub-gen. 1. *Parus.*

36. *Parus major.* Great Tit. Common.
37. *Parus ater.* Colemouse. } Of these two *palustris* is much
38. *Parus palustris.* Marsh Tit. } more frequent than *ater*, which is somewhat scarce.
39. *Parus cæruleus.* Blue Tit. Very common.
40. *Parus caudatus.* Long-tailed Tit. In some localities and seasons very plentiful; in others not to be met with.

Gen. EMBERIZA.

41. *Emberiza citrinella.* Yellow Bunting. One of the most common of the *Passeres.*
42. *Emberiza Schœniculus.* Reed Bunting. Common.
43. *Emberiza miliaria.* Common Bunting. Rare, at least not common.

Gen. PLECTROPHANES.

44. *Plectrophanes nivalis.* Snow Bunting. Occasionally flocks have been seen in the mountains, but they appear capricious in their habits. We have had none for the last three years.

Gen. FRINGILLA.—Sub-gen. 1. *Pyrgita.*

45. *Pyrgita domestica.* House Sparrow. Abundant.†

Sub-gen. 2. *Fringilla*

46. *Fringilla cælebs.* Chaffinch. Common. In the winter I never meet with any but males.
47. *Fringilla Montifringilla.* Mountain Finch. Rare, and only found in the mountains, or their immediate neighbourhood.

Sub-gen. 3. *Carduelis.*

48. *Carduelis aurata.* Goldfinch. Sparingly scattered in our neighbourhood.

Sub-gen. 4. *Linaria.*

49. *Linaria Spinus.* Siskin. Rare, but obtained occasionally.
50. *Linaria flavirostris.* Lesser Redpole. Common.

* Last year I was so fortunate as to procure a black lark. The ground colour is a dark brown, and those parts of the plumage which, in the common skylark, are brown, in this bird are jet black. In form it is not distinguishable from the skylark. Last autumn a white lark was frequently seen in a flock of skylarks, on the lower range of hills two miles south of Blackburn. The colliers, who saw it several times, said that it was of a pure white, and that the eye was red, for it flew so near to them as almost to be within reach of the hand. As soon as I heard of it I sent a man, who is a good shot, in pursuit of it; he beat about its accustomed haunts for two days, but could not meet with it.

† In August, 1834, a white sparrow was frequently seen about the farm yards, hedges, &c., in the neighbourhood of the Alum Scar. I saw it several times myself; it was of the usual dingy hue. Unfortunately I had no gun: several of my sporting friends promised to shoot it for me, but whenever they beat up its quarters it was gone. It was seen occasionally for many weeks: I never heard of its capture, nor do I believe that it was taken.

51. *Linaria cannabina.* Brown Linnet. Very common.
52. *Linaria montium.* Twite. Common. The moorlands are peculiarly favourable to the linnets.

Gen. COCCOTHRAUSTES.—Sub-gen. 1. *Coccothraustes.*

53. *Coccothraustes Chloris.* Green Grosbeak. Common.

Sub-gen. 2. *Pyrrhula.*

54. *Pyrrhula vulgaris.* Bulfinch. Common.

Gen. STURNUS.

55. *Sturnus vulgaris.* Starling. Especially abundant.

Gen. FREGILUS.

56. *Fregilus Graculus.* Red-legged Chough. An occasional specimen has been taken at the mouth of the Ribble, after very stormy weather; considered a great rarity. Probably driven from the coast of Wales by stress of weather; Wales being the nearest locality where they are found in abundance.

Gen. CORVUS.—Sub-gen. 1. *Corvus.*

57. *Corvus Monedula.* Jackdaw. Common.
58. *Corvus frugilegus.* Rook. Abundant.
59. *Corvus Corone.* Carrion Crow. Only thinly scattered in these parts.
60. *Corvus Cornix.* Hooded Crow. Rare. I have occasionally met with a specimen or two on the coast.

Sub-gen. 2. *Pica.*

61. *Pica caudata.* Magpie. Common.

Sub-gen. 3. *Garrulus.*

62. *Garrulus glandarius.* Jay. Common.

Fam. iii.—*Fissirostres.*

Gen. HIRUNDO.—Sub-gen. 1. *Cypselus.*

63. *Cypselus Apus.* Swift. Common.

Sub-gen. 2. *Hirundo.*

64. *Hirundo urbica.* Marten. Common.
65. *Hirundo riparia.* Sand Marten. Common.
66. *Hirundo rustica.* Swallow. Common.

Gen. CAPRIMULGUS.

67. *Caprimulgus Europæus.* Night-jar. Moderately plentiful.

Fam. iv.—*Tenuirostres.*

Gen. CERTHIA.

68. *Certhia familiaris:* Creeper. Common where found, but the localities are not many.

Gen. ALCEDO.

69. *Alcedo ispida.* Kingfisher. Once very abundant in all the brooks about here, and still commonly met with in the less frequented parts.

(*To be continued.*)

*Blackburn, Lancashire,*
*July 14th,* 1838.

ART. VI. *Monograph of the Genus Semnopithecus.* By WILLIAM MARTIN, Esq. F.L.S.

*(Continued from Page 326).*

WITH respect to the habits and manners of the *Semnopitheci*, little need be said. Their movements are more slow and composed than we see among the *Cercopitheci*,—they have far less brusquerie and petulance, and are more *staid*, quiet, and gentle. While young they are playful and familiar, but as age advances they become surly, mistrustful, and even ferocious. They leap and bound among the trees of their native woods, with extreme address and vigour, exceeding even the guenons in the distance to which they spring. Several species, but more particularly the *Entellus*, are held in veneration by the worshippers of Brama, and are not only tolerated but protected; they are permitted to ravage gardens in troops, without the least molestation, or even to enter within the very walls of dwelling houses, and appropriate whatever suits their appetite or inclination. This blind veneration is, however, by no means universal. The *Entellus*, for instance, which abounds in the forests of the western ghauts, is not regarded as sacred by the Mahratta people, nor, as we are assured, do they object to its being killed. Many species attain to considerable dimensions; and many are distinguished by the softness and glossiness of their fur, as well as by the beauty of their colouring.

Among the species comprehended in the present genus, there obtains a mass of confusion, which we trust to be able, in some degree at least, to disentangle. Most of our descriptions are original, and as correct as possible; nor have we omitted consulting various authorities on the subject, not, however, to the warping of our opinion on a single species. We shall arrange them as follows.

## *Genus SEMNOPITHECUS*, F. Cuv.

SPECIES.

S. *nemæus*. The Douc Monkey.

General colour of the body beautiful grey, arising from the hairs being annulated with black and white. Forehead black; long hairs around the face white; gorget light chesnut red; shoulders and a bar under the gorget black. Fore arms white; thighs black, legs bright deep chesnut red; hands and feet black; tail white; skin of face yellow. Fur full, deep and soft. Length about 2 feet,—the tail being about 1 foot 8 or 9 inches.
*Habitat* Cochinchina.

Syn.—*Simia nemæus.* Linn.
*Pygathrix nemæus.* Geoffr. in Ann. Mus. vol. xix.
*Lasiopyga nemæus.* Illig. in Prodrom. Syst. Mam.
*Douc.* Buffon; Hist. Nat. vol. xiv.
*Cochinchina Monkey.* Pennant.

### S. *Entellus.* Entellus Monkey.

Hair of the head radiating from a centre; superciliary rows of bristles projecting, long, and black, very marked. General colour ashy grey, with a tinge of straw yellow, passing into dull white on the sides of the face and under parts of the body. In young individuals, the hands and feet are washed with dusky black, but this is not the case in adults, which have a paler colouring altogether, often verging upon white, tinted with pale straw colour. Face black, with a slight violet hue.

Length of an adult male fom vertex to root of tail 2 feet 5 inches; the tail being 3 feet 1 inch to the end of the hairs, which run out into a sort of pencil, but do not form a tuft.

*Habitat* India and the islands of the Indian Archipelago.

Syn.—*Rollewai.* Thunberg, in Travels, 1793. And in Wolf: see Residence in Ceylon, 1783.

Note.—From some unaccountable mistake the name of Rollewai, or Roloway, has been transferred to the Diana monkey, (*Cercopithecus Diana*), a native of Africa.

### S. *fascicularis.* Kra, or Croo Monkey.

Back and upper part of the head reddish brown; tail and sides of the body grey, becoming still paler on the inside of the limbs, and under surface of the body. Face brown, with short white hair, and a full grey tuft on each side, before the ears. Ridge of the nose between the eyes prominent. We have examined a variety of this monkey, of an ashy grey colour, with the top of the head and back of a greyish brown, patches of the same occurring on the arms and thighs.

Length 22 inches; tail 2 feet 8 inches.

*Habitat* Sumatra and the Malay islands.

Syn.—*Simia fascicularis.* Raffles, in Linn. Trans. vol. xiii. p. 246.
*Semnopithecus comatus?* Desm.
*Kra,* of the Malays.

Sir S. Raffles notices a species, (or as he terms it, variety), agreeing with the Kra in colour, but far less in size, being under a foot in length, and wanting the full tuft of hair on the sides of the face, so remarkable in the Kra; it is called '*Kra Buku*' by the Malays, and is found in Sumatra and the other Malay islands.

We shall term it provisionally *Semnopithecus Buku.* Is it the *Presbytis mitrata* of Eschscholtz?

### S. *cristatus.* Chingkau.

General colour silvered black; the hairs, which are black throughout the greater part of their length, having white tips. Face and limbs black; under surface of body more inclining to grey. The hairs of the forehead diverge over the face, those on the top of the head are elevated into a peaked crest. The hair of the body long and falling.

The chingkau when very young is of a reddish fawn colour, with blackish hands and feet; when half grown of a greyish brown, with black hands and feet, the frontal hairs diverging forward, and the peaked crest being distended.

The contour of body remarkably slender. Length nearly 2 feet; tail 2 feet 6 inches.

This species is certainly not identical with the *Simia Maura* of Schreber, as Fischer intimates, but with the *Semnopithecus pruinosus* of Desmarest.

*Habitat* Sumatra, Java, &c.

Syn.—*Simia cristata.* Raffles, in Linn. Trans. vol. xiii. p. 244.
*Semnopithecus pruinosus.* Desm.
*Chingkau* of the Malays.

## S. *femoralis*, Horsf. White-thighed Monkey.

Top of the head and occipital tuft of hair, back, and shoulders to the elbows, dusky greyish brown; the frontal hairs, which diverge forwards, the sides of the head and body, the fore arms and outside of the thighs, the legs, hands, feet, and tail, black, slightly grizzled, especially the fore arms, with white; the chin white; as is also a line down the chest and abdomen to the lower part, which is all white; the inside of the *humerus* from the *axilla*, and the inside of the thighs, white, with an abrupt margin. No tuft on the sides of the face; a line of short black hairs on the molar bones.

Length 19 inches; tail 22½ inches.

*Habitat* Sumatra, &c.

Syn.—"*Simia Maura?*" of Sir S. Raffles, in Linn. Trans. vol. xiii. but not the *S. Maura* of Schreber.
*Lotong* of the Malays.
*Cercopithecus albo-cinereus,* Desm. ?

## S. *Maurus.*

We cannot but consider the *Simia Maura* of Schreber as distinct from the *S. cristata* of Raffles, (the *Semnopithecus pruinosus* of Desm.); and we have had the opportunity of examining a young individual, which we hesitate not to regard as this species, and which closely agrees with the "*middle-sized black monkey*" of Edwards, vol. vii. plate 311. The specimen in question was brought from India, but the exact locality could not be distinctly ascertained. The hair on the head is full, but does not rise into a crest; that on the forehead is directed forwards from a central point at the top of the frontal bone: the hair on the sides of the face is long and bushy, obscuring the ears: the fur is full and rather soft. Colour glossy black; a grey indefinite mark underneath the root of the tail; the thinly scattered hairs between the thighs, white.

Length 18 inches; tail 22½ inches.

That this is not *S. cristata*, in an intermediate stage, is very plain, not only because there is no peaked crest on the *vertex*, but because, in the middle age, this latter species is dull greyish brown, with black hands and feet: neither is the ridge of the nose between the orbits elevated, as in a young *S. cristata* of the same size.

Syn. provisionally.—*Simia Maura.* Linn.
*Simia Maura.* Schreber.

*Guenon negre.* Buff. Supp. vii. p. 47.
*Simiolus Ceylonicus.* Seba.

Fischer, in his Synopsis, distinguishes the "middle-sized black monkey" of Edwards, as the *S. Edwardsii*, regarding it however as a doubtful species. He gives Guinea with a query as its habitat, and considers it synonymous with the *Cercopithecus Maurus* of Erxleben, and the *C. afer* of Latreille, in Buff. Hist. Nat. xxxvi. Edwards, on whose authority Fischer speaks, states that he was informed that his monkey came from Guinea, but he does not assert it as a fact; he observes that the hair above the eyes was long, and also on the temples, partly covering the ears; and adds that he had had an opportunity of seeing a *black monkey* something like his species, called a *spider monkey*, from the thinness and length of his limbs, with four fingers and a prehensile tail,—in fact a species of the American genus *Ateles*, to which we have already made allusion. Now we gain from this note an important fact, viz., that the long and slender limbs of this *Ateles* struck him as being like those of his "middle-sized black monkey," thereby almost demonstrating that this animal must have been a *Semnopithecus*, (in which genus, the character of the limbs is much the same as in *Ateles*); and not a *Cercopithecus*; indeed the figure given by Edwards, though rude, has all the appearance of a young species of *Semnopithecus*. That it was not an *Ateles* is proved by its non-prehensile tail, and the presence of a thumb on the hands.

The *Guenon nègre* is described by Buffon on the authority of Edwards and Seba; the latter of whom terms it *Simiolus Ceylonicus*, indicating by its specific title, that it is a native of Ceylon; and Edwards observes that "in Siam is a large species of monkey, *probably* different from this,"—viz., the "middle-sized black monkey." Shaw, combining the accounts of Edwards and Seba, states the *Simia Maura* to be a native both of Ceylon and Guinea. What Edwards's monkey really was, or whence it really came, is of course impossible for us to determine; and in referring the specimen here described as *Semnopithecus Maurus*, to the species figured by him, we are to be understood as only assuming a probability, based upon the coincidence of his description with that of the specimen before us.*

*Since writing the above we have had the opportunity of examining an adult specimen of *S. Maurus*, from India. The general colour is deep black, with a decided silvery grey patch on the under surface at the root of the tail. The hairs of the head radiate from a centre, and those on the sides of the head and face are long and bushy, completely overshrouding the ears. The fur is full, glossy, and soft. Length of head and body 20 inches. Tail imperfect. It is evidently the adult of the young specimens to which we have already alluded.

### S. *melalophus.* Cuv. and Geoff.

Fine bright rust colour, or rufous chesnut, pure and rich on the limbs, but slightly washed with a dusky tint on the back. The lower part of the abdomen, and the inside of the limbs, straw yellow. Hair of head rising into a long, peaked, compressed, vertical crest, of a fuliginous colour; into which merges a dusky black line, beginning over each eye, passing over the temples, and turning up over each ear. Occiput on each side of crest pale sandy red. Fur glossy, long, full, and falling. Palms of hands, soles of feet, and nails, black.

Length of head and body 20½ inches; tail 2 feet 8½ inches.

*Habitat* Sumatra?

Syn.——————?

Closely allied to this splendid monkey, if indeed it be not a pale variety, as we strongly suspect, is a *Semnopithecus*, several specimens of which were brought by the late Sir Thomas Stamford Raffles from Sumatra, and described by him under the title of *Simia melalophos*, in the thirteenth volume of the 'Linnean Transactions.' Recently the same animal, as the specimen in the Museum at Paris proves, has been described by Isidore Geoffroy, in the 'Supplement to Belanger's Travels,' under the title of *Semnopithecus flavimanus*; its distinguishing character consisting in the yellow colour prevailing on the lower portions of the extremities, the same parts in the former species being bright rust. If admitted as distinct from its more richly coloured congener, it will stand as follows.

### S. *flavimanus*; Isid. Geoffroy. Sempai.

General colour sandy red, slightly washed with dusky black; occiput, neck, chest, and under parts, whiteish; vertical crest long and peaked, the sandy red passing into black at its point. Fore arms and legs pure pale sandy yellow. Fur full, long, and falling. Palms of hands, soles of feet, and nails, black. General form that of *S. cristatus*.

Length 1 foot 7 inches; tail 2 feet 3 inches.

*Habitat* Sumatra.

Syn.—*Simia melalophos*. Raffles, in Linn. Trans. vol. xiii.
*Simpai* of the Malays.

### S. *Pyrrhus*; Horsfield, in 'Zool. Researches.'

General colour bright sandy red, or fulvous; hair long, soft, and silky, very full on the head, where it forms a bushy, but not a pointed, tuft.—Hands and feet pale yellow. Nails yellowish white.

Length 1 foot 7 inches; tail 24 inches.

*Habitat* Java.

This beautiful species is closely allied to the preceding, from which, however, it is sufficiently distinguishable. It has been confounded by most writers with the following, from which we regard it as separate.

S. *auratus*.

Colour bright glossy golden yellow, washed with rufous about the back, and passing into cinereous on the forearms and outside of the thighs.—Hairs of the head long, but those on the body and limbs are rather short, and inclined to be curly, being very different in character from the long soft falling hairs of *S. Pyrrhus*, and *S. melalophos*.

The length from the neck, (the head being removed), to the insertion of the tail, 18 inches; the tail being 22 inches: allowing 4 inches for the head, the total length of the body would be, as that of the tail, 22 inches.

The above description is taken from an imperfect skin which we have had an opportunity of examining.

S. *fulvo-griseus;* Demoul. in 'Dict. Class. d'Hist. Nat.'

General colour fulvous grey, passing into brown on the shoulders and lower part of the four limbs; the hands and feet black; the face tan-coloured; the moustaches, throat, and chin of a dull greyish white. The tail consists of 32 vertebral bones, and is one fourth longer than the body, of which the trunk is shortened, as in the lotong, by there being fewer lumbar *vertebræ*, namely 5. The fingers are very long and very slender, and their *phalanges* are well arched; the upper canines are very large, and furrowed anteriorly.

M. Diard found this monkey at Java. Vide 'Dict. Class. d'Hist. Nat.'

Of the above species we have not had the opportunity of examining a specimen. It exists, however, in the Museum, at Paris.

S. *latibarbatus*.

General colour deep blackish grey, becoming paler on the back of the neck and head; loins, hinder part of thighs, and tail, pale grey; the end of the tail becoming almost white; a greyish white broadly triangular beard, on the sides of the face and chin; under parts light grey. Hands and feet dull black, as are also the face and superciliary row of hairs.

Length of a young specimen 16 inches: tail 20 incher.

*Habitat* India; (Ceylon).

Syn.—*Cercopithecus leucoprymnus.* Otto, in 'Nova Acta Acad. Nat. Cur.' xii.

*Semnopithecus Nestor.* Benn. in 'Proceeds. of Zool. Soc.' for 1833, p. 67.

*Cercopithecus latibarbatus.* Geoff. 'Ann. du Mus.' xix. p. 95.

*Purple-faced Monkey.* Pennant.

S. *Johnii*.

Superciliary bristles black; head and neck brownish grey; body, tail, and limbs glossy black, a brownish tint being spread over the outside of the thighs and anterior part of the *humerus*. No crest.

Length of the specimen not quite adult, 1 foot 9 inches; tail 2 ft. 4 in.

*Habitat* India, (Malabar).

Syn.—*Simia Johnii.* Fischer.

*Semnopithecus cucullatus.* Isidore Geoffroy, in 'Supplement to Belanger's Travels.'

*Semnopithecus ruficeps.* Temm.?

S. *obscurus*; Reid.

This species was lately described as new at the scientific meeting of the Zoological Society, 1837. It is closely allied to the preceding, and may perhaps eventually prove to be a variety; it has, however, an occipital crest.

Forehead blackish brown, passing into brown on the top of the head, this colour merging into cinereous on the occipital crest; general colour brownish black, especially along the central line of the back, merging into a greyish tint on the outside of the thighs. Tail dusky cinereous. Hands and feet black. Fur long and moderately soft.

Length 1 foot 7 inches; tail 2 feet 5 inches.

*Habitat* India, (Ceylon, Siam?)

Syn.—*Semnopihecus leucomystax*. Temm., in Van Hoeven's Journ.?

We have not seen the specimen described by M. Temminck, but have reasons for believing it to be identical with *S. obscurus*.

S. *nasalis*.

Nose enormously developed, forming a sort of proboscis, with the nasal apertures situated as in man. Top of the head, occiput, and scapular portion of the back chesnut brown, passing, on the body, into deep sandy red. Sides of face and a stripe over the shoulders, yellow; rump, tail, fore arms, legs, hands, and feet cinereous: under parts of body pale yellowish. Chin without a decided beard.

Length from *vertex* to origin of tail 2 feet 2 inches; tail 2 feet 1 inch.

*Habitat* Borneo and Cochinchina.

Syn.—*Simia nasica*. Linn.
*Nasalis larvatus*. Geoffr.
*Simia nasuta*. Shaw.
*Guenon a museau allonge*. Buffon; 'Hist. Nat. Supp.' vii. *cum figura*.

S. *recurvus*.

The top of the head, sides of the face, and beard of the chin, bright chesnut, as is also the anterior part of the *humerus*. The chest is pale chesnut red; back sandy brown, abruptly terminating at the rump, which, together with the tail, is deep grey. Abdomen bright straw yellow; wrists and hands, inside of arms, and of posterior extremities, together with the feet, dusky grey; outside of thighs rufous, outside of legs sandy red.

Syn.—*Nasalis recurvus*. Vigors & Horsfield; in 'Zool. Journal.'

This species, under the title of *Nasalis recurvus*, was first described by Mr. Vigors and Dr. Horsfield, in the 4th vol. of the 'Zoological Journal,' p. 109, and stated to have been procured in Borneo, by a collector sent to that island by the late Sir Stamford Raffles: it forms part of the Rafflesian collection in the museum of the Zoological Society. The nose in this species, instead of being recumbent, as in the former, is turned up, and also shorter in proportion; and the chin is furnished with a prominent beard. In its general colour it resembles *S. nasalis*, but is much less in size. Whether it may ultimately prove to be that species in an immature state is yet to be determined. The specimen from which Mr. Vigors and Dr. Horsfield took their description, is certainly that of an animal not yet adult. We confess that we doubt much its claim to the place of a distinct species; until, however, we possess a series of specimens, this point cannot be determined with certainty, and therefore we allow it to stand.

## SCIENTIFIC INTELLIGENCE.

*The Academy of Sciences at Haarlem* held its eighty-sixth annual sitting on the 19th of May, 1838.

The President, M. W. P. Barnaard Van Bergen opened the meeting by an address, in which he paid a just tribute of praise to the memory of the late illustrious Dr. M. Van Marum, who had, through a long series of years, used every effort to raise the Society to the high position in the scientific world, which it at present occupies.

The Society has received, *First*, some additions to the reply to the following question, previously forwarded. "Can there be shown, in the fossil remains of organized bodies which have existed in the different eras, from the earliest to the latest times, a progressive developement in organization, becoming more and more complex, and approaching to perfection?" A reply, written in French, was sent to the president in 1837, too late to be then brought under consideration. The additions having been received this year in time, have been examined with the memoirs. The Society found great merit in this paper; and considers that it is rich in interesting facts, and that it bears proof of the extent of the author's knowledge; but the Society has decided, that the question is not resolved in a manner sufficiently conclusive to allow of the paper being crowned. The Society repeats the question, in order that it may be replied to before the 1st January, 1840.

*Secondly*, a paper written in Dutch, upon the following question. "What is the formation of wood? Does it originate immediately from the sap or *cambium* under the bark, or is it formed by vessels which descend from the buds and leaves, as the observations of Du Petit Thouars and of Buzareignes seem to prove? And how can an exact knowledge of the formation of wood be applied in the culture of useful trees?" The Society acknowledges that the author's experiments are full of interest, and have great merit; it is judged, nevertheless, that the question is not resolved in a manner sufficiently conclusive to allow of the prize being awarded to him; and the question is repeated for a reply before the 1st Jany. 1840.

*Thirdly*, a reply to the following question, written in Dutch. Professor Brunner, of Berne, having proposed a new method of analysing atmospheric air, a method which allows of the employment of a larger volume of air than the ordinary mode of procedure, and consequently furnishes more certain results; the Society proposes this question.—"To what degree is the analyzation of the air perfected by the method just alluded to? What improvement can be made in the apparatus of which we are to make use, in order to analyse any quantity of air as may be judged necessary? What are the positive results obtained in this manner?" The Society considers that this paper does not merit the reward.

The Society has decided upon repeating the seven following questions, replies to which are to be sent in before the 1st of January, 1840.

I.—Since the metamorphoses and economy of a great number of insects are still unknown to us, and as it is desirable that our knowledge in this respect should advance, especially with regard to noxious insects, in order to deduce the best means of arresting the increase of these animals; the Society is desirous of receiving, First, a treatise, illustrated by plates, on the metamorphoses of at least fifty species of Coleopterous insects; as many as possible of which shall be indigenous to Holland, and of which the metamorphoses and economy are either unknown, or undescribed. Secondly, a methodical distribution of Coleopterous insects, founded upon their metamorphoses, and the structure of their *larvæ* and *pupæ*.—Thirdly, a paper of instructions, founded upon an acquaintance with their metamorphoses, pointing out the most effectual means to obviate an excessive multiplication of these injurious insects.

II.—What is known of the history of migratory fishes, especially of those which serve for the food or other purposes of man? It is requested that any works referred to may be notified with precision; and that, by a critical examination, the degree of credit to be attached to the information made use of, may be ascertained.

III.—However important may be the recent researches in the chemistry of organic bodies, it cannot be denied that, for the most part, they relate to the examination of vegetable rather than of animal substances. With a view therefore of contributing something towards the promotion of animal chemistry, the Society requests an exact examination of the substances known under the name of "animal extract," or "osmazone," a name common to them all, notwithstanding the difference in their composition according to the diversity in the animals, or parts of bodies from which they are drawn. Are these substances individual principles, or are they rather composed of other more simple elements of the animal body?—What are the differences in these substances, as obtained from different animals, or from different parts of the same animal body?

IV.—What is the nature of chlorophylle, (phlylochlore, chromale), in vegetables? What is its form and composition; and what are the characters by which this substance differs from other vegetable matter? Is it different according to the diversity of plants containing it, and what constitutes such a difference? What are the circumstances by which it is produced, and changed, or modified, in plants, during the process of vegetation? Vide Pelletier and Caventon, 'Annales de Chimie et de Physique,' vol. ix. p. 194. Macaire-Princep., ibid., vol. xxxviii. p. 415. Mulder, Scheinkundig Archiv. vol. ii. p. 1.

V.—The experiments of Lavoisier, Seguin, H. Davy, Pfaff, Allen, Pepys, Dulong, Despretz, Prout, and others, relating to respiration having in many cases produced contrary results, and our chemical knowledge with regard to this subject being as yet very limited, the Society wishes for a critique upon, and, as far as may be judged expedient, a repetition of these experiments, as well as a solution of the following questions. What is the difference in the composition of air, as inhaled or expired? Is the oxygen of the air returned in an equal quantity, and in combination with carbon, in expirated carbonic acid gas? Is nitrogen separated from the blood in respiration? What do we generally remark during the respiration of the different orders of animals? What consequences may we draw from a more extended knowledge of respiration, for explaining the changes which the blood undergoes by its means? The Society requests that in replying to these questions, an adherence to facts may be observed, without entering upon theoretical views.

VI.—What is the composition of the iron ores found in Holland, and which are those that may be employed in the preparation of iron of a good quality? What kinds of iron can be produced from the minerals of this country, and what relation is there between the composition of these minerals, and of the iron drawn from them? What are the qualities and the distinguishing characters of the different kinds of iron prepared from different oxides; and what are the modifications to which the processes now in use must be submitted, in order to improve the quality of the metal?

VII.—It appears to result from the experiments of M. Jacobi, that the electro-magnetic force may be employed as a new impelling power; which, as much by the simplicity of the apparatus, as by the absence of all danger, will be preferable to any other force of which we have hitherto availed ourselves.

In consequence of this the Society request that it be proved by new researches, First, how far the impelling electro-magnetic force may be augmented to this end? Secondly, what is the apparatus by which a given electro-magnetic force, equivalent, for example, to three or four horses, can be produced? Thirdly, what are the metals and acids which may be employed with most advantage? And what form is it necessary to give to these metals, and how must they be arranged, to reduce them into powerful electro-impellers, acting with the least loss of metal, and the greatest economy of acid? Vide 'Memoire sur l'application de l'Electro-magnetisme au mouvement des machines,' by M. H. Jacobi, Doctor and Professor at Dorpat: Potsdam, 1835. And Messrs. Steatingh et Becker, Algem-Konst, en Letterbode, No. 54 and 55, "Electro-magnetische Wagen."

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The Society this year proposes the following ten questions to be replied to before the 1st of January, 1840.

I.—No place in the kingdom of the Netherlands being as yet determined with exactness by means of astronomical observations, the Society desires that the latitude and longitude of one or more places in the Netherlands be determined by astronomical observations. The decision of the Society will depend more upon the exactitude of the observations, and the neglecting no precautions which the present state of astronomy requires, than upon the instrument made use of; and it is anxious that the observations made, should in no respect yield in accuracy to those of other countries.

II.—The Society wishes for a clear and precise description, as well as a complete theory, of the prismatic circle of reflection, invented by Steinheil, and perfected by Ertel; with a comparative examination of that instrument, as well as of the nautical sextant, and the common circle of reflection.

The Society desires that the uses of this instrument in astronomy and navigation be exactly explained; and that the advantages which it possesses over the above-named instruments be pointed out, and the changes noticed which may render it less expensive, and of more general use. Vide the

'Astronomische Nackrichten de Schumacher,' Nos. 243 and 244; and above all consult M. Bessel's excellent paper upon the prismatic circle, in the above-named Journal, Nos. 254 and 255.

III.—Among those discoveries which are most fertile in results, and which appear more especially calculated to throw new light upon the phenomena of living bodies, we must place that of a new chemical action, which M. Berzelius has entitled 'catalysis.' The Society requests that this action be studied in all its relations; that the substances which have shown this action be brought to act on each other under every variety of circumstances; that it be endeavoured to discover the catalysis among bodies in which it has not yet been observed; and that it be noticed whether it be observable in the organic tissue of plants and animals; and finally, that in case it should be there traced, an examination be made as to what may be its consequences in explaining the phenomena of living bodies.

IV.—Meteorologists are agreed, that great variations in temperature reach us from the East, which is particularly observable in winter, when the frost is usually felt some days earlier at St. Petersburgh than at Amsterdam. The Society desires that this meteorological phenomenon be examined in all its details, and its causes determined with as much exactness as possible.

V.—It appears to be proved by experiments made in England, that the inference deduced from the law of the resistance of water, that it would be impossible, in navigation, to exceed a certain degree of rapidity, can no longer be admitted; but that when a certain degree of rapidity has been attained, the vessel, being elevated from beneath, experiences less resistance. The Society requests that this subject be illustrated by fresh experiments; and that it be proved, as far as possible, by analytical researches, but above all, by practical experiments,—what influence the elevation towards the surface, of boats of different constructions, may have upon the relation between speed and distance, when the former becomes very considerable. The Society *then* wishes that it be analytically deduced from the precedent facts, what form of vessel, moving with great velocity, will experience the least resistance.

VI.—Why in lofty stoves is the employment of air heated to a high degree so advantageous? Can this heated air be employed with advantage in the other operations to which iron is submitted, for different uses besides those in which it is already employed? Might its use advantageously replace that of cold air, in the production of other substances besides iron, where it is not yet employed?

VII.—Geologists agree that the fossil remains of animals and plants found in the different beds composing the crust of the earth, contribute very much to characterise these beds.—There exists, however, one great difficulty in this respect, which is, that some of these beds, composed of the fragments of more ancient ones, contain many fossil species of the latter mingled with the remains of animals and vegetables which existed at the time of the deposition of the former. This mixture may easily lead to erroneous conclusions; and the Society enquires, What are the beds in which this intermingling takes place? And by what means may we guard against erroneous conclusions in consequence?

VIII.—Dr. Prevost, a celebrated Genevese naturalist, has for a long time, and particularly recently, been endeavouring to prove, by highly ingenious experiments, that muscular contraction, and consequently all the movements of animals, are in immediate connexion with galvanic or magnetic currents, which direct themselves along the nerves extending to the muscular fibres. The Society, convinced that this opinion, though not without some appearance of probability, is yet far from being proved, desires that it be further examined; that the observations and experiments of Dr. Prevost be repeated, and fresh experiments made, which may either put its correctness beyond doubt, or disprove its accuracy.

IX.—It has been proved by the experiments of the celebrated French naturalists, Brechet and Becquerel, that it is possible not only to introduce metallic wires through the skin, and the organs situated beneath it, into the interior of the human body, which fact had long before been ascertained; but farther, that we may direct along these wires a galvanic or magnetic current, towards any one of the interior organs.—The Society enquires, In what case can such a current, directed against one of the diseased organs of the human body contribute to its cure? It is desired that by fresh and direct experiments, this action may be studied, applying it immediately to unhealthy organs in the human frame.

X.—Since the time of Celsius it has been believed that a gradual elevation of the soil above the level of the Baltic sea has been observable in some territories of Scandinavia. This belief has recently been confirmed by the researches of the celebrated English geologist, Lyell. In other countries, as in England, and in France, we remark, not far from the coast, the remains of marine animals, which prove that the soil in which they repose, and which is now dry, was formerly covered by the same sea, which, at an inferior level, now washes their shores. On the other hand, the illustrious Swedish geologist, Nilson, has shown, that another part of Scandinavia remains at the same level, or rather, that it sinks; so that the phenomenon observed appears to consist in a see-saw movement, upon an axis whose position is not thoroughly known. The Society requests, that by a particular examination it be discovered, whether in Holland, or the neighbouring states of this kingdom, a similar elevation or depression be observable; or whether it can, on the contrary, be concluded, from the nature of their soil and the fossil remains which they contain, that nothing of the kind has taken place there.

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The Society recapitulates that it has proposed, in preceding years, the thirteen following questions, to be replied to before the 1st of January, 1839.

I.—Sulphur, considered in relation to its existence in nature, being met with in associations and localities widely differing from each other, some of which have given reason to suppose that this substance is produced in a different manner from the greater number of minerals, or, indeed, that it may perhaps derive its origin from organic bodies;—the Society requires the natural history of sulphur, particularly with reference to the different combinations and relation under which it presents itself; and the deductions which may be thence gathered, concerning its origin and production.

II.—The progress of Chemistry having made known a great number of methods by which, from very different materials, sugar may be produced; it is required, What are the different species of such artificial sugar? And what is the best method of producing each kind; Also, which of these kinds is the most useful, and the most suitable to take the place of cane-sugar, and other kinds now in use?

III.—What are the different species of animals which, by perforating, destroy the piles and other wooden works which surround our shores and dykes, in many places?—What is the natural history and anatomy of these animals? What are the means which have hitherto been employed to resist their devastations? Finally, what will further researches into their natural history and comparative anatomy offer, as a means of preservation preferable to those already known? The Society does not wish that, in reply to these questions, anything should be repeated which is already known. It requires, on the contrary, that new researches should supply what is deficient in the old ones.

IV.—An enormous quantity of different gases escapes from the bosom of the earth with spring water, in almost all countries. The Society requires that this be examined in reference to the springs which are found in the kingdom of the Netherlands. The Society is desirous that it should be ascertained, by exact experiments, and by all the means which Physics and Chemistry supply, whether gases really accompany the waters of our springs at their exit from the earth; and if so, what is the composition of these gases?

V.—The researches of Dr. Rathke have proved that the fresh water crawfish undergoes no very considerable metamorphosis after quitting the egg; while, according to the important discoveries of Mr. Thomson, crabs do not arrive at their perfect state, until after having passed through many intermediate ones. This great difference between two genera so nearly allied, has attracted the attention of the Society.—It therefore requests that further enquiries may be made on this subject; and that a description may be given, accompanied with accurate figures, of the developement of one or more species of crab, from their escape from the egg to their perfect state.

VI.—According to some botanists, *Algæ*, of a very simple structure, placed under favourable circumstances, develope, and change into very different plants, belonging to genera much more elevated in the scale of organic beings; although these same *Algæ*, in the absence of such favourable circumstances, would be fertile, and reproduce their primitive form. The Society judging that "if we could place these observations beyond dispute, and prove, in an undoubted manner, the transmutation of two organized bodies, the one into the other, we should have made an immense step in the knowledge of these bodies;" requires that these observations be repeated with the greatest care; that they be extended to other plants, which have not yet been examined in this point of view; and that, finally, the reality or the falsity of this transmutation of one organized body into another, be proved, by exact descriptions, and by detailed figures.

VII.—What are the substances whose physical properties are distinct, though their chemical composition is absolutely the same; since they contain the same elements, united in similar numbers and in the same manner?

VIII.—Many experiments, particularly those of M. Becquerel, having made known the influence exercised by Electricity and other physical forces, in the formation of crystals, even in substances, the crystallization of which it had previously been difficult to explain, such as quartz, and other very hard minerals: and considering that the knowledge of all the circumstances which concur in the crystalline formation of minerals, may serve to explain many points in geology; it is enquired, What are the observations and experiments which demonstrate the influence of Electricity, Magnetism, Heat, and Light, upon the crystallization of quartz and other minerals insoluble in water; and by which, at the same time, we may be made acquainted with the other circumstances favorable to crystallization? The Society is desirous that this subject should be explained by fresh experiments.

IX.—The supposition of a spontaneous generation of *Infusoria*, and other small animals, having been considerably checked, and in part refuted, by the numerous and important observations of Professor Ehrenberg, relating to the organization and reproduction of *Infusoria;* the Society proposes this question. What are the animals formerly supposed to multiply without fecundation, but the propagation of which by sexual intercourse is now sufficiently established? Which on the contrary, are the animals, whose production, not preceded by fecundation, we must still admit? Above all, what notion may we form, in the present state of Zoology, of the origin of intestinal animals?

X.—How far are we acquainted with, or ought we to admit, those physical forces which M. Dutrochet believes himself to have discovered, and which he points out by the names of "Endosmose et Exosmose," in his work entitled 'L'agent immédiat du mouvement vital, devoilé dans là nature et dans sa mode d'action, chez les végétaux et chez les animaux.'—Paris: 1826? See also, 'Annales de Chimie et de Physique,' vol. xxxv. p. 393, and vol. xxvii. The Society is desirous to see this subject cleared up as much as possible by fresh researches.

XI.—It has been frequently observed among some living plants, that in certain cases they emit a phosphoric light; as for instance, the *Tropæolum*, *Calendula*, *Lilium bulbiferum*, *Tagetes*, *Euphorbia phosphorea*, *Rhizomorpha*, &c.; and the Society requests, That by researches made for this express purpose, it should be endeavoured to elucidate this phenomenon; to ascertain how far what has been stated concerning it is admissible as fact; and what are the circumstances under which it takes place, as well as what is the cause of it. Vide 'Acta Suecica,' 1762 and 1768. Ingenhouz, 'Versuche mit Pflanzen,' 79; 151. Nees V. Esenbeck & Bischof; 'Nov. Act. Leop. Car. II.' 605. L. C. Treviranus, 'Zitschr.

für Physiol.' iii. 261. Martius, 'Reisenach Brasilien,' ii. 726. 'Flora,' 1837, p. 8.

XII.—What fossil remains of animals and plants are found in the different beds of the soil in Holland, except the strata around Maestricht? What do they teach us respecting the relative ages and succession of these beds; as well as of the changes which the soil of this country has undergone in past ages?

XIII.—What does experience teach us with regard to the cause of violent tempests, like those which took place on the 9th of November, 1800, and the 29th of November, 1836?—Had these two storms, and other anterior ones, been preceded by phenomena announcing their approach? Over what space did the storm of November the 29th, 1836, rage with the same violence as in this country, as far as can be judged of from its effects? In what parts of Europe did it commence, and in what parts was it latest felt; and what may we conclude from thence with regard to its course? Is it known, by positive accounts, that similarly violent storms have taken place at the same time, or nearly the same time, in different parts of the world, distant from each other? What were the most particular and remarkable phenomena observed during the last storm?

It is required that the papers and other authentic documents referred to in replying to this question, be pointed out.

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Historical Question, to be replied to before the 1st of January, 1840.

What may we know with certainty, by consulting History and the researches of learned men, aided also by archives and local tradition, concerning the successive changes which the downs that border the shores of Holland have continually undergone, since the times of the earliest written account to the present day; especially with regard to the losses sustained by these downs on the side towards the sea; and, on the other hand, with regard to what they have gained by encroaching on the opposite side, by the progressive advance of the sand; and what has been the effect upon the woods, lands, and waters of the interior?

The reward for a satisfactory reply to each of the above questions, is a gold medal of the value of 150 florins; and a further reward of 150 florins Dutch, when the answer is judged to be deserving of it. The answers must be legibly written in Dutch, French, English, Latin, or German, in Italic characters, and addressed, post paid, with billets, in the accustomed manner, to the permanent secretary of the Society, at Haarlem.

## SHORT COMMUNICATIONS.

*Plumage of the Smew Merganser.*—I would remark that the fact stated by my friend, Mr. Bartlett, at p. 398, of the young male smew, is far from being of general occurrence, to judge from a number of specimens which I have examined late in the spring, with a view to ascertain whether they then exhibited signs of moulting, (as in the golden-eye), which proved not to be the case. The living specimen still in St. James's Park certainly did not possess the marking adverted to, during last summer, as I remember distinctly: it attained its mature plumage at the autumn moult, which remained unsullied until about six weeks ago, when it rapidly assumed the colouring of the adult female, but without change of feather, as in the common duck and its allies), a metamorphosis which also takes place in the male bay-breasted merganser, (*Mergus serrator*), and doubtless in the large species, (*M. merganser*); it is likewise effected very completely by the common red-headed pochard, (*Fuligula ferina*).—*E. Blyth.* —*June 23rd*, 1838.

*Plumage of the Crossbill.*—I have just received three recent specimens of the common crossbill, (obtained in Merton, Surrey), all birds of the present season, the plumage of which is especially interesting, as demonstrably establishing the fact, stated by me on previous occasions, that the saffron tint, commonly described as peculiar to the old males, is also sometimes assumed at the first moult: while, on the other hand, I have long since ascertained, from personal observation, that many of the old males re-acquire the red plumage, which, in such specimens, is always much finer and more vivid than the young once moulted.

Of the three now before me, the first is a female, in the striated nestling garb, unmingled with other feathers: the second a male, with a series of orange feathers on each side of the breast, and a few elsewhere; the rest unmoulted, and as in the preceding: the third another male, in the plumage ordinarily described as that of the *old* bird only, but still retaining many streaked nestling feathers on the belly and elsewhere. The striated nestling garb of the male is considerably more distinct and vividly contrasted than that of the female. —*Ib.*—*July* 25*th*, 1838.

*Effects of the excessive and protracted cold of the last Winter.*—One of the natural consequences of the severity and long continuance of the frost, as well as the great depth of the snow, was the extreme boldness and destructiveness of the wolves, which killed great numbers of men and cattle, made inroads into provinces where they had long been extirpated; nay, they penetrated even into populous cities.

As early as the middle of January many of them made their appearance in the neighbourhood of Stuttgart, either from France or Switzerland; they devoured a boy twelve years of age, about five English miles from that city: but the eagerness with which they were persecuted put a stop to further accidents.

Numerous reports from all parts of Hungary assert that the wolves, prowling about in packs, have destroyed great numbers of men and cattle. In the night of the 7th of February, ten wolves forced their way into the barn of a peasant, in the village of Lekenek, near Agram; whence they were not dislodged until they had severely wounded eight head of cattle.

The eastern provinces of Prussia were much infested by the wolves which crossed over the frozen rivers, from Poland.—They met with a warm reception from the Prussian foresters, which however did not hinder one of them from assailing a horse in one of the busiest streets of Königsberg, on the 27th of February. The wolf was immediatly attacked, but succeeded in escaping from the city.

Many species of birds were obliged to migrate to countries or resort to localities, which, in general, are not visited by them. Among those which poured in from the north, the wild swans excited most attention in Germany. Their flight extended all over that country and the Netherlands; when, however, they fell in with a river running northwards, they followed its course; thus they were observed all along the Rhine, and in Switzerland, having been seen not only on the lake of Constance, but also on those of Biel and Waldstädlen. They were often so exhausted that several were caught alive in different parts of Germany.

About the end of January immense flocks of aquatic birds particularly ducks of various species, arrived in the Departement des Landes, completely exhausted. Above 20,000 are said to have been taken by the country people along the coast of that district. *W. Weissenborn. Weimar.*

# THE MAGAZINE

OF

# NATURAL HISTORY

SEPTEMBER, 1838.

## Art. I. *Some Observations on a Collection of Ferns from the Island of Jamaica.* By Robert Heward, Esq., F.L.S.

In submitting the accompanying remarks, my principal object has been to point out the great facilities which exist for extending our knowledge of the almost boundless stores of vegetation, at present but imperfectly known,—and also the opportunities for increasing our botanical collections from a part of the world, which, although it has been nearly two hundred years under the dominion of Great Britain, still contains many botanical rarities which seldom reach this country.

The West India islands, although within a month or six weeks' sail from England, have been less *botanically* explored than many places at a much greater distance; while the luxuriance of their vegetation, and the ready communication with this country, ought to put us in possession of many plants, as yet known only through the works of Sloane, Plumier, P. Browne, and Swartz.*

My very limited knowledge and equally limited opportunities afforded me but few chances of collecting specimens; yet

* Since the above was written I have seen the first part of the 'Flora of Jamaica' by Dr. MacFadyen, which appears to be a most excellent work, and from that gentleman's long residence in that island cannot fail to be interesting to the botanical world.

with these drawbacks, I have sent or brought home upwards of 80 species of ferns, and about 500 species of phænogamous plants. Now, if with the slender means that I possesed, I was able to make such a collection, what might not be expected from any intelligent botanist, who would visit these islands? I have no hesitation in saying his harvest would be most abundant.

The number of ferns enumerated below amounts to seventy five species. They were collected in the parishes of St. Elizabeth, and Manchester, in the island of Jamaica, during my residence there in the years 1823-4-5, and part of 1826.—The time that I was enabled to appropriate to botanical pursuits was very limited; my avocations and a severe fit of illness prevented me from devoting to the collection of specimens so much time as I wished to do.

The portion of country in which I made my collections was small, extending only, from east to west, about 25 miles, and from north to south about 15 miles; and in this small space, nine-tenths of the ferns were collected in the eastern half, which is a more mountainous and less settled district than the western portion. I was particularly struck with the circumstance that few of the ferns growing in the western, or more open district, were to be found in the eastern or more wooded one, although the distance was so trifling, and in some cases the habitats (stone walls) were the same. I will point out a few instances; but in the first place I should mention, that the western portion of this district has been much longer under cultivation than the eastern, and that, consequently, there is very little woodland left. The timbers are of a small description, few of the trees exceeding ten inches in diameter, and those growing mostly in places the cultivation of which is given up, or in the local island phrase, "run to ruinate." These thickets, for they are little better, generally consist of bully tree, (*Achras, sp.*), lance-wood, (*Guatteria virgata*, Dunal.), maiden plum, (*Comocladia integrifolia*, Linn.), birch, (*Bursera gummifera*, Jacq.), &c. A large portion of this part also is a lowland district, the cultivated part principally grass, the establishments being for the breeding of horses, mules, and horned stock, and in some few places, the sugar-cane is grown. The fences are either logwood, (*Hæmatoxylon campeachianum*, Linn.), which, when clipped, looks very like a hawthorn hedge, and forcibly reminds the traveller of the well-trimmed hedges of *home*; pinguin, (*Bromelia Pinguin*, Linn.); or stone walls; these last are a favorite habitat of ferns, the top being often crested with them for their whole length.

In the eastern part of this district there is much forest land that has never been under cultivation, and the elevation is considerable, compared with the western part. The Carpenter and Mayday mountains being about 2500 feet above the level of the sea. The principal cultivation in this part is coffee. The fences are either stone walls or posts and rails, but few live fences, it being too cold at that height for logwood or pinguin to be advantageously planted. The walls here also are a favourite habitat for ferns, but of different species, except in one or two instances, from those found in the western part. The fern that I most frequently found in the western part was *Cheilanthes microphylla*, Sw.; with occasionally, but not often, *Polypodium incanum*, Sw. In the eastern part the fern that was in the greatest abundance in similar situations, (stone walls), was the very graceful *Polypodium pectinatum*, Linn., in company with *P. incanum*, and two new species which are described below.

Another favourite place of growth for ferns is the horizontal branches of *Bombax Ceiba*, Linn., the towering silk-cotton tree, which are always crowded with *Filices*, *Orchidaceæ*, *Bromeliaceæ*, *Aroideæ*, &c., forming beautiful gardens at a considerable elevation above one's head. One thing that struck me as very singular in these parasitic ferns was, that the form of the fronds was always either simple or pinnate, and I never observed a fern with a multifid frond growing in similar situations. I do not mean to assert that ferns with multifid fronds do not grow on trees, but certainly I never observed them, although I often searched.

The richest collections of ferns are generally to be found on the sides of roads cut through the forests, each side being generally densely clothed with filical rarities in such abundance, that a newly-arrived botanist cannot but be struck with wonder at such a display of ferns, mostly unknown to him; and he is enabled to make a plentiful collection at a trifling expenditure of labour.

In the primæval forests where the *Bombax*, *Cedrela*, and *Ficus* grow to the enormous size of from 25 to 36 feet in circumference, and often from 50 to 60 feet in height before the branches break forth, the tree ferns appear most to luxuriate. In the district where I resided I never saw one above 25 feet in height; in fact, the average height is about 18 feet, with a *caudex* of 6 inches in diameter: but in the Port Royal and Liguanea mountains they attain a much greater altitude.—They are very splendid in certain wooded districts, and exceedingly beautiful in their form; the segments of their multifid fronds, moving with the slightest breath of air, are constantly in motion, and give them a most elegant and graceful appearance.

In enumerating the ferns that I brought to England, I have quoted the best figure of each species that I have been able to compare them with; and by the very excellent plates in the works of Sloane, Plumier, and the 'Icones Filicum' of Hooker and Greville, I have been enabled to determine many of my specimens.

## *GLEICHENEÆ*, R. Br.

### Gleichenia, Sm.

G. *immersa*, Kaul.; Icon. Fil. *t.* 15; Kaul. Enum. p. 38.—(*Mertensia*).

This species of *Gleichenia* has a straggling growth, supporting itself among the surrounding bushes, and sometimes attaining a length of 15 or 20 feet.

Woodsides; Mayday mountains, Jamaica.

## *OSMUNDACEÆ*, R. Br.

### Aneimia, Sw.

A. *adiantifolia*, Sw.; Icon. Fil. *t.* 16; Willd. Sp. Pl. vol. v. p. 94.

This graceful fern varies much in size: I have specimens from an inch in height to 18 inches. The segments of the frond also vary considerably in their configuration.

Growing in great abundance on a bank near Warwick plantation, Manchester, Jamaica.

## *POLYPODIACEÆ*, R. Br.

### Polybotrya, Humb.

1. P. *cervina*, Kaul.; Icon. Fil. *t.* 81; Kaul. Enum. p. 55.

I only found the variety with narrow fronds, (β, var. *lanceolata*. H. and G.), in Jamaica. It is very common, growing in large patches in the woods of the Mayday mountains, but not often producing fertile fronds. I have fine specimens of this fern with broad fronds, from Trinidad.

2. P. *cylindrica*, Kaul. Enum. p. 56.

This is a scandent fern, growing to the height of 20 feet up the trunks of trees, and is rather common. My specimens agree with Kaulfuss' description, but he makes no mention of its being scandent. There is no figure of it, that I am aware of.

Mayday Mountains.

### Acrostichum, Linn.

1. A. *aureum*, Linn.; Plum. Fil. *t.* 104; Willd. Sp. Pl. vol. v. p. 116.

This noble fern is very plentiful in morasses and water-courses in the lowlands of Jamaica. It grows from 8 to 10 feet in height. I never found it at any great elevation above the sea-shore.

Milk River, &c. Jamaica.

2. A. *nicotianæfolium*, Sw.; Willd. Sp. Pl. vol. v. p. 118.

Generally found at the margins of woods. The barren frond is of a very bright green while growing, and the texture rather delicate.

Mayday mountains. I have it also from Trinidad.

### Gymnogramma, Desv.

1. G. *Lowei*, Hook. & Grev.; Icon. Fil. t. 89.

This fern, which I have little doubt of being the same as the one figured in the splendid work quoted above, is an instance of the wide range of habitats of ferns; for the plant from which the figure was taken came from Madeira, growing at a height of between 2000 and 3000 feet; my specimens were found at about the same height, in the Mayday mountains.

2. G. *gracile*, *n. s.*

*G. gracile*, frondibus pilosis lanceolatis elongatis bipinnatifidis, pinnis lanceolatis attenuatis alternis: infimis brevibus, laciniis linearibus apice rotundato crenato.

Frons 2-pedalis utrinque pilosa. Pinnæ 4-6 pollicares pinnatifidæ. Laciniæ 6-lineares apice crenato. Sori insidentes venis secondariis simplicibus.

I found this fern in the mountain woods in the parish of Manchester, Jamaica, at the same elevation as the preceding species. It is not very common.

3. G. *tartarea*, Desv.; Willd. Sp. Pl. vol. v. p. 131. (*Hemionitis dealbata*).

This and the following species I found growing in a marl-pit, in the same wood where I had previously found the two other species of this genus.

4. G. *calomelanos*, Kaul.; Plum. Fil. *t.* 40; Kaul. Enum. p. 76.

I think starved specimens of *G. calomelanos* often go under the name of *G. tartarea*.

### Grammitis, Sw.

1. G. *elongata*, Sw.; Spreng. Crypt. *t.* 3. *fig.* 21; Willd. Sp. Pl. vol. v. p. 140.

Generally to be found on decaying trees in the deep mountain woods. Manchester.

2. G. *angustifolia*, Willd. Sp. Pl. vol. v. p. 153. (*Polypodium*).

This is a true *Grammitis;* Willdenow had not seen the fructification. *Polypodium dimorphum* of Link is probably the true *P. angustifolium,* which is figured in Raddi, *t.* 24, *f.* 2. This fern grows in more open situations than the preceding.
Mayday Mountains.

TÆNITIS, Sw.

T. *lanceolata,* Kaul.; Plum. Fil. *t.* 132; Kaul. Enum. p. 130.

I found this fern but once; it was growing on the rotten stump of a tree in a coffee-plantation in the Mayday Mountains.

POLYPODIUM, Linn.

1. P. *exiguum, n. s.*

*P. exiguum,* frondibus glabris repandis, sterilibus oblongis, fertilibus linearibus apice attenuato, caudice filiformi, soris solitariis.
Frons glabra, sterili semipollicari oblonga repanda; fertili sesquipollicari lineari repanda utrinque attenuata. Caudex filiformis repens setoso-paleaceus.

This and the following species are rather common on stone walls in the Mayday Mountains. I believe they have not been previously described.

2. P. *glabellum, n. s.*

*P. glabellum,* frondibus glabris, sterilibus oblongis, fertilibus lineari-lanceolatis bifidisque, margine reflexa, caudice filiformi repente, soris solitariis immersis.
Frons glabra, margine reflexa, sterili pollicari oblonga; fertili bipollicari lineari-lanceolata bifidaque. Sori solitarii immersi, margini approximati. Caudex filiformis repens setoso-paleaceus.
I have specimens of this fern also from Trinidad.

3. P. *serpens,* Sw.; Plum. Fil. *t.* 121; Willd. Sp. Pl. vol. v. p. 148.

Common on the trunks of trees in the shady woods.
Mayday Mountains.

4. P. *Phyllitidis,* Linn.; Plum. Fil. *t.* 130; Willd. Sp. Pl. vol. v. p. 157.

Common on the honey-combed limestone rocks in the Mayday Mountains.

5. P. *crassifolium,* Linn.; Plum. Fil. *t.* 123; Willd. Sp. Pl. vol. v. p. 161.

Very frequently found with the preceding species.

6. P. *pectinatum,* Linn.; Bot. Cab. *t.* 748; Willd. Sp. Pl. vol. v. p. 180.

Very common on stone walls in the Mayday Mountains.

7. P. *incanum*, Sw.; Schkuhr Fil. *t.* 11, b; Willd. Sp. Pl. vol. v. p. 174.

Generally growing with the last-named species, or with *Cheilanthes microphylla*, in similar situations. It varies much in size. I have it also from Trinidad, Brasil, and Sierra Leone.

8. P. *sporadocarpum?* Willd.; Willd. Sp. Pl. vol. v. p. 171.

This fern has very much the habit of *P. aureum*, except that the *laciniæ* of the fronds are broader in the middle, and much closer together: it belongs to a section of *Polypodium* extremely difficult to determine without accurate figures. I mostly found it growing about the spurs of large trees, in open districts in the Mayday Mountains.

9. P. *loriceum*, Linn.; Plum. Fil. *t.* 78; Willd. Sp. Pl. vol. v. p. 176.

Found generally in the same situations as the preceding, but occasionally in the woods.

10. P. *simile*, Linn.; Sloane Jam. *t.* 32; Willd. Sp. Pl. vol. v. p. 192.

Common on living trees in the woods near Wellington plantation, on the western face of the Mayday Mountains, where it has a very graceful appearance as it hangs down, the *stipes* being slender, and unable to bear the fronds erect.

11. P. *reptans*, Sw.; Sloane Jam., *tt.* 29, 30; Willd. Sp. Pl. vol. v. p. 186.

Growing in a damp ravine in the woods near Old England plantation, Manchester.

12. P. *Smithianum*, *n. s.*

*P. Smithianum*, frondibus pilosis latè-lanceolatis pinnatis, pinnis lanceolato-acuminatis subsessilibus profundè crenatis oppositis vel alternis, pinnis terminalibus petiolatis, venis stipiteque pilosis, soris medio venarum insidentibus.

Frons sesquipedalis pilosa. Pinnæ 4-pollicares profundè crenatis. Sori pilosi.

I have great pleasure in dedicating this species to my old and valued friend Mr. John Smith, the able Curator of the Royal Botanic Garden at Kew, who has for many years successfully dedicated his time to the growth of this most interesting family.

Common in the woods on the western face of the Mayday Mountains; I have specimens also from Trinidad.

13. P. *crenatum*, Sw.; Plum. Fil. *t.* 111; Willd. Sp. Pl. vol. v. p. 189.

Frequent in the mountain woods near Old England plantation, Manchester. I have this also from Trinidad.

14. P. *Lunanianum*, *n. s.*

*P. Lunanianum*, frondibus pilosis latè lanceolatis pinnatis, apice pinnatifido, pinnis lineari-lanceolatis attenuatis basi cuneatis subsessilibus obliquè crenatis: infimis brevibus, soris biserialibus.

Frons bipedalis. Stipes venæque pilosi. Pinnæ 4 pollicares, infimis pollicaribus obliquè crenatis.

I have named this species after John Lunan, Esq., author of the 'Hortus Jamaicensis,' 2 vols. 4to., a work highly creditable to a colonial press.

This species is common in the woods near Wellington plantation, Manchester.

15. P. *miser*, *n. s.*

*P. miser*, frondibus glabris deltoideis tri-pinnatis, pinnis alternis vel oppositis lanceolatis, pinnulis primariis alternis, pinnulis secondariis subopposítis profundè pinnatifidis, laciniis lanceolatis serratis remotis, soris minutis venis dichotomis terminalibus.

Frons 3-4 pedalis glabris subtus resinoso-glandulosa. Stipes 2 pedales canaliculati. Pinnæ pedales. Pinnulæ primariæ 2-3 pollicares. Pinnulæ secondariæ pollicares distantes profundè pinnatifidæ. Laciniæ serratæ. Sori venas dichotomas terminantes.

Frequent in the mountain woods near Old England plantation, Manchester. This species is remarkable in bearing only a single frond at a time from its root.

16. P. *effusum*, Sw.; Sloane Jam., *t.* 57, *f.* 3; Willd. Sp. Pl. vol. v. p. 208.

Common at the sides of the roads which are cut through the woods in the Mayday Mountains.

LOMARIA, Willd.

L.? *longifolia*, Kaul.; Plum. Fil. *t.* 117, *fig. dextra*; Radd. Fil. *t.* 73? Kaul. Enum. p. 152.

I much doubt if this fern be a *Lomaria*, and am inclined to agree with Willdenow, who places it in *Acrostichum*, for I have never satisfied myself that it has an *indusium*; if it has one it must be very fugacious. *Lomaria fraxinifolia* of Raddi I think is not distinct; *L. fraxinea* of Willdenow from the Mauritius I have never seen: he speaks of it as very distinct from *Acrostichum (Lomaria) sorbifolium*, and as having "*indusia integerrima.*"

This is a scandent fern, growing to a considerable height up the trunks of trees, and rather common in woods in the Carpenter and Mayday Mountains: I have it also from Trinidad.

ANTROPHYUM, Kaul.

A. *lanceolatum*, Kaul.; Schkuhr Crypt. *t.* 6; Kaul. Enum. p. 198.

This is scarcely an *Antrophyum*, for the *sori* are not immersed in the substance of the frond.

Found sparingly in the woods both on living and dead trees. Mayday Mountains.

### Diplazium, Sw.

1. D. *plantagineum*, Sw.; Schkuhr Crypt. *t.* 65; Willd. Sp. Pl. vol. v. p. 351.

Very common by roadsides in the Carpenter and Mayday Mountains. I doubt if *D. acuminatum* of Raddi is distinct from this.

2. D. *juglandifolium*, Sw.; Sloane Jam. *t.* 37; Willd. Sp. Pl. vol. v. p. 352.

Frequent with the preceding species in the Mayday Mountains.

3. D. *obtusum*, Kaul. ined.; Link Hort. Berol. vol. ii. p. 73.

Rather common in the woods near Old England plantation, Manchester.

### Pteris, Linn.

1. P. *longifolia*, Linn.; Plum. Fil. *t.* 69; Willd. Sp. Pl. vol. v. p. 369.

On rocks in the open country, Manchester.

2. P. *grandifolia*, Linn.; Plum. Fil. *t.* 105; Willd. Sp. Pl. vol. v. p. 369.

This elegant fern grows to the height of 8 feet. It is not common: I only found it twice, in coffee-plantations that had been given up. Mayday Mountains.

3. P. *Plumerii*, Willd. Supp.; Spreng. Syst. vol. iv. p. 74.

Frequent in the woods near Old England plantation, Manchester.

4. P. *concinna, n. s.*

*P. concinna*, frondibus glabris deltoideis bipinnatifidis; pinnis lanceolatis: infimis bipartitis, laciniis linearibus apice rotundato argutè serrato.

Frons sesquipedalis et altior glabris. Stipes pedales. Pinnæ 6 pollicares, infimis 2 pollicaribus. Laciniæ pollicares.

I never saw this fern but once: it is very distinct from any *Pteris* I have yet seen. I found it in the woods near Grant's Green plantation on the western face of the Carpenter's Mountains, a few days previous to my embarkation for England. It was the last fern I collected in Jamaica.

5. P. *heterophylla*, Linn.; Plum. Fil. *t.* 29; Willd. Sp. Pl. vol. v. p. 394.

Occasionally found in the back woods of the Mayday Mountains.

6. P. *caudata*, Linn.; Plum. Fil. *t.* 29; Willd. Sp. Pl. vol. v. p. 401.

This fern is a great pest to the cultivator, in those soils in which it has established itself, for there is great difficulty in eradicating it, the roots running very deep into the earth. It grows 10 feet high, and much resembles *P. aquilina* in habit.

Too common in St. Elizabeth's and Manchester.

ASPLENIUM, Linn.

1. A. *serratum*, Linn.; Plum. Fil. 124; Willd. Sp. Pl. vol. v. p. 304.

Grows in large tufts on the honey-combed rocks in the Mayday Mountains.

2. A. *ambiguum*, Raddi; Raddi Fil. *tt.* 54, 54 *bis;* Spreng. Syst. vol. iv. p. 82; (*A. Shepherdii*).

I believe the fern figured by Raddi to be the same as Sprengel has named *A. Shepherdii:* Raddi's name being the oldest, of course must stand. It occasionally has the *sori* of a *Diplazium*.

Common in the woods near Old England plantation, Manchester.

3. A. *obtusifolium*, Linn.; Icon. Fil. *t.* 230; Willd. Sp. Pl. vol. v. p. 314.

Common in similar situations, with the preceding.

4. A. *brasiliense*, Raddi; Raddi Fil. *t.* 51. *fig.* 1.

Woodsides at the back of the Mayday Mountains.

5. A. *auritum*, Sw.; Sloane Jam. *t.* 31. *ff.* 1, 2; Willd. Sp. Pl. vol. v. p. 326.

Found with the preceding.

6. A. *dentatum*, Linn.; Icon. Fil. *t.* 72; Will. Sp. Pl. vol. v. p. 324.

On living trees in the woods between Old England and Albion plantations, Manchester.

7. A. *rhizhophorum*, Linn.; Willd. Sp. Pl. vol. v. p. 334.

Willdenow has quoted Sloane, *tt.* 29, 30, but those plates are figures of *Polypodium reptans*. The description answers very well for my plant, except that the *pinnæ* are scarcely "*sub-auritis*."

Rather common in damp ravines in woods in the Mayday Mountains.

8. A. *præmorsum*, Sw.; Pluk. Alm. *t.* 73, p. 5; Willd. Sp. Pl. vol. v. p. 339.

Common in the woods; Mayday Mountains.

CÆNOPTERIS, Berg.

C. *myriophylla*, Sw.; Willd. Sp. Pl. vol. v. p. 301. (*Darea*).

In the woods between Old England and Bel Retiro plantations, Manchester. I have it also from Trinidad.

### Blechnum, Linn.

B. *occidentale*, Linn.; Plum. Fil. *t.* 62, *f.* B; Willd. Sp. Pl. vol. v. p. 412.

Very common at roadsides in the Santa Cruz and Mayday Mountains.

### Aspidium, Sw.

* *Indusium peltatum.*

1. A. *trifoliatum*, Sw.; Plum. Fil. *t.* 148; Willd. Sp. Pl. vol. v. p. 213.

Very common; generally growing on rocks in the parish of Manchester. It varies considerably in size.

2. A. *macrophyllum*, Sw.; Plum. Fil. *t.* 145; Willd. Sp. Pl. vol. v. p. 217.

Frequent at woodsides, Mayday Mountains.

3. A. *ascendens*, *n. s.*

*A. ascendens*, frondibus sterilibus glabris deltoideis bipinnatis longè stipitatis, pinnis lanceolatis basi truncatis, pinnulis et laciniis lanceolatis argutè serratis, laciniis inferioribus minoribus; fertilibus bipinnatis, pinnis superioribus pinnatifidis, inferioribus pinnatis, pinnulis rotundatis sinuatis, soris solitariis, caudice scandente densè paleaceo.

Caudex scandens digitalis crassitudine. Paleæ acerosæ fuscæ. Stipes pedales scabriusculi. Frons sterilis 8-10 pollicaris glabra. Pinnæ 3 pollicares suboppositæ. Pinnulæ pollicares. Laciniæ lanceolatæ argutè serratæ inferioribus minutis. Frons fertilis 5 pollicaris. Pinnæ pollicares alternæ. Indusium peltatum glabrum.

This is a very remarkable species of *Aspidium*, and totally distinct from any that I have ever seen: it is very common in the mountain forests round Old England plantation, Manchester, climbing 20 or 30 feet up the trunks of trees. I found the fertile fronds but twice; they are very remarkable, being so different in form to the sterile ones.—There is a figure in Raddi of a sterile frond, (*A. scandens*, *t.* 49), that appears to be nearly allied to this species, but the form of the *pinnulæ* is different, and they are on longer footstalks. Raddi had not seen a fertile frond.

** *Indusium reniforme*, (Nephrodium, *Mich.*)

4. A. *exaltatum*, Sw.; Raddi Fil. *t.* 46; Willd. Sp. Pl. vol. v. p. 229.

Very frequent in the woods in the Mayday Mountains, almost invariably growing on prostrate decaying trees, for their whole length.

5. A. *Hippocrepis*, Sw.; Plum. Fil. *t.* 150; Willd. Sp. Pl. vol. v. p. 235.

This fern varies much in size; Plumier's figure is from a small plant. Common at roadsides, Manchester.

6. A. *Sprengelii*, Kaul.; Kaul. Enum. p. 239.

Frequent about Wellington plantation, on the western face of the Mayday Mountains, generally growing on living trees, along with *Polypodium simile*.

7. A. *molle*, Sw.; Schkuhr Crypt. *t.* 34, *b.*; Willd. Sp. Pl. vol. v. p. 246.

Common in the woods in the Mayday and Carpenter's Mountains.

8. A. *invisum*, Sw.; Sloane Jam. *tt.* 50, 51; Willd. Sp. Pl. vol. v. p. 244.

In great abundance at the roadside between Old England and Knockpatrick plantations, Manchester. It is a very elegant fern, generally attaining the height of 8 feet.

9. A. *venustum*, *n. s.*

*A. venustum*, frondibus glabris lanceolatis bipinnatifidis, pinnis lanceolatis basi truncatis subsessilibus alternis, laciniis falcatis rotundatis integerrimis ciliatis, soris minutis marginalibus.

Frons 3 pedalis glabra. Stipes pedales tomentosi. Pinnæ 6 pollicares verè alternæ, infimis brevibus. Indusium reniforme glabrum.

This is a very gracefully growing fern, and conspicuous from its marginal fructification. I found it in the woods in the Mayday Mountains, but not often.

10. A. *pubescens*, Sw.; Icon. Fil. *t.* 162; Willd. Sp. Pl. vol. v. p. 271.

Rather frequent in the back woods of the Mayday Mountains.

11. A.? *villosum*, Sw.; Plum. Fil. *t.* 27; Willd. Sp. Pl. vol. v. p. 271.

I am not quite certain of being correct in assigning this name to my plant, for I have never been able to detect any trace of an *indusium* on my specimens; but they are very like Plumier's figure, which Swartz quotes, and as he changed it from *Polypodium*, I suppose mine must have lost their *indusium*.

Frequent in the woods near Old England plantation, Manchester.

## Adiantum, Linn.

1. A. *macrophyllum*, Sw.; Icon. Fil. *t.* 132; Willd. Sp. Pl. vol. v. p. 429.

I was only fortunate enough to find this truly elegant fern twice during my residence in Jamaica; once in a dense forest in the Mayday

Mountains, near Old England plantation, and a second time in a field of ruinate coffee, on the southern face of the same mountains, and much nearer the sea: they were only small plants on each occasion. I think it is not a plant of frequent occurrence. I have specimens of it from Trinidad.

2. A. *serrulatum*, Linn.; Sloane Jam. *t.* 35, *f.* 2; Willd. Sp. Pl. vol. v. p. 436.

The figure in Sloane is only pinnate, but this species is more generally found bi-pinnate.

Common by roadsides in the Mayday and Santa Cruz Mountains.

3. A. *radiatum*, Linn.; Plum. Fil. *t.* 100; Willd. Sp. Pl. vol. v. p. 437.

This pretty little fern is very common at roadsides in the Mayday Mountains.

4. A. *cristatum*, Linn.; Plum. Fil. *t.* 97; Willd. Sp. Pl. vol. v. p. 443.

In similar places to the preceding.

5. A. *trapeziforme*, Linn.; Sloane Jam. *t.* 59; Willd. Sp. Pl. vol. v. p. 447.

This very beautiful fern is rather common in the open forest land in the Mayday Mountains. It has a most elegant appearance from the contrast of its delicate green *pinnulæ* with the shining black *stipes* and *rachis*.

6. A. *tenerum*, Sw.; Pluk. Alm. *t.* 254, *f.* 2.; Willd. Sp. Pl. vol. v. p. 450.

Frequent in cleared land in the Santa Cruz and Mayday Mountains. The *Adianti* of Jamaica appear to prefer more open land than the generality of ferns; they are more commonly found in exposed situations, as road sides and sunny banks, than most other *Filices*.

### CHEILANTHES, Sw.

C. *microphylla*, Sw.; Plum. Fil. *t.* 58; Willd. Sp. Pl. vol. v. p. 458.

Very common on stone walls in the Santa Cruz Mountains.

### DAVALLIA, Sm.

D. *alata*, *n. s.*

*D. alata*, frondibus glabris deltoideis tripinnatis, pinnis pinnulisque lanceolatis apice attenuato alternis, pinnulis alatis, laciniis sorophoris truncato-incisis.

Frons 4 pedalis glabra. Stipes 2 pedales rubri. Pinnæ pedales. Pinnulæ 4 pollicares alatæ. Laciniæ semipollicares sorophoræ truncato-incisæ. Indusium urceolatum.

Frequent at woodsides in the Mayday Mountains.

DICKSONIA, Herit.

D. *cicutaria*, Sw.; Sloane Jam. *t.* 57, *ff.* 1, 2; Willd. Sp. Pl. vol. v. p. 487.

Common with the preceding.

WOODSIA, R. Br.

? W. *pubescens*, Spreng.; Spreng. Syst. vol. iv. p. 125.

I am in much doubt if I am correct in this specimen, for I have only Sprengel's short description to compare it with. I found the fern but once; it was growing in a damp ravine in the Mayday Mountains.

CYATHEA, Sm.

C. *elegans*, *n. s.*

*C. elegans*, frondibus glabris tripinnatifidis, pinnulis lineari-lanceolatis apice acuminato, basi truncatis subsessilibus pinnatifidis; laciniis subfalcatis obtusè serratis apice rotundato, sori venis primariis approximati, caudice arboreo aspero, stipes rachesque aculeati, costæ hirsutæ.

Caudex arboreus asper 20 pedales. Stipes 3 pedales aculeati. Frons 6 pedalis. Pinnæ primariæ 2 pedales, secondariæ 4 pollicares. Laciniæ 4-6 lineares obtusè serratæ apice rotundato. Sori glabri venis primariis approximati. Indusium cyathoforme.

Frequent in the forests in the Mayday Mountains, varying in height from 15 to 25 feet, with a *caudex* from 6 to 8 inches in diameter. It has a most graceful appearance, the fronds waving with the slightest breeze, are constantly in motion, and create a delicious coolness in their vicinity.

## *HYMENOPHYLLEÆ*, ENDL.

TRICHOMANES, Linn.

1 T. *sinuosum*, Rich.; Icon. Fil. *t.* 13; Willd. Sp. Pl. vol. v. p. 502.

I once found this species climbing up the *caudex* of *Cyathea elegans*; it is not unfrequent in the woods in the Mayday Mountains.

2. T. *crispum*, Linn.; Icon. Fil. *t.* 12; Willd. Sp. Pl. vol. v. p. 504.

This species varies considerably; my specimens are more acuminate and the *pinnæ* more crowded than in the figure quoted above, but I believe them to be the same. I found it growing on a living tree, (*Achras*, sp.), on the southern face of the Mayday Mountains.

3. T. *scandens*, Linn.; Plum. Fil. *t.* 93, (not good); Willd. Sp. Pl. vol. v. p. 514.

In great abundance in a damp ravine near Old England plantation Manchester.

## *LYCOPODINEÆ*, Sw.

### Psilotum, Sw.

P. *triquetrum*, Sw.; Plum. Fil. *t.* 170, A. A.; Willd. Sp. Pl. vol. v. p. 56, (*Bernhardia dichotoma*).

Santa Cruz Mountains, on the road to Black River.

### Lycopodium, Linn.

L. *cernuum*, Linn.; Plum. Fil. *t.* 165, A.; Willd. Sp. Pl. vol. v. p. 30.

My specimens were brought to me from a mountain morass near Mile Gully, where I understood it grew in great abundance.

### ENUMERATION.

| | SP. | | SP. |
|---|---|---|---|
| | | | 48 |
| Gleichenia | 1 | Cænopteris | 1 |
| Aneimia | 1 | Blechnum | 1 |
| Polybotrya | 2 | Aspidium | 11 |
| Achrostichum | 2 | Adiantum | 6 |
| Gymnogramma | 4 | Cheilanthes | 1 |
| Grammitis | 2 | Davallia | 1 |
| Tænitis | 1 | Dicksonia | 1 |
| Polypodium | 16 | Woodsia? | 1 |
| Lomaria? | 1 | Cyathea | 1 |
| Antrophyum | 1 | Trichomanes | 3 |
| Diplazium | 3 | Psilotum | 1 |
| Pteris | 6 | Lycopodium | 1 |
| Asplenium | 8 | | |
| | 48 | Total | 77 |

ART. II. *Monograph of the Genus Leptocera*, Dejean; *with Descriptions of two new Species found in the Isle of Bourbon.* By M. JULIEN DESJARDINS, Secretary of the Natural History Society of the Mauritius.*

THE subject of the present communication is a genus of insects of the order *Coleoptera*, established by Count Dejean, in the first edition of the catalogue of his collection, and to which he has given the name of *Leptocera*, (slender horned). This genus was formed for the reception of an insect which, up to the present time, has been found only in our island.—The most recent works that I have been able to consult contain no mention of it's having been found elsewhere. It is the *Leptocera scripta*, included by Fabricius in the great genus *Cerambyx*, under the name of *Cer. scriptus.*

The genus *Leptocera*, Dej., was composed solely of this single species, when M.M. Gory and Boisduval, two of the most distinguished French entomologists, found occasion, more recently, to add to it two more species, namely the *Lep. bilineata* of Gory, and the *Lep. graphica* of Boisduval. The latter is from New Holland; and the first is given in the "Iconographie du Regne Animal," by M. Guérin, from which I have copied it; and was probably described by M. Gory in some work upon species.

Two other not less remarkable species appear to me to be new. They were found in the commune of St. Suzanne, in the Isle of Bourbon; whence our colleagues M. M. Bellier Beaumont and Lepéevauche Mézière have several times sent me specimens, which have enabled me to ascertain the differences which distinguish them from each other, and from the species found in Mauritius.

The genus is thus characterized by Latreille, in the 2nd edition of the 'Animal Kingdom.'

"No projection in the *presternum;* the *antennæ* setaceous, and much longer than the body, especially in the males; the corslet united, in form a truncated cone; the *abdomen* and *elytra* nearly triangular."

*Leptocera scripta*, Dej. Cat.; *Cerambyx scriptus*, Fabr.

Colour of the upper parts brown with black; that of the under parts a silvery white, or sometimes verging upon a clear yellow, disposed in a regular manner, and always deep.

* Communicated by the author. Read at the Society's Sitting, Aug. 3rd. 1837.

The suture is bordered by a white line, which occupies the extremity of the *elytra;* towards the base are three other stripes; the longest, which passes down the middle, is nearest the suture, the second is very faint, and situated almost in the angle, the third is below the angle, and is interrupted in the midst of its course, upon which it returns upwards, and terminates near the first. A large spot, or transverse stripe, which seems formed of two oval hollows, succeeds. They neither join the sutural stripe nor the elongated border. Finally, a very elongated spot occupies the extremity of the *elytra*, and, in connection with the whole of the preceding, produces a very pleasing effect.

The corslet, the lower part of which is of a darker colour than the *elytra*, is ornamented with four longitudinal stripes of the same colour as those on the *elytra*, and producing an agreeable alternation of black and white. The front, which is white, displays a black triangular spot on the upper part. This white colour is continued over the face and mandibles, and even over the eyes at the base of the *antennæ:* the latter are black; the eyes are of a reddish brown; the feet brown with whitish stains, particularly on the claws.

The body is short and pyramidical; the *elytra* terminated by two points, and presenting a very distinct angle on each side of the base. The corslet is very finely wrinkled transversely, while the *elytra* are punctured; these punctures and wrinkles are visible without the aid of a magnifier. The corslet is short, and tumid at the sides; it is larger than the head, and much narrower than the body. The legs are thicker towards the thighs, and of proportionate length. The *antennæ* are at least three times the length of the insect. They consist of ten joints, of which the first is very short, and the last very long, diminishing almost to the size of a horse-hair.

This species is very common in Mauritius, but we do not find it in the Isle of Bourbon. About fifteen years ago, I, for the first time, discovered it in considerable numbers in the Plaines Wilhems; since that time I have procured a great number at Flacq, in the months of January, February, May, and November.

In its *larva* state it is said to live in the woods of the olive, (*Eleodendron orientale*). It is very easily captured, and frequently suffers itself to be caught in houses.

I have sent a great number of specimens of this species to different collections in France and England; and two of the most celebrated Parisian naturalists in particular have assured me that it is the *Leptocera scripta* of Dejean.

*Leptocera Mezierei*; (Leptocere de Mézières), Mihi.

This species is generally more vigorous than the preceding. The longitudinal stripes of the corslet and the *abdomen*, as well as some spots upon its flanks, instead of being of a silvery white, as in the *Lep. scripta*, Dej., are of a ferruginous red, which is very beautiful, particularly in the *elytra*. The reflections and the brown parts are not greenish, but of a beautiful violet, and the eyes are reddish. All the rest is similar, with regard to form and distribution of colours, except that the latter are a little weaker. There is also the same puncturing on the *elytra*, and the same black and silver stripes upon the *abdomen*. In some individuals the two intermediate stripes of the corslet are white, whilst the other two are ferruginous.

The *Leptocera Mezierei* inhabits the Isle of Bourbon. It has been found in considerable numbers at St. Suzanne by my colleague and friend, Lesserbanche Mézières. I was extremely glad of the opportunity of dedicating to a correspondent, as zealous as he is learned, a species which appeared to me to belong exclusively to the little island in which he is cultivating, with so much success, the different branches of natural history.

*Leptocera Beaumontii*, Mihi.

True to the livery of its genus, this little species has, like its fellows, clear stripes upon a brown ground; but Nature has so many ways of combining and varying even things the most alike in appearance, and which bear the most intimate relation to each other, that this one differs still more widely from the two preceding species than they do from each other.

Upon a ground of a ripe brown colour, we perceive upon each of the *elytra*, first, a stripe, which runs the whole length of the suture, and which is larger than the analogous one in the preceding species; then succeed four elongated spots, of which three are in the same line, or very nearly so, and the fourth at the external angle towards the base. We do not here observe the transverse stripe of the two preceding species. Upon the corslet there are the same number of stripes, but they are much larger, and indeed they so overpower the ground, that of its tint, which is black, they leave scarcely the thickness of a line. It should however be remarked, that all these stripes and spots are of a warm dull colour. The base of the *elytra* is greenish, particularly the external angle. The *abdomen* is rather of a gold than silver colour. The legs are russet, and the *antennæ* are very nearly the same colour, but browner. The forehead and mandibles are gold colour.

The corslet, instead of being wrinkled, is punctured like the *elytra*, and the puncturing is more decided than in the preceding species.

The corslet is very little narrower than the body, which gives to this species a more cylindrical and elongated form.

The *antennæ* are much shorter in the three specimens that I have examined.

The *Lep. Beaumontii* inhabits the same locality as the *Lep. Mezierei*, but appears to be more rare.

I have dedicated this species to the eminent individual to whom I am indebted for it,—M. F. Bellier Beaumont, one of our correspondents in the Isle of Bourbon.

*Leptocera bilineata*, Gory.

All the knowledge that I have of this species is from the figure which M. F. Guerin has given of it, in the 'Iconographie du Regne Animal,' Jus., pl. 45., fig. 9. Two longitudinal bands of a yellowish colour are observable through the whole length of each of the *elytra*, and two others of the same colour upon the corslet, which appear hairy and rounded; the legs are yellowish; the *antennæ* brown and formed of eight pieces.

*Leptocera graphica*. Boisd. 'Faune Entomologique du Voyage de l'Astrolabe,' 2nd part, 8vo., Paris, 1835, p. 511, pl. 9, fig. 17. The following is M. Boisduval's description.

"Supra ænea, thorace nigricante, punctato, sub-cylindrica, lineis quatuor, albicantibus; elytris punctatis maculis tribus impressis suturaque posticè albicantibus, antennis pedibusque nigris, femorum basi testacea.

"The upper part of a bronze colour, corslet blackish, punctured, almost cylindrical, with four whitish lines; the *elytra* punctured, with three deep spots, and the posterior part of the suture whitish; *antennæ* and legs black, with the base of the thighs testaceous."

This species is so near to the *Lep. scripta*, that if I had not before me two specimens brought from New Holland, I should have regarded it as a variety of rather smaller size.

It is smaller than *Lep. scripta* of the Isle of France, but its form is the same, and it very much resembles it. The head and the corslet are blackish, the latter is almost cylindrical, punctured, and marked on the upper part with four small whitish lines. The *elytra* are bronzed, with a slight coppery reflection, covered with small deep punctures: they have besides, three small white spots upon each of them, almost in a longitudinal line: and at the base of each is usually observable a small spot similar to the others. The posterior half of the suture is bordered with a whitish colour. The extremity of the *elytra* is terminated by two small points. The breast and sides of the *abdomen* are whitish and shining.—The *antennæ* are black; the legs are of the same colour, and the base of the thighs testaceous.

It is noticed as being found in Vanikoro, but I have before me another specimen taken in the North of New Holland by Mr. Cunningham.

*Flacq, Mauritius, April 30th*, 1838.

Art. III. *On the Organs of Hearing in Insects.* By Leonard W. Clarke, Esq., Honorary Entomological Curator to the Royal School of Medicine at Birmingham.

"The organ of hearing is excited by vibrations or undulations of air, of water, or of some solid medium, recurring at intervals, with different degrees of frequency. These impulses are received upon the *tympanum*, or ear-drum, thence they are communicated to the acoustic nerve, and are finally transmitted to the brain."—Cuvier.

In 1832, when Professor Rennie presumed to revive the notion,—the "silly and absurd" supposition,—that the *antennæ* were the organs by which insects distinguished sound, he was treated with contumely;—the idea was ridiculed without any inquiry whatever;—it was consigned to the "tomb of the Capulets," and the "corroborating testimony of all great naturalists" triumphed;—the world was induced to believe as before, that insects use *antennæ* as feelers, and not as ears," while the Professor for his pains was honoured with the dunce's cap and bells. With this example before me it may be asked whether I dare to revive the almost annihilated idea? I do, most certainly, though under different auspices, and upon very different grounds.

The first consideration is whether insects are cognisant of sound or not. Most entomologists admit that they are, but confess their ignorance of the locality of the organs of hearing. Some have imagined the *antennæ* to be these organs; hitherto this has been no more than supposition, and of course imagination and theory have failed to convince the multitude. Are the *antennæ* adapted for conveying sound? Is there any liquid in them similar to that which Scarpa discovered to fill the labyrinth of the human ear? Are there a *tympanum*, auditory nerves, and an opening or external orifice through which the vibrations of the air may be conveyed, by means of the acoustic nerve to the first cerebroid? Is there anything in the structure of the external portion inducing us to suppose they can be of service in arresting the undulations of sound? To each of these important questions I may answer yes, without reservation and without a surmise. Observation places the facts on grounds not to be disputed. But to proceed to the proof.

During the time I was studying the utility of the *antennæ*, whilst walking in the garden between eight and nine o'clock at night, I saw a specimen of *Carabus memoralis*, (Illiger) in search of food, which consists of worms and small coleopterous insects, that conceal themselves in the earth, or on its surface under stones &c. For rather more than a quarter of an hour I amused myself with observing its motions on newly turned up ground, without being inconvenienced by the interruption of plants or weeds. It walked with the *antennæ* bent forward and somewhat arched, occasionally touching the ground with them in its progress. On reaching a clod of earth they were placed beneath, yet still arched. Could it be feeling for anything? No! because, if so, they would have been stretched out rather than arched. When it discovered any worm-holes, the tips merely were inserted, or one of them, and it paused as if listening for prey. I have sometimes seen terrier dogs do the same, when waiting for a rat! I returned to the house, and taking an insect of the same species from my collection, carefully inspected every joint of the *antennæ* one by one; then bent them into the same form: I afterwards turned both of them backward, over the *thorax*, so that the tips met on the suture of the *elytra*, beyond the *scutellum*.— Now looking in front I DISCOVERED AN OPENING IN THE *LOBA*. I said in my last, that they were organs of hearing, even *if* there be no external communication with the atmosphere:— the *if* vanished; all doubt was removed; and I perceived that they could hear as plainly as I could myself;—much more so indeed, because the upper part of the *antennæ* has the power of increasing the sound. My exertions were thus rewarded by results that even my most sanguine expectations had not dared to hope for, though I was previously convinced by dissection that the internal formation required this *meatus*. I then determined to use this as my first test, as I had in my possession nearly a hundred duplicate specimens on which I could exercise my patience.

The *antennæ* of this insect are filiform, and their situation pre-ocular. *a* is the natural size, *b* magnified. 1 is the *loba*, 1° the *scapus*: the *loba* (*torulus*, Kirby) is not a distinct articulation, but a process of the *scapus*. Each individual joint also has an insertion, (*c*) that fits into the cup of the one

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*a*, auricula, natural size; *b*, magnified; 1, loba; 1°, scapus; 2, torulus; 3, antescapus; 4, cyanthis; 5 to 11, phonascus; *c*, one of the articulations showing the insertion; *d*, the two elevated stops; *e*, the bristle on the scapus; *f*, the apex, showing the orifice: *g*, the scapus opened; *h*, the loba, side view; *i*, the same at the back; *k*, to the front; *l*, from the inner side; *m*, the operculum; *n*, the tympanum.

below it, answering the same purpose as the rounded end of bones in animals, with this difference, that the muscular power that gives motion to them is inserted on the *outside* of the bone, in the *antennæ* it is inserted and situated in the interior; hence the idea of their being "perfectly solid" is erroneous. The *loba* is punctured on the exposed part, polished and smooth on the inner side, where it may be lubricated by *synovia*. The surface of the *loba* is also furnished with two elevated points, which serve as stops to prevent the *antennæ* from working round, (see *d*). On the *scapus*, towards the upper end, is a stiff bristle, always present in this species, inserted into a reniform cavity, (*e*). What purpose this can answer we will not at present inquire, but that it is important we may learn from the care manifested in the structure of the recess in which it is seated. The *torulus* (2) has not any hairs upon it; the *antescapus* (3) a few towards the upper end; the next, *cyanthis*, (4) is furnished with a coronet of them; and the seven last (5 to 11) composing the *phonascus* are entirely covered with minute brownish hairs. The last segment (11) has a cup at the tip, concealed from view by the hairs that surround it. These hairs may be removed by the scalpel, and when the *apex* is submitted to the microscope, the capsule (*f*) is easily distinguished, with the membrane covering its surface.

The outer covering is the *epidermis*, very thin, and easily scraped off: it is this that causes the polish on the surface. The *rete mucosum* lies in connection with it, pitchy black. Below this is the adepose tissue, whitish and vascular, immediately in connection with the bone. The bone, or ossified portion consists of the same substance as the bones of animals, that is, cellular tissue, with depositions of earthy particles.

Each annulation is provided with distinct muscles, uniting and forming two *fasciculi* within the *loba*: the auditory nerves from them unite, and pass to the back of it. The white matter that fills the *antennæ* consists of the medullary substance, through which the nerves and muscles pass, which it keeps moist. The cellular tissue lines the surface and ramifies through every part. The medullary substance is of vital importance in organization, whether of vegetable or of animal existence: destroy the pith of trees, or injure the marrow in the spinal column, and destruction of life is the ultimate consequence. When near the brain, death takes place sooner than if the injury be more remotely seated. From a knowledge of this fact, the matadors of Spain endeavour to discomfit their antagonists in the bull-fight: from the application of this law, we deprive the most powerful of the feathered race of vitality as easily as the most puny. Concerning the medullary substance Cuvier says,—"it possesses that most wonderful of all properties, the power of transmitting to the mind the impressions made on the external organs of sense, and rendering the muscles subservient to the will. The brain and spinal marrow are almost entirely composed of medullary substance, and the nerves which are distributed through all the organs capable of sensation, are in respect of their composition nothing but bundles or *fasciculi* of it." In the living or recently destroyed insect, this substance is white and pulpy, but in that which has become dry, it appears as minute yellowish granules,—(*g*).

At the base of the *auricula*, (*antenna*), as mentioned before, is the *loba*, to the front of which is found the *meatus*, (*h*, *k*, *l*), that conveys sound to the *tympanum*, (*n*). At the base is a bony *operculum*, in the shape of a shield, concave, and furnished with muscles, by which the animal may close the orifice at pleasure, (*m*). On the side of the tube nearest the *cranium* is a channel for the passage of the muscles, (*l*).—At the end of the *meatus internus* is situated the *tympanum*, beyond it the labyrinth.

My intention, as regards this matter, is to proceed with an examination of one or more species in each order, and then institute an enquiry into their comparative form, with the adaptation of the auricles to the habits of the creatures possessing them.

*Birmingham, July* 16*th*, 1838.

ART. IV. *On Succinea amphibia,* (Drap.), *and its varieties.* By DANIEL COOPER, Esq. A.L.S., Curator to the Botanical Society of London.*

THE following short communication has been drawn up for the purpose of pointing out some long prevailing errors respecting this mollusc, which, in marshy situations, is perhaps the most common species in the neighbourhood of London, and probably throughout the whole kingdom.

## *MOLLUSCA*, (Cuv.).

First Section.—*MOLLUSCA CEPHALA*, (Ferrussac).
Class.—*Gasteropoda*, (Cuv.).
Order.—*Pulmonifera*, (Fleming).
Family.—*Helicidæ*, (Jeffrys).

* Read before the Linnean Society of London, Decr. 19th, 1837.

## Genus *Succinea*, (Drap.): Amber-shell.

ANIMAL.—*Tentacula* short; the superior swollen, conical.

SHELL.—Oval or oblong: aperture large, oblique: pillar spiral. Plane of the aperture much inclined in front, in relation to the axis of the shell: (*Drap.*).

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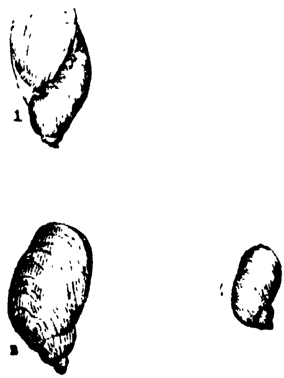

1, 2, var. *β*, *major*; 3, 4, var. *γ*, *media*; 5, 6, var. *δ*, *minor*.

### 1. S. *amphibia*, (Drap.). Common Amber-shell.

*Animal* blackish, thick, very glutinous, spotted, occupying the whole of the shell, having four *tentacula*, the two superior longer than the inferior, at the extremities of which are situated the eyes, also slightly rugose in the centre.

*Shell* varying much in size, being from 4 to 9½ lines in length, and from 3½ to 5 in breadth; the usual size of full grown specimens is about 8 lines in length and 4½ in breadth; of somewhat an oval figure, pale amber or orange yellow, occasionally slightly opaque, glossy, transparent, and striated longitudinally. Spire composed of three oblique swollen volutions, of which the inferior is the larger, the remaining two gradually tapering to an obtuse apex. Aperture covering ¾ of the shell, oval, lip usually entire, simple, membranous at the margin.

| | |
|---|---|
| *Succinea amphibia*, | Drap. Hist. des Moll. p. 58, *t.* 3, *f.* 22. |
| ———— | Beard, p. 72, *t.* 3, *f.* 1. |
| ———— | Sowerby, Genera, *f.* 3. |
| ———— | Lamarck, Hist. des Animaux sans Vertéb., vi. p. 135. |
| *Succinea Mülleri*, | Leach, Mollusca, p. 78. |
| *Helix Succinea*, | Turt. Dict. p. 67. |
| ——. *putris*, | Mont. p. 376, *t.* 16, *f.* 14. |
| ——. *limosa*, | Dillwyn, Cat. ii. p. 996. |

Of this species Draparnaud makes three varieties:—

Var. *β*, *major*, thicker and flesh coloured; (*Fig.* 1 and 2).

*γ, media*, more elongated and deeper coloured; (*Fig.* 3 and 4).

*δ, minor*, with the aperture ovate; (*Fig.* 5 and 6).

Var. *β, major*. This, the first variety, is abundantly met with in the neighbourhood of London. The largest specimens in my collection measure 9½ lines in length, and 5 in breadth. It is easily distinguished from the ordinary *Succinea amphibia* by its larger size, thicker nature, and flesh-coloured appearance. In the vicinity of Richmond, Surrey, this variety is most abundant.

Var. *γ, media*. Much confusion has arisen with this variety. Dr. Turton in his 'Manual' actually figures it for *Succinea oblonga*, (Drap.), by no means a common shell in the vicinity of London, but occurs occasionally at Battersea.—This then is the variety *γ* of Beard, the *Suc. oblonga* of Dr. Turton, and the *Suc. gracilis* of Mr. Alder, in 'Magazine of Zoology and Botany.' It is most abundant in the River Wandle, Surrey, and many other parts of the neighbourhood. Mr. Alder mentions having observed them within a hundred yards of *Suc. amphibia*, each retaining its characteristic marks in the colour of the animal and shape of the shell. This I cannot confirm, for I have observed them in several situations high up the river Thames, and have gathered specimens of this variety, actually intermingled with the true shell; confirming my opinion that *Suc. gracilis* of Mr. Alder is the variety *γ* of Drap. and therefore synonymous with Dr. Turton's *Suc. oblonga*. This variety usually measures 6 lines in length and nearly 3 in breadth; is of a more slender form and a deeper amber colour than the preceding.

Var. *δ, minor*. I consider this to be the shell sent me by Mr. Bean of Scarborough, under the name of *Suc. intermedia*, (Bean). They are occasionally met with in the neighbourhood of London, as I am informed by Professor Thomas Bell, beneath cow-dung. This variety comprises the smallest perfect shells of the *amphibia* I have seen; measuring only 4 lines in length and 2½ in breadth. In addition to their corresponding with Draparnaud's description, they are of a lighter and more opaline colour than any of the preceding varieties.

The *Succinea amphibia* and its varieties are found generally abundant in ponds, ditches, and marshy situations, attached to the roots or other parts of aquatic plants overflowed by the tide. The shell is very thin and fragile, much care is therefore necessary in extracting the animal. I cannot altogether agree with Mr. Jeffrys with respect to changing the name from *Suc. amphibia* of Draparnaud to *Suc. putris* of Linnæus; as I have frequently collected this species on various substances immersed in water; for instance, on the reeds and other water plants on the banks of the Thames, when the tide is up. During the winter months the animal forms an epiphragm, of nearly the same consistence as its shell. When dead shells are examined, the beautiful colour and transparency will be found to be entirely destroyed.

It is this species, according to Mr. Dikes, of Hull, in Mag. Nat. Hist., that is the food of the bearded titmouse. He examined three specimens of this bird, and found the crop of each to be filled with *Suc. amphibia* and *Pupa muscorum*. He states that although the crop of one of them was not larger than a hasel nut, it contained twenty of this species, singularly packed together, and four of *Pupa muscorum*; the shells of all being perfectly uninjured. I cannot help thinking that the twenty species must have been those of the variety *minor* of Draparnaud.

Art. V. *Some Remarks on the Habits of the Common Snake, (Coluber Natrix of* Linn.). By Dr. W. B. Clarke.

Thinking that a few remarks respecting the habits of the common snake may prove interesting to some of the general readers of your Magazine, I venture to send the following, requesting you to give them insertion, if you deem them worthy to occupy a place in your interesting publication.

On a very fine day in June, 1837, whilst walking near the outskirt of a wood in the neighbourhood of this town, I observed a very fine snake reposing at the base of a sand bank, evidently enjoying itself under the influence of the rays of a nearly meridian sun. Upon my approaching it more nearly, it became alarmed, and endeavoured to make off by ascending the bank near which it was lying. This it accomplished with some difficulty, for, from the swollen appearance of the body in the region of the stomach, it was evident that it had swallowed some animal of considerable size; and the side of the bank, being perpendicular in its lower part for a height nearly equalling two thirds of the animal's length, presented a considerable barrier to its escape. On surmounting this perpendicular part, which it effected by a zigzag disposition of the anterior three fourths of the body, it gained the acclivity, and glided along the ascent among the grass, until it reached a blackthorn bush, the branches of which were extremely numerous, the lowermost spreading on the ground so as closely to cover a space of three or four feet in circumference. The snake glided into the midst of this, and availed itself of the shelter it afforded, though evidently much embarrassed, and apparently sensible of its incapability, from its state of repletion, to slip away, as it might probably have done under ordinary circumstances. Whenever an attempt was made to oppose its escape from this bush, that it might reach the ferns and brushwood which abounded on all sides, it would draw back its head, erect its slender neck, emit its peculiar hissing sound, thrust out and rapidly vibrate its little black and forked tongue, and at the same time gradually retreat to the opposite side of the bush. This was repeated many times, until at length, in the act of turning to make its escape from one part of the bush to another, it left a portion of its body unprotected, by which it was seized, drawn from its retreat, and secured. Upon examination it appeared to have swallowed a frog or toad, so large that the part of the body which contained it was distended to at least three times its natural size, and the form of the animal's limbs could be distinctly seen as it lay within the stomach of the snake, which was afterwards placed in a large botanical box, and carried home with great care. On reaching home we found that the snake had disgorged its prey, which proved to be a very large toad, quite dead, and entire, with the exception of two or three lacerations on the left fore leg, where probably the snake had first seized it. Upon taking the snake from the box, it exhibited every sign of health and vigour, gliding from the hands of those who attempted to take hold of it, and over the floor of the room, making many efforts to escape. One very remarkable instinctive character we observed in the snake, which was exhibited on presenting to it a dead viper, (*Coluber berus*, Linn.), which we had captured the same day, and deprived of life, to avoid accidents. The snake was confined in an upright basket, the sides of which were so high that it could not escape over them; upon presenting our hands to it, the snake invariably receded, and endeavoured to escape, but on presenting the viper so as to imitate, as nearly as possible, the approach of a living one, the snake invariably erected its head, and, darting out its neck, struck the head of the viper with its own: this was several times repeated, with the same result, until, not wishing to irritate or frighten the animal, we discontinued thus to annoy it. It would appear that the snake, naturally aware of the character of the viper, instinctively endeavoured to surprise the latter on its approach, which, in the natural state of things, would have given the snake time to escape, before the viper's recovery from the effects of the sudden attack.

In about four or five days from this time, we observed an opacity in the corner of one eye, and in a day or two more a similar appearance presented itself in the corresponding part of the other eye, which continued to increase for ten or twelve days, notwithstanding which the snake was capable of discovering the approach of the hand, or any other body; but it gradually became more and more dormant, and disinclined to move, yet, when fully roused, would glide over the hand or arm of any one offering to handle it, or amongst the small branches of a tree or bush, with nearly as much agility as before. The next morning, on looking into the box where it was usually kept, it was found to have collected the hay into one corner, and to have secreted itself beneath it. On removing the hay, the snake was found coiled up into a very small space, and the cuticle around the upper jaw had begun to desquamate and turn upwards, giving the head a very rough and peculiarly fierce appearance. The snake now appeared to be extremely irritable, hissing violently, and endeavouring, in every possible way, to secrete itself beneath the hay; when it found itself unable to do this, the quantity not being sufficient, it moved with great rapidity out of the box. The box was afterwards filled with hay, and the snake returned into it and left unmolested for about two hours; at the expiration of this time we paid it another visit, and then found it in a very remarkable condition: a great portion of the cuticle had desquamated, and appeared very much inflated, presenting the appearance of a single coil or ring, about six inches in diameter, completely enclosing the animal. Upon more closely inspecting this inflated ring, we found that it was produced by the snake, after having inverted a part of its skin over the tail, having accidentally entered the open extremity of the inverted portion, while in the act of disengaging itself from the remainder; the *exuviæ* were so far transparent, that we could observe the yellow spots upon the neck and the dark folds of the enclosed snake. After letting it remain some little time in this situation, upon attempting to take it up, it made its way through the skin, and gradually dragging on the smaller part of its body which was not disengaged from the skin, after a short time it was slowly drawn from it, and the animal moved about in its new and gaudy attire. Immediately after this process was completed, the snake exhibited considerable activity, gliding with much vigour out of the hands of those who attempted to secure it. On being placed upon a grass plot, it moved over it with great rapidity, and amongst the boughs of a tree on which it was placed, it travelled with far greater speed and vigour than I had ever observed it to do before, passing over and among the branches in an incessantly progressing movement, for a considerable time.

The fact related above was evidently accidental, and dependant upon the peculiar direction of the animal's head as it moved onward in the act of disengaging itself from the *exuviæ*. Under ordinary circumstances the process goes on as follows. The desquamation of the skin begins by a separation taking place around the jaws, that from the upper jaw turning upwards and backwards, whilst that from the lower jaw turns downwards and backwards by its elasticity; and as the animal glides through the surrounding grass, or similar substances, the skin becomes inverted and drawn off from the head downwards, to the very tip of the tail, and the animal escapes, leaving the *exuviæ* turned inside out. The skin dilates very much on separating from the body, which enables the animal to draw it off with greater ease.

The movements of this species are highly elegant. Its course among grass or underwood is performed in a zigzag direction; the head and neck are thrust forward alternately to the right and left, whilst the rest of the body follows precisely in the same course. In its progress the head pushes aside the blades of grass or other yielding bodies, and the remainder of the body follows without communicating any motion to them: and in this way a snake will often steal across a meadow or through a thicket, unperceived by a person standing at a little distance. Its course is not indicated by any sound, except when passing over dead and dry leaves, or similar bodies, of which the friction of one against another will produce a sound: thus silently and unperceived the snake is able to steal upon its unwary prey, or to make its escape from a more powerful assailant.

I am not aware that a snake is capable of ascending a tree the trunk of which is lofty, and unprovided with branches sufficiently close for the animal to extend its body from one to another, although this part of the tree may be small enough to be encompassed by the folds of the animal. We have many times tried to induce this species to ascend the trunk of such a tree, but always without success. But when there are a number of branches or twigs sufficiently strong to support the animal's weight, and within the necessary distance, the ascent is effected with considerable rapidity, and the movements of the animal are extremely elegant during its progress. Amongst the smaller branches of a tree the snake moves with the greatest rapidity and elegance, gliding, at one time, from bough to bough, following its general zigzag direction, or progressing in an elegant spiral course from the base to the extremity of a branch, assisted by the twigs projecting from it. In the latter movement it generally prefers elevating its head, to pass *over* the *axilla* of a branch, rather than to pass beneath it; thus additional support is given to the body, and the abdominal scales, (*scuta*), which are the principal agents of progression, are made to act with greater power. These transverse abdominal scales are of a peculiar nature; not only as they defend the lower part of the body from external injury, but, having an intimate connection with the ends of the ribs, are by them, through the agency of a series of powerful internal muscles, erected, and made to move backwards and forwards upon each other, and thus each *scutum* is, as it were, drawn after the preceding, and this, in rapid succession, being continued throughout the entire series, gives a progressive motion to the body of the serpent, which travels onward, as if upon so many feet. Hence it is that a snake, after having coiled its head and neck over a branch, is capable of drawing the remainder of the body over, in a gradually progressing direction. It will sometimes extend itself from the upper branches, by twisting its tail round a small one, lowering the rest of its body, and extending itself to its full length, pass its head and neck in a spiral course round a lower branch, then loosening its hold of the upper one, drop the tail end of the body into the lower part of the tree, and, following the course which the head and neck had previously taken, will travel on, drawing up the pendant part of its body, and proceed as before. The snake is not only able to travel with rapidity over the earth, but possesses the power of throwing the whole length of its body from the ground, performing a kind of leap: this is done by placing the body upon the ground in the form of an involuted spire, the folds of the anterior part forming the centre of the figure; then suddenly extending itself in the form of a spiral spring, it will throw itself to a distance. This movement may sometimes be seen in very hot weather, by the banks of a stream, when snakes will often lie basking in the sun, with their bodies coiled in the manner just described,—the neck and head being directed from the centre to the circumference, above the folds.—This position seems to be preferred to any other by the snake while reposing, and it is one from which the animal is enabled to perform the most rapid movement upon a sudden surprise; for in a wood, from this position, they will leap, by an instantaneous effort, into the brushwood, and thus elude our most energetic efforts to secure them, or even to get sight of them; but by the side of a stream this movement may be better seen, for on a sudden approach, they will leap from the bank into the midst of the stream, swim to the opposite side, ascend the bank, and secrete themselves. This movement they perform with astonishing rapidity.

The progression of this species in the water is not so rapid as upon land, for the undulations or serpentine movements of the body are performed in such a way that no very great lateral action is induced upon the water, which action is most energetically exerted in the motion of an eel, (which, among fishes, is most nearly allied in form to a serpent), through that medium. Besides, the nearly cylindrical shape of a serpent's body is not that which would be supposed the best adapted to propel the animal through the water.

This species is perfectly harmless, never attempting to bite unless very much irritated, and is even then incapable of doing injury. From its gentleness it becomes extremely interesting and engaging. Several varieties are at times met with, but the colour is generally of an olive green, with irregular black spots. On each side of the neck is a characteristic yellow spot, with a dense black somewhat lunated one posterior to it. The under part of the body is of a greenish white, elegantly marked with large black patches. This species is said to be found in many parts of Europe, frequenting moist hedges, woods, and other shady places. It is in such situations that it may be continually met with in different parts of our own island. It preys upon toads, frogs, insects and worms. It occasionally resorts to the water, and searches for its prey while it swims down the sides of the stream. It preys also upon mice, and will climb amongst thickets and brushwood in search of the nestlings of small birds; and after satisfying its appetite, will remain many weeks without requiring another supply. It deposits its eggs, in number from 12 to 20, in some moist and warm situation, where they remain until they are hatched. During the winter it remains concealed within some hole in a bank, or hollow trunk of a tree, or similar situation, coming forth in the spring.

*Ipswich, February 23rd,* 1838.

## Art. VI. *Remarks on Zoological Classification.* By Sir Edward Ff. Bromhead, Bt. F.R.S. L. & E.

*(Continued from p.* 419*).*

In 1828 Mr. John Stark published his 'Elements of Natural History,' bringing the whole Zoological Series up to the highest level of Science at that time; but the subject has since so entirely changed, that a reference to his Work will not carry us very far. The Cuvierian Table to be found at the end of Griffith's Translation, takes us nearer to the present views of Classification, but the Scale of Genera is so extremely high and so inadequate to necessary subdivision, as to remind us of the wide Linnæan Genera. It will perhaps be better to enumerate the references of the leading Structures, where these Publications principally fail us:—

The Infusoria, Polypi, and other Elementary Structures are as yet in the same loose state, as the Fungi, Lichens, and Algæ of Botany; the place of many in the System is disputed, and the stations deviate widely; Ehrenberg, Blainville, Milne Edwards, and Farre may be consulted.

The AMŒBALES are the Gymnica, Epitricha, Pseudopodia; Enantiotreta, and Allotreta of Ehrenbergh.

The FLUSTRALES may represent the Bryozoa of Ehrenbergh, and the Ciliobrachiata of Farre; they open with Ehrenbergh's Katotreta and Anopisthia.

SERTULARIALES may represent the Hydriform Polypes of Farre; MADREPORALES are nearly his Zoanthiform Polypes. In the ECHINALES I have taken the limits of Agassiz. I follow Agassiz in considering the MEDUSALES as the true passage, connecting the *Echinales* with the ASCIDIALES. The Bryozoa are admitted to pass by Vorticella to the Infusoria, and are said on the other hand to pass into the Ascidiales; but in laying stress on the Vent, we must recollect, that the Vent may gradually approach the Mouth, until the two openings may coincide.

The Families of AVICULALES and TRIDACNALES are limited from Dr. Flemming's Treatise on Mollusca.

The *Crustacea* are limited principally from Milne Edwards:—

GECARCINALES are Oxyrhinques, Cyclometopes, Catometopes, Leucosiens-calappiens, and Corystiens-dorypiens.

HIPPALES are Dromiens, Raniniens, Hippiens, Paguriens-homaliens-pactoliens, and Porcellaniens.

PALÆMONALES are Macroûre cuirassées, Thalassiniens-astaciens, Salicoques; Caridioides-bicuirassées, and Unicuirassées. Bopyridæ-cymothoadæ are his Cymothoadiens; Sphæromadæ-idoteadæ-asellidæ are his Idotéidiens; Gammaridæ-corophiadæ are his Crevethiniens.

The Families of the CEPHALOSE-MOLLUSCS are easily distinguishable; their order of Succession and that of the Alliances are open to remark.

The PISCES are principally formed from the Groups of Cuvier.

In the AVES I have leaned to Swainson's Divisions, but his Families seem frequently too small, nor am I now satisfied, that I have sufficiently consolidated them :—

Meropidæ are (Trogonidæ)-Halcyonidæ-Meropidæ ;
Trochilidæ are Trochilidæ-cinnyridæ-promeropidæ ;
Meliphagadæ are (Paradiseadæ)-Meliphagadæ ;
Muscicapadæ are Ampelidæ-Muscicapadæ-Laniadæ ;
Corvidæ are Corvidæ-Sturnidæ ;
Psittacidæ are Psittacidæ-Picidæ ;
Cuculidæ are Certhiadæ-Cuculidæ.

I have not any satisfactory reference for the families of the Mammalia, which require new-casting, and which seem to have retrograded since the arrangements of Desmarest, in consequence of the Abuse of Characteristic Nomenclature.

Between Equidæ and Suidæ may lie Hippopotamus-mastodon-elephas-tapirus-palæotherium-rhinoceros.

Didelphidæ and Kanguridæ may be compound, and the parts lie in different Alliances.

From Felidæ to Melesidæ we may pass thus, Hyæna-canis-viverra-paradoxurus.

For LUMBRICALES, and EUNICEALES consult Milne Edwards; LUMBRICALES are :—

Cephalobranches; Arenicoliens, Terricoles; Suceurs; Gasterobranchidæ.

EUNICEALES are :—

Cephalées § A.; Nereidiens, Euniciens, Amphynomiens-aphrodisiens; Sipunculi (Agassiz).

There will not be any difficulty in recognizing the Families intended among the Insecta; an attempt is made at a more natural distribution of the great Groups; Lamarck seems to have been underestimated here. Mr. James Wilson in his Treatise gives the Diptera from Meigen, who seems to have divided the families much too far and beyond Lamarck :—

Hippoboscadæ are Nycteribia-coriaceæ ;
Muscadæ are Trineuræ-muscides ;
Conopsidæ are Stomoxidæ-conopsariæ ;
Others are still more broken down.

GAMASALES are from Dugés :—

Acaridæ are Bdelleæ-acareæ ;
Gamasidæ are Ixodeæ-gamaseæ.

FURCULARIALES are from Ehrenberg :

Monotrocha, Schizotrocha, Polytrocha, Zygotrocha nuda, and Zygotrocha loricata.

*Thurlby Hall, Lincoln,*
*June 13th*, 1838.

ART. VIII. *Remarks on Mr. Eyton's Arrangement of the Gulls.* By FRED. MC'COY, Esq.

IN taking up Part 2 of the 'History of the rarer species of British Birds,' by T. C. Eyton, Esq., I was somewhat surprised to find, under the head "Of the Gulls in general," a new classification of these birds, or rather a combining of those of Leach, Stephens, and Mr. Eyton himself. The author divides the gulls into four sub-genera, as follows:—

Sub-gen. 1.—*Rissa*, Leach; wanting the hind toe; *tarsi* moderate.
2.—*Larus*, Stephens; hind toe perfect; *tarsi* strong; thighs feathered nearly to the joints; head white in the summer and winter plumage; tail rounded.
3.—*Chroicocephalus*, Nobis; hind toe perfect, *tarsi* slender; thighs much denuded; tail rounded; head dark coloured in the summer plumage.
4.—*Xema*, Leach; tail forked.

Before we go any farther, I am extremely anxious to know under which of these sub-genera we are to place our common gull, *Larus canus*, auct., with the pretty spotted head, which of course will turn it out of the sub-genus *Larus;* and it cannot be admitted to a place in the new sub-genus, *Croicocephalus*, because its head is not "dark-coloured in the summer plumage." We will now begin with *Xema*, and work upwards towards *Rissa*. The only character, you will recollect, given for *Xema*, is "tail forked;" now by this we are to understand, that any gull having a forked tail, must belong to the sub-genus *Xema*, that character alone, it seems, being sufficient to point out its situation.

Now, it is stated in the 12th. volume of the Linnean Transactions, near the end of the account of the Sabine Gull, that the tail of the kittiwake is slightly forked;—I regret that the only specimens I can get at immediately are stuffed, so that I cannot examine them as minutely as I could wish; the Linnean Transactions, however, are quite sufficient for the purpose; we must therefore consider the kittiwake for the future, (at least according to Mr. Eyton's views), as a species of *Xema*, the character of the forked tail being, in that gentleman's opinion, sufficiently characteristic of the sub-genus. Then as the kittiwake is given as the typical species of the sub-genus *Rissa*,—and, as it has been shown, by his own characters, to belong to the sub-genus *Xema*, we must unite the two sub-genera *Rissa* and *Xema*, as having no characters to separate them. As to *Rissa* wanting the hind toe, and the *tarsi* being moderate, these can never be urged as distinctions, for nothing is mentioned either of toes or *tarsi* among the characters of *Xema*, the only given character, "tail forked," being evidently thought quite sufficient.

Leaving *Xema* for an instant, we will examine the author's own sub-genus *Chroicocephalus*, which, to say the truth of it. is by far the best of the groups, with the exception of *Larus*, He says, "Under the sub-genus *Larus*, there has generally been placed two distinct forms, which appear to us to require further subdivision; we therefore propose the name of *Chroicocephalus*, (derived from two Greek words, χροικος, coloured, and κεφαλη, head, signifying that the birds classed under that name have coloured heads), for a new sub-genus under *Larus*, Linn., for the reception of such gulls as have the *tarsi* slender, thighs considerably denuded, hind toe very small, head only, or head and upper part of the neck, dark coloured in the summer plumage." And again, "The general contour of these birds, (those belonging to the sub-genus *Chroicocephalus*), is much lighter than that of *Larus;* they generally feed on the edge of the water, sometimes wading, for which their partially naked thighs peculiarly adapt them." Now here we have a perfect sketch of the habits of the sub-genus *Xema*, or at least of the type of the sub-genus, the sabine or forked-tail gull, as detailed by Capt. Sabine in the volume of the Linnean Transactions already quoted; indeed the habits of the one would pass for those of the other without any alteration whatever, at least as given by those two gentlemen. You will perceive, from what I have just quoted from Mr. Eyton's work, that his sheet-anchor is the colouring of the head in the summer plumage in *Chroicocephalus*, and the head being white both in the summer and winter plumage in *Larus*: this opinion, if any doubt existed, would be confirmed by his name, which of course explains the most prominent character; and you will also observe that he thought the form of the tail of so little importance, that it is not mentioned at all until we find it placed among the characters of the sub-genus which I have mentioned above. It is somewhat singular that the original describer of the *Larus Sabini*, says "it will naturally fall into the division of the gulls with the black heads," and in this I think my readers will entirely agree with him; for on examination we find that there is absolutely no character, with the exception of the difference in the forms of the tails, to separate them, and this form of the tail I have shewn to constitute no more than its specific character, and it would form even a very bad specific distinction when it is common to two such distinct gulls as the kittiwake and the sabine. So, leaving it out as a generic character, let us see how the two groups stand. Mr. Eyton declares that the birds of his new sub-genus have dark heads in their summer plumage;—on turning to the account of the Sabine Gull in the Linnean Transactions, we find "Capite nigricante, torque cervicale nigro," therefore the two sub-genera agree in what Mr. Eyton pronounces to be the most important character of his sub-genus *Chroicocephalus;* as they agree in the most important, we shall also find them agreeing in the most neglected characters, ;—for instance, "tarsi slender" and "thighs considerably denuded" may be given as generic characters with equal truth to both, Sabine's Gull possessing both characters to a very eminent degree. The character, "hind toe perfect," belongs also equally to both, so that as the two groups agree perfectly in their habits, as far as these are known, are perfectly alike in their organization, and when *Xema* possesses in a very eminent degree the characters which have been deemed most important in the sub-genus *Chroicocephalus*, and as they agree in all the minor characters, with the exception of the form of the tail, (which I have shewn, by reference to the sub-genus *Rissa*, to be wholly unfit to be employed as a generic character), I am sure my readers will join with me as to the propriety of uniting the two groups We have now but to do with the two sub-genera *Larus* and *Chroicocephalus*. On comparing the characters of these two groups we shall find that they agree in almost every particular. "Hind toe perfect" is given as the first character of both groups; the second character in *Larus* is "*tarsi* strong," and in *Chroicocephalus*, "*tarsi* slender," but here two such vague terms are employed, that we could not attach any exact meaning to them, they appearing to leave it as quite a matter to be decided by each individual's acceptation of the terms, and I am quite satisfied that there is no *universal* difference in the strength of the *tarsi* in the two groups. The third character of *Larus* is "thighs feathered nearly to the joints." In *Chroicocephalus* it is "thighs much denuded," which means precisely the same thing; for, I think you will find that any gull having his thighs much denuded, will be perfectly described by the words "*tarsi* feathered nearly to the joints;" the characters of the tail are the same in both, and now the only remaining character is "head white in the winter and summer plumage" in *Larus*, and "head dark coloured in the summer plumage" in *Chroicocephalus*. But when we consider that, even according to the author's own admission, the head of *Chroicocephalus* is dark coloured only in the summer plumage, and that even then it does not possess the dark head, unless the bird be in its mature plumage, and when we consider that this is the only character separating it from *Larus*, we are struck with the frivolity of the distinction. By what means are we to know a *Chroicocephalus* in its immature or its winter plumage from a *Larus?* The only additional evidence to prove the fallacy of the separation which we could require, would be the discovery of some gull partaking of the characters of both, and this we find in the common gull *Larus canus* before referred to, whose head is spotted both in the summer and winter plumage, and which, were we to follow Mr. Eyton's rule, must have a "new sub-genus" established for its reception. I hope the arguments I have given will be thought sufficiently conclusive to warrant the union of the two sub-genera, *Larus* and *Chroicocephalus.*

I am sorry to be obliged again to differ with Mr. Eyton, in another part of his valuable work, in which he makes the grey wagtail come under the sub-genus *Budytes.* According to Swainson, the sub-genus *Budytes* has the *tarsi* and middle toe equal, and the hind toe as long as the *tarsus;* now, this obviously can never apply to the grey wagtail, which, in my opinion, belongs to the genus *Motacilla*, with which it agrees in the character of its feet, &c.

*French Street, Dublin.*

ART. VIII. *Notes on the Trumpeter Bird, or Waracobi of th Arowahs of Guiana; Psophia crepitans of* Linnæus. By DR. JOHN HANCOCK, Corr. Memb. Zool. Soc., &c. &c.

THIS bird, which is about the size of a domestic fowl, has many affinities with the genus *Struthio.* Its tail is short, the wings are small, and it seldom flies; but with the assistance of its short wings it runs, or rather hops along, with much rapidity.

The singular and social habits, and very antic gambols of this bird, have frequently attracted the notice of travellers.—It will stand on one leg, then hop and dance before the spectator, and tumble over like a Merry-Andrew; so that an African noticing it, was not unapt in calling it the *crazy bird.*—Like a dog, it shows great attachment to its keeper, and will follow him wherever he goes,—a rare propensity in a bird.—It is bold and pugnacious, and appears to be the master of other birds on the ground, as the toucans are among the trees; it domineers likewise over hogs, and various other animals, jumping up and scratching with such violent motions, as rather to intimidate than conquer by fair combat.

The waracoba may with propriety be regarded as a real ventriloquist; the sound of its note actually proceeding from its belly, although by some naturalists supposed to proceed from the *anus*. This is the cause of that singular sound which has induced naturalists to give it the name of *Psophia crepitans*. M. de la Condamine is of opinion that this sound arises from an organ quite opposite to that of the throat. M. Fermin observes that the most learned naturalists are ignorant of its precise position, but he thinks it may one day or other be discovered.*

Dr. Traill dissected one of these birds, which was sent home by an active and spirited naturalist, Mr. Charles Parker, of Liverpool. An interesting account of the same has been published by the Doctor; but it does not elucidate the present question, respecting the organ of voice. Nor does M. Cuvier afford any additional information on the subject: the species best known in South America is, he says, "L'oiseau trompette, (*Psophia crepitans*, Lin.), ainsi nommé de la faculté de faire entendre un son sourd et profond, que semble d'abord venir de l'anus."†

It should be observed that the male only utters this sound, and the cause thereof is evident in the peculiar structure of the *trachea* or windpipe, which runs down the belly immediately under the skin, to within about an inch of the *anus*, where it is doubled back upon itself, returns and enters the cavity of the chest, at the anterior part of the breast bone.—No dissection is required to ascertain this point; it is indeed very palpable, for the *trachea* is plainly felt under the skin of the abdomen, and the male and female may be thus distinguished. It is doubtless, then, this conformation alone that has given rise to the idea that its obscure grunting sound proceeds from the *anus*. There is nothing very peculiar or complex in the structure of the *larynx*, as observed in some birds of song. It has been said that the structure of the *trachea* here noticed is not common to all the males of the same species: this is singular, if true, but it seems very improbable.

The Indians are fond of keeping the waracoba about their houses, but it is seldom, if ever, known to breed in the domestic state. Its eggs are not often discovered, as it forms its nest, without much art or care, in the deepest recesses of

* 'Hist. de Surinam.' † 'Regne Animal,' tom. i. p. 506.

the forest; depositing two light ash-coloured eggs, rather less in size than those of the domestic fowl. When hatched, the young ones are attended by both parents; and during incubation the male is constantly on guard, ready to give combat to all obtruders. These birds, like the common fowl, scratch up the ground amongst decayed leaves and rubbish, in search of their food, which consists of various seeds, worms, and insects.

It is singular that amongst the numerous useful birds that are indigenous to Guiana, none are found to propagate among the Indians: yet the common fowl (or *Gallina* as it is called after the Spaniards) is reared in abundance throughout the country. We find the term *Gallina*, or a corruption of it, in use among all the native tribes; a proof, I think, that this useful bird was unknown in the country prior to the arrival of Europeans; although M. Sonnini imagined he had discovered it existing in a wild or native state, in what he called the "*Coq de Guiane*."

Art. IX. *Letter from* William Ogilby, Esq. *in reference to Mr. Strickland's Observations on the application of the term Simia.*

Dear Sir,

It was not my intention to have troubled either you or your readers with any farther remarks upon nomenclature.—A passage in Mr. Strickland's last paper, (p. 328), however, demands a reply; and I confess myself rather disappointed that Mr. Strickland has allowed two months to pass without having himself corrected a misrepresentation, which I am sure must have been unintentional, and which I had hoped was as unworthy of Mr. Strickland as of me. Mr. Strickland has affirmed that both Linnæus and Erxleben sanctioned his application of the term *Simia*, that is, *its confinement to the group which Geoffroy calls Pithecus:* I showed Mr. S. that he was mistaken in this, in as far as Linnæus applied the name in question to the whole of the *Anthropoid Cheiropeds*, and Erxleben to the three modern genera *Pithecus*, *Troglodytes*, and *Hylobates, and partly to Macacus.* Between candid and honourable disputants this ought to have been sufficient: at all events I was not prepared to expect a flat contradiction from a gentleman who acknowledges that "*he had not Erxleben's work at hand to refer to.*" I had; otherwise I should not have taken it upon me to dispute Mr. Strickland's original position, from mere recollection. The following are the differential characters which Erxleben assigns to his genus *Simia*.—"*Manus in palmis plantisque; cauda nulla;*" and he comprehends under it the species *S. Satyrus*, (including both the orang and chimpanzee, the *Pithecus Satyrus* and *Troglodytes niger* of modern authors), *S. longimana*, (*Hylobates* of recent naturalists), and *S. Sylvanus* and *Inuus*, (*Macacus Inuus*). To *demonstrate* Mr. Strickland's error, I shall state this in the form of an equation: let the genus *Troglodytes* be represented by $t$, *Pithecus* by $p$, *Hylobates* by $h$, *Macacus* by $m$, and *Simia* by $S$. Now according to Erxleben,—

$$S = t + p + h + m,$$

but Mr. Strickland contends that $S = p$, and says that Erxleben used it in that sense: therefore according to Mr. Strickland,—

$$p = t + p + h + m,$$

which is a manifest absurdity. When therefore Mr. Strickland says,—"With regard to Erxleben, though I have not his work at hand to refer to, yet I believe I am correct in stating that he *does* apply the term *Simia* to the orang outangs, though Mr. Ogilby asserts that he does *not* sanction its application in that sense," he makes an insinuation, I am sure unintentionally, which is as uncourteous as it is unfounded, and which I feel convinced Mr. Strickland was only led into by the carelessness of depending too much upon a fallacious memory. In the passage here quoted there is moreover a mistatement of my sentiments in a former paper: I never either asserted or thought that Erxleben *did not apply* the term *Simia* to the orang outangs; what I said was that "he did not sanction its application in the sense contended for by Mr. Strickland," (p. 279), or in other words, that he *did not confine* the term to the orangs, which is a very different thing from what Mr. Strickland has represented. I regret having been forced to notice this subject; I regret still more that Mr. Strickland has not himself corrected a mistatement which I cannot help thinking he was not warranted to make upon the mere strength of memory. To other parts of Mr. Strickland's paper I shall not reply: the controversy between us has been pushed quite far enough, and I see nothing that should induce me to break the resolution expressed at the conclusion of my last paper, to let the subject drop. I willingly give Mr. Strickland the last word, as he had the first, and leave the balance of the argument to those who take an interest in it. If it tend to open the eyes of zoological legislators to their own fallibility, and to make them a little more moderate in their pretensions and a little less dogmatical and inaccurate in their statements, the controversy will have accomplished a very great *desideratum*, and fulfilled my intentions.

Ever, Dear Sir,
Sincerely yours,
W. Ogilby.

19, *Gower St., Aug. 20th*, 1838.
*Editor of the Magazine of Natural History.*

Art. X. "*A Short Reply to my Reviewers.*" By W. Swainson, Esq. A.G.G., F.R.S., H.M.C.P.S., F.L.S., &c.

Sir,

Although my time would, in all probability, be better employed in prosecuting science than in noticing my critics and reviewers, an interval of leisure induces me to deviate from my usual silence. The subjects upon which I shall touch are chiefly contained in your Magazine, and as the following observations in reply will elicit some scientific information, they will not be altogether of a controversial nature.

In your first volume (p. 489) appears Mr. G. R. Gray's maiden ornithological paper. As this gentleman has personally assured me that he had not the least intention of giving offence by the observations therein contained, I shall make no comments on the tone which pervades that paper, but confine myself to noticing its scientific contents. In the first place I feel myself obliged to the author for showing that my *Malaconotus mollissimus* had already been separated from the *Cubla* of Le Vaillant, by my friend Professor Lichtenstein, in a valuable, but little known German work. Not having a specimen of the Cape species to compare with the Gambian, when writing the description of the latter, I naturally thought they were the same, and hence the mistake arose, a sort of mistake which all of us are liable to, and are falling into almost daily. I have since procured a specimen of the true *Cubla* from South Africa, which by no means verifies the observations of Mr. Gray on the difference he states to exist between these two closely-allied species. He observes, among other points, that the *gambensis* of Lichtenstein is distinguished from the *Cubla* of Le Vaillant "by the colour of its wings and back, which are fuscous." Now Le Vaillant expressly states that the male of his *Cubla* has the "*manteau* *d'un beau noir,*" not "fuscous," which is only the plumage of the female *Cubla* and also of the female *gambensis*, while the back of the male *Cubla* is of the very same "beau noir" in my specimen, as that of the male *gambensis*. As a further point of distinction between the two, (and that upon which Mr. Gray's specific characters are chiefly founded), he remarks that "the longest quill in the *Cubla* is the fourth, and in *gambensis* the third." My specimens neither exhibit these characters or differences. I find that in both the third quill is $\frac{1}{10}$ in. shorter than the fourth; in *Cubla* the fourth, fifth, and sixth quills are perfectly equal, but in *gambensis*, the fourth is rather longer than the fifth and sixth, the two latter being almost imperceptibly graduated. These variations from Mr. Gray's characters may possibly originate in the different age of the specimens, rather than from error of description, but in either case, it is quite manifest that no specific characters between these birds can be drawn from the relative length of their quill feathers.

Mr. G. R. Gray proposes to make the *Thamnophilus Sabini* of his brother, the type of a new sub-genus, and to do the same with the *Cubla* and *gambensis*. I have already stated my inability, after fifteen years study of this family, to determine the natural genera; and as I have myself refrained from characterizing those which were artificial, it cannot be supposed that I should adopt these of Mr. Gray's, founded, as it appears to me, on a very imperfect knowledge of the whole group. I consider the *Malaconotus Sabini* which I examined some years ago, as the most pre-eminent typical species I have yet seen of the genus, while its striking representation to the *Conirostres*, according to the theory of variation, may be gathered from the confession of Mr. G. R. Gray, who says that "the broad, smooth, and rounded *culmen*, gives it so great an approximation, (or rather analogy), to the Australian genus, *Cracticus*, that it may be considered an intermediate link." *Malaconotus Cubla* and *gambensis* are equally types of my genus; and to remove *them* from it, is to destroy the genus itself. If the group is to be divided, M. Vieillot's subgenus *Laniarius* must be adopted, which will separate the bright coloured division from the above, but at present I can discover no tangible characters, by which this can be effected.

A few words to Mr. Strickland, whose gentlemanly tone of discussion will always insure him attention. Mr. Strickland observes, p. 203, "I cannot, however, withold the expression of my regret, that Mr. Swainson, after deprecating in 1836 the extension of English names to foreign Ornithology, should, in 1837, have committed this very error, by introducing this unscientific, and worse than useless English nomenclature, into his 'Birds of Western Africa.'" If Mr. Strickland will again peruse what I wrote in 1836,* he will no where find that I deprecated English names to foreign birds, a practice that originated with Willughby and Ray, and has been continued to the present time. My objections are made not to the use, but to its abuse,—in having, for instance, twenty-five different new English names expressive of a parrot, or a woodpecker. But even were it otherwise no "error" is committed, it is only a question of opinion, amenable to no law of science, and with which, as I have before observed, science has nothing to do; so it cannot be "unscientific." Whether it be "worse than useless" to have an English nomenclature for foreign birds, is another matter of opinion. If the generality of mankind had not thought this plan both useful and convenient, English names would not have spread into general use. I apprehend that people in general would not prefer to call one bird a *Gypogeranos* instead of serpent-eater, another *Casmorhynchus* instead of bell-bird, or a third *Dendrocolaptes* instead of creeper. Such vernacular names are for the multitude, not for naturalists, who never use them when they wish to be clearly understood.

The reviewer of my "*Muscicapidæ*" complains that a "careful and exact definition" is not given of every genus, and laments that there is not "appended a list of all the species that are known." He may with just as much reason complain that I have not made it a complete *Systema Avium*.—Here is a volume with upwards of thirty coloured plates, and 256 printed pages, all for six shillings, and yet fault is found with it because it does not contain what would fill two or three other volumes, although the reviewer himself says "it is not one third the price at which many works of no greater scientific value" are published! The "careful and exact definitions" have all been given in my 'Classification of Birds;' and as for a list of all the species, it will require a much abler pen and greater knowledge than I possess, to do it; and no one, who knows the actual state of descriptive Ornithology, would have made such a remark.

But these are not all the faults of my poor little volume.—It appears, according to the learned reviewer, that it does not even perform what it professes to do. "Indeed," he continues, "it cannot be considered as a complete synopsis even of the genera, for several important generic forms, (such for

* Classification of Birds, i. 242.

instance as the white-headed tody, and the so-called *Muscicapa leucocilla*, are wholly omitted, possibly because Mr. Swainson has not succeeded in making them square with the quinary arrangement, or the theory of representation."*

I will now call upon this reviewer to name any one of these "several important generic forms" which, according to *my* definition of the family of *Muscicapidæ*, has been "wholly omitted." It is due to his own credit, and to the credit of your Magazine, to substantiate this assertion. And in the next place I call upon him, as another test of his knowledge of this family, to tell the public what he knows of the white-headed tody, and the "so-called *Muscicapa leucocilla*," more than what he has gathered from the following passage at p. 90 of my second volume of Birds.

"Besides these genera there are several black and white coloured birds, having a general resemblance to the foregoing, (*Fluvicola*, *Perspicilla*, &c.), which would seem to enter among the water-chats; yet as we have not sufficiently analyzed the group, we must leave this point undetermined. Among these are the white-headed tody of the old writers, which is either a *Tyrannula* or an aberrant *Fluvicola*, as well as the *Muscicapa leucocilla* of Hahl, which, in outward appearance, so much resembles a manakin, that it may possibly prove a representative of that family."

Now it so happens that I have chanced to see and study these two birds in South America, and their habits, no less than their structure, exclude them from my definition of the *Muscicapidæ*. Let the reviewer, therefore, who calls them "important *generic*" (not subgeneric) "forms" in my family, state his grounds for this opinion. But I will not put his presumed knowledge of this family to such a test, I will simply call upon him to tell us where he got the name of the "so-called *Muscicapa leucocilla*," except from my volume?—Where is this name to be found elsewhere? And in what work is the bird first described and figured? If he cannot answer these questions, he will confirm my strong suspicion,

* This assertion is just as well-founded as another in the same number of your Magazine, p. 355; where it is said that "the kingfisher family (*Halcyonidæ*) only, is feebly represented in America by a few piscivorous species; all the remainder being peculiar to the eastern hemisphere." Why! America is actually the chief metropolis of the piscivorous kingfishers! a circumstance well known to every experienced ornithologist. With the exception, indeed, of my *Ispida gigantea* and *bitorquata*, and another, I am unacquainted with any long-tailed kingfishers that *are not* found in America, where the largest and most powerful species abound on the banks of all the great rivers. On the other hand, the short-tailed "feeble" race, represented by *A. ispida*, is totally excluded from America; while those which are "peculiar to the eastern hemisphere," (*Halcyon*, Sw.), are not *piscivorous*, but almost entirely *insectivorous*.

nay, my firm belief, that he has adroitly used the information thus given him, as a weapon of offence against myself.

I cannot feel flattered by the "faint praise" the writer has thought fit to sprinkle in his review. He lauds me for what any one, at all conversant with technical Ornithology, is able to do as well as myself;—he lauds, in short, only what he can understand. But those higher objects of the science, those generalizations of innumerable facts, which have cost me a life to put together, *these* his limited knowledge renders him wholly incapable of understanding: they are therefore called "theoretical notions,"—"which it is impossible to discuss;"—and in this latter he says most truly, for how can we discuss a subject we have never studied?

To "errors and misprints" I believe I must plead guilty; it is a fault I always have had, and am afraid I always shall have. The revises, however, in the present instance, went to Sir W. Jardine, for *his* perusal and correction, and therefore the blame is as much his as mine.

If that captious and disputatious spirit which is now rife among naturalists, particularly the juniors, is to go on, I see no other result than that the lovers of quiet should draw away in disgust. Do we find this same spirit among botanists?—Certainly not! For myself, I shall studiously avoid, in future, all praise or blame to others. My greatest enemies, if I have any, must confess that I have ever been impartial in this respect, and as eager to exhibit the excellencies of my predecessors, as to animadvert on what I thought their defects. I wish to follow peace, and live in charity and good-will with all men; but to do this, as the world is now constructed, it is absolutely necessary, sometimes, to raise one's voice against those who would trample upon a patient and retired student, merely because, unfortunately for himself, he has acquired some notoriety.

With many apologies to you and your readers for thus obtruding myself on their notice, at so much greater length than I originally intended, I here conclude.

I remain, Sir,
Your obedient Servant,
W. SWAINSON.

[Although we would much rather have avoided incurring the charge of suppressing a part of Mr. Swainson's vindicatory remarks, by placing before our readers the *whole* of that gentleman's Reply to his reviewers, yet, as a portion of the communication with which he has favoured us, related exclusively to an article in a contemporary journal, we trust that our motives for declining to give thus much of it insertion, will be so far appreciated as to shield us from the suspicion of partiality or injustice. It would doubtless have suited Mr. Swainson's convenience to kill as many birds as possible with *one* stone, but we think he must, upon consideration, be sensible that to have made the pages of the 'Magazine of Natural History' a vehicle for giving publicity to any thing in the shape of censure upon the conductors of another Journal, unless that censure were to assume the form of an *editorial* article, would on our part have involved, not only a breach of courtesy, but an apparent violation of that good feeling which we trust exists between the two periodicals in question.

As a general principle we think every one must admit the inexpediency of publishing the replies which authors may think fit to make to the criticisms of reviewers; for if this course were to be frequently followed, the public would be annoyed with endless controversies, in the place of obtaining that literary information which it is the object of reviewers to supply. Upon the present occasion however we have departed from this rule, and if Mr. Swainson thinks he has been hardly dealt with, so far as the publication of his reply to our critique, (if it have been unjust,) can be any reparation, we are happy to afford it him.

From the tenour of Mr. Swainson's remarks it is plain that he does not identify us with the review of his volume upon *Muscicapidæ*, and in this instance, contrary to our usual custom, the criticisms were not those of our own pen. We are fully conscious, however, that the editor of a journal is the ostensible author of every review which may appear in the work under his superintendance, and, as such, answerable for the justness of everything in the shape of editorial criticism which may there be put forth.

The remarks on the 'Birds of Western Africa,' in common with most of the critical notices which we have been able to give of works sent to us for review, were by the editor; and in the case of the '*Muscicapidæ*,' we availed ourselves of the scientific knowledge and literary assistance of a friend, solely that this volume might not, in common with many others of the 'Naturalist's Library,' lie unnoticed on our table, until a spare hour should bring us leisure to peruse it. In saying this we do not in the least wish to shift the responsibility from our own shoulders to those of the reviewer; but in publishing Mr. Swainson's Reply, we had the choice of only two courses to follow,—either to explain the position in which we stand as to the review in question, or to insert his rejoinder without note or comment.

Having said thus much for ourselves, we quote our reviewer for "scientific information."

"Mr. Swainson wishes to be informed what we know of the white-headed tody, and the *Muscicapa leucocilla*, more than what we have gathered from vol. ii. p. 90 of his 'Birds.' Now the white-headed tody has been long ago described by Latham and the "old writers," as Mr. Swainson admits, and it is therefore unnecessary to consult the 'Classification of Birds' with respect to this species. As to the *Muscicapa leucocilla* of Hahn, we have no hesitation in saying that we *did* acquire the *name* from Mr. Swainson's very useful volume.

Yet we can assure him that we know a great deal more about these birds than he has told us. Both of them are common and well-known species, and it was not till we had carefully studied several specimens of each, that we ventured to term them "important generic forms" of *Muscicapidæ*,—as Mr. Swainson has defined the family. His definition of *Muscicapidæ* is as follows:—('Classif. of Birds,' vol. ii. p. 254).

"Stature small. Bill considerably depressed for its entire length, broad: the edge of the upper mandible folding over that of the lower; the tip abruptly bent and notched. *Rictus* wide, defended with strong bristles pointing forwards. Feet almost always short, small, and weak. Feed solely upon insects captured during flight. Habits sedentary."

"Now if any one will compare specimens of the white-headed tody and the *Muscicapa leucocilla* with the above definition, he will find that in all respects of structure they conform to it. Of the habits of these birds we do not pretend to speak; and if Mr. Swainson can inform us of any marked peculiarity in this respect, we shall be obliged for the information, and will allow it due weight in forming our opinion. But judging from structure alone, it is clear either that these birds are *Muscicapidæ*, or that Mr. Swainson's definition of that family should be altered so as to exclude them.

"When we termed these birds "*generic forms*," we did not mean to fix their precise value as compared with the *genera* or the *sub-genera* of Mr. Swainson. Many, (we might say *most*) naturalists disapprove of the term *sub-genus*, and prefer following the rules of logic in calling the group next above the species, a *genus*. But to a quinary author, sub-genera are indispensable, as they enable him to dispose of any superfluous groups which would otherwise raise the genera of a family above their allotted limits of five or twenty-five."

Mr. Swainson appears somewhat indignant that the reviewer should have made use of the expression "theoretical notions" in reference to the representative system, and the quinary distribution of animals, &c.: now as on other occasions we have ventured to hint that something of theory was, to a greater or less extent, associated with what Mr. Swainson looks upon as altogether a matter of absolute demonstration, we may in this particular fairly identify ourselves with the sentiments put forward by our reviewer.

Mr. Swainson's impression that the non-adoption of the views which he advocates, arises from our *utter incapability of understanding them*, is, in a great measure, perfectly true; and if this incapability depend upon our limited acquaintance with zoological facts, it is some consolation to bear in mind, how many naturalists there are whose scientific reputation is of an order far beyond that which we are ever likely to attain, and who yet must be placed in the same list of ignoramuses as ourselves, if the comprehension of the natural system, as evolved by Mr. Swainson, is to be the test of a profound insight into the science of Zoology.

We can readily imagine the self-satisfaction accompanying Mr. Swainson's no less convenient than ingenious belief, that limited zoological knowledge is the barrier to the comprehension of the natural system with those who, like ourselves, have never come forward as converts to the principles embodied in his views of zoological classification. There is, however, one class of inquirers, whose opinions, in relation to this matter, must be entitled to somewhat more consideration, since they cannot be disposed of in quite so summary a manner as our own. It happens that an instance or two have come under our notice, and possibly Mr. Swainson, were he to exert his powers of recollection, could call to mind the like occurrence, of individuals, who at one time did possess the requisite amount of zoological knowledge to admit all Mr. Swainson's positions, and to appreciate the force of all his generalizations, but who having nevertheless their understandings open to conviction, proceeded in the field of scientific research until a wider sphere of observation, and a greater accumulation of experience, enabled them to discriminate, perhaps with greater accuracy than formerly, between positive truisms and assumed facts, between "theoretical notions" and matters capable of demonstration,—a condition of things bringing about, curiously enough, an abandonment *in toto* on their part of the natural system.

The existence of such a class as this, we presume, Mr. Swainson will not attempt to dispute; and although he may argue that the individuals so circumstanced merely constitute an *aberrant group* of non-conformists to the quinary doctrines, yet it is plain that *incapability of comprehension* cannot be brought to his assistance, as a solution of the phenomenon of *their* recantation, and it will be necessary for Mr. Swainson to frame some *special rule* applicable to the exigencies of the occasion, in order to remove what must otherwise be a stumbling-block in the way of the general introduction of his principles.

We understand the allusion to the disputatious spirit among the "*juniors*," and most certainly we yield the precedence both in years and experience to the author of the *Muscicapidæ*, but at the same time we venture to remark that although he should live, as we sincerely trust he may, to the age of three-score years and ten, and multiply his observations an hundred fold, the *quinary millennium*, at the expiration of that period, may be as far distant as at the present moment, unless the indications of the existence of the so-called natural system, shall be shewn to admit of a nearer approach towards legitimate demonstration, by a course of induction more logical in its nature, more philosophical in its principles, than that which we can gather from the writings of Mr. Swainson.]—*Ed.*

## SCIENTIFIC INTELLIGENCE.

MEETING *of the British Association.*—We do not think it necessary to place before our readers an outline of the subjects relating to Natural History, brought forward at the present meeting of the British Association at Newcastle, because the public have access to reports of its scientific proceedings through so many readily accessible channels; but we avail ourselves of the Athenæum, to transfer from the columns of that journal an interesting letter from Lord Tankerville, on the wild cattle in Chillingham Park, addressed to Mr. Hindmarsh, of Alnwick, who read a paper upon these animals, the history of which must be deeply interesting to all British Zoologists.

"Grosvenor Square, 8th June, 1838.

"Sir,

"Some time since I promised to put down upon paper whatever I knew as to the origin, or thought most deserving of notice, in respect to the habits and peculiarities of the wild cattle at Chillingham. I now proceed to redeem my promise, begging pardon for the delay. In the first place, I must premise that our information as to their origin is very scanty; all that we know and believe in respect to it rests in great measure on conjecture, supported, however, by certain facts and reasonings, which lead us to believe in their ancient origin, not so much from any direct evidence, as from the improbability of any hypothesis ascribing to them a more *recent* date. I remember an old gardener of the name of Moscrop, who died about thirty years ago, at the age of perhaps eighty, who used to tell of what his father had told him as happening to him, when a boy, relative to these wild cattle; which were then spoken of as wild cattle, and with the same sort of curiosity as exists with regard to them at the present day. In my father and grandfather's time we know that the same obscurity as to their origin prevailed; and if we suppose (as was no doubt the case) that there were old persons in their time capable of carrying back their recollections to the conversation still antecedent to them, this enables us at once to look back to a very considerable period, during which no greater knowledge existed as to their origin than at the present period. It is fair, however, to say, that I know of no document in which they are mentioned at any past period.—Any reasoning, however, that might be built on their not being so noticed, would equally apply to the want of evidence of that which would be more easily remembered or recollected—the fact of their recent introduction. The probability is, that they were the ancient breed of the island, inclosed long since within the boundary of the park. Sir Walter Scott rather particularly supposes that they are the descendants of those which inhabited the Great Caledonian Forest, extending from the Tweed to Glasgow, at the two extremities of which, namely, Chillingham and Hamilton, they are found. His lines in the ballad 'Cadyow Castle' describe them pretty accurately at the present day:—

"Mightiest of all the beasts of chace
"That roam o'er woody Caledon,
"Crushing the forest in his race,
"The mountain bull comes thundering on:
"Fierce on the hunters' quiver'd band
"He rolls his eye of swarthy glow,
"Spurns with black hoof and horns the sand,
"And tosses high his mane of snow."

"I must observe, however, that those of Hamilton, if ever they were of the same breed, have much degenerated.

"The park of Chillingham is a very ancient one. By a copy of the endowment of the vicarage, extracted from the records at Durham, and referring to a period certainly as early as the reign of King John, about which time, viz. 1220, the church of Chillingham was built, the vicar of Chillingham was, by an agreement with Robert de Muschamp, to be allowed as much timber as he wanted for repairs, of the best oak out of the Great Wood of Chillingham, the remains of which were extant in the time of my grandfather. The more ancient part of the castle also appears to have been built in the next reign, that of Henry III., since which it has been held, without interruption, by the family of Grey. At what period, or by what process the park became inclosed, it is impossible to say; but it was closely bounded by the domains of the Percies on the one side, and by the Hibburnes on the other, the latter of whom had been seated there since the time of King John; and as the chief branch of the Greys always made Chillingham their principal residence, until it passed into the hands of Lord Ossulston, by his marriage with the daughter and heiress of Ford Lord Grey, it is reasonable to suppose that, in order to secure their cattle, wild and tame, they had recourse to an inclosure probably at an early period. It is said there are some other places in which a similar breed is found: Lymne Park, in Cheshire; Hamilton, as I before mentioned; and Chartley Park, (Lord Ferrers). The first I have not seen, but they are described as of a different colour, and different in every respect. Those at Hamilton, or, rather, Chatelherault, I have seen, and they in no degree resemble those at Chillingham. They have no beauty, no marks of high breeding, no wild habits, being kept, when I saw them, in a sort of paddock; and I could hear no history or tradition about them, which entitled them to be called wild cattle.—Those at Chartley Park, on the contrary, closely resemble ours in every particular; in their colour, except some small difference in the colour of their ears—their size—general appearance: and, as well as I could collect, in their habits. This was a very ancient park, belonging formerly to Devereux, Earl of Essex, who built the bridge on the Trent, to communicate with his chace at Channock, and Beaudesert, then belonging to him; and the belief is, that these cattle had been there from time immemorial. With respect to their habits, it is probable that you will learn more from Cole, who has now been park-keeper at Chillingham for many years, than from any information I can give. I can mention, however, some particulars. They have, in the first place, pre-eminently, all the characteristics of wild animals, with some peculiarities that are sometimes very curious and amusing. They hide their young, feed in the night, basking or sleeping during the day; —they are fierce when pressed, but, generally speaking, very timorous, moving off on the appearance of any one, even at a great distance. Yet, this varies very much in different seasons of the year, according to the manner in which they are approached. In summer, I have been for several weeks at a time without getting a sight of them,—they, on the slightest appearance of any one, retiring into a wood, which serves them as a sanctuary. On the other hand, in winter, when coming down for food into the inner park, and being in contact with the people, they will let you almost come among them, particularly if on horseback. But then they have also a thousand peculiarities. They will be feeding sometimes quietly, when if any one appear suddenly near them,—particularly coming down the wind, they will be struck with a sudden panic, and gallop off, running one after another, and never stopping till they get into their sanctuary. It is observable of them as of red deer, that they have a peculiar faculty of taking advantage of the irregularities of the ground, so that on being disturbed, they may traverse the whole park, and yet you hardly get a sight of them. Their usual mode of retreat is to get up slowly, set off in a walk, then a trot, and seldom begin to gallop till they have put the ground between you and them in the manner that I have described. In form they are beautifully shaped, short legs, straight back, horns of a very fine texture, thin skin, so that some of the bulls appear of a cream colour; and they have a cry, more like that of a wild beast, than that of ordinary cattle. With all the marks of high breeding, they have also some of its defects. They are bad breeders, and are much subject to the *rush*, a complaint common to animals bred in and in, which is unquestionably the case with these as long as we have any account of them. When they come down into the lower part of the park, which they do at stated hours, they move like a regiment of cavalry in single files, the bulls leading the van, as in retreat it is the bulls that bring up the rear. Lord Ossulston was witness to a curious way in which they took possession, as it were, of a new pasture recently opened to them. It was in the evening about sunset. They began by lining the front of a small wood, which seemed quite alive with them, when all of a sudden they made a dash forward altogether in a line, and charging close by him across the plain, they then spread out, and after a little time began feeding. Of their tenacity of life the following is an instance. An old bull being to be killed, one of the keepers had proceeded to separate him from the rest of the herd, which were feeding in the outer park.—This the bull resenting, and having been frustrated in several attempts to join them by the keeper's interposing, (the latter doing it incautiously), the bull made a rush at him and got him down; he then tossed him three several times, and afterwards knelt down upon him, and broke several of his ribs.—There being no other person present but a boy, the only assistance that could be given him was, by letting loose a deer hound belonging to Lord Ossulston, who immediately attacked the bull, and by biting his heels drew him off the man and eventually saved his life. The bull, however, never left the keeper, but kept continually watching and returning to him, giving him a toss from time to time. In this state of things, and while the dog with singular sagacity and courage was holding the bull at bay, a messenger came up to the castle, when all the gentlemen came out with their rifles, and commenced a fire upon the bull, principally by a steady good marksman, from behind a fence at the distance of twenty-five yards; but it was not till six or seven balls had actually entered the head of the animal, (one of them passing in at the eye), that he at last fell. During the whole time he never flinched nor changed his ground, merely shaking his head as he received the several shots. Many more stories might be told of hair-breadth escapes, accidents of sundry kinds, and an endless variety of peculiar habits observable in these animals, as more or less in all animals existing in a wild state: but, I think I have recapitulated all that my memory suggests to me, as most deserving of notice; and will only add, that if you continue in the intention of preparing a paper to be read before the approaching Scientific Association at Newcastle, on this subject, you are welcome to append this letter to it, as containing all the information I am able to give.—I have the pleasure &c.,

"TANKERVILLE."

"To L. Hindmarsh, Esq."

*Electric Eel.*—At the last meeting of the Zoological Society, a living specimen (we believe the first ever brought to Europe), of the electric eel, from the river Amazon, was exhibited by a gentleman of the name of Porter.

Most of the members present had the curiosity to feel the shock given by this animal, the intensity of which varied according to the mode of handling, or the excitement of the fish.

This interesting scientific rarity has since been purchased by the proprietors of the Adelaide St. gallery, for public exhibition.

*Artesian Wells.*—The Moniteur gives an account of the report lately made to the French Academy, by M. Arago, respecting the Artesian well which the municipality of Paris is now engaged in boring, and which has already been sunk to the depth of 410 metres. The council of the municipality has granted fresh sums, but M. Arago, fearing that they would relax in their zeal if well-founded hopes of a good result were not offered, invited M. Elie de Beaumont to institute a geognostical inquiry into the strata which had been pierced, in order to judge of those through which it would be necessary to bore before water would rise above the surface of the ground. M. de Beaumont believes from the chalk, in which the bottom of the hole now is, being without flint, of a greyish green colour, and containing but little *alumina*, that the operation has been for some time proceeding in the marly chalk which generally forms the stratum immediately under the white chalk. He therefore thinks that only the tufaceous chalk, the chloritic chalk, and that layer of clay which the English geologists call "gault," are yet to be pierced, before the instrument will penetrate into the layer of sand which furnishes such rich springs at Tours and Elbœuf; and he estimates the depth to which the instrument must be driven at 100 metres more. Though this prospect is rather encouraging, M. Arago is afraid that the high temperature of the water rising from the depth of 510 metres, and perhaps more, will be prejudicial to its usefulness for most purposes.

*Electrical Telegraph.*—Professor Steinheil, of Munich, who is actively and most successfully engaged in perfecting the methods of using galvanism for telegraphic purposes, has made the important discovery that the earth may be used, to a great extent, for conducting galvanic electricity. The ends of the wires used need only be furnished with plates, and be sunk a few inches in the ground, where it is sufficiently saturated with moisture. The current may thus be made to traverse distances of several leagues, without interruption.

*Natural History of Nowaja Semlija and Caucasia.*—The report of the Russian minister of public instruction contains an interesting chapter on the results obtained by the latest travels of Russian Academicians and Professors. Those obtained by M.M. de Baer and Nordman are particularly interesting to the friends of Natural History. The number of objects brought by the former from Nowaja Semlija is so considerable, that the Natural History of those islands is now as well known as that of other arctic countries which have been frequently visited by scientific travellers. Prof. Nordmann has been as successful a collector in the countries situated near the eastern coast of the Black Sea. He has brought with him 20 species of quadrupeds, 232 of birds, 89 of reptiles, or amphibious animals, 492 of fishes, 340 of molluscous animals, 3600 of insects, and about 13210 specimens of plants comprising 950 species.

## SHORT COMMUNICATIONS.

*The Doctrine of Spontaneous Organization.*—The following fact, stated in the new edition of Dr. Prichard's 'Researches into the Physical History of Mankind,' (vol. i., pp. 40, 41), may be quoted in reference to Dr. Weissenborn's paper on Equivocal Generation.

After mentioning several instances of plants appearing in newly turned up soil, the author narrates, that—"Another fact of similar kind, which I likewise owe to Dr. Graham, would serve to indicate, if there were any doubt on the subject, what is the true explanation of the preceding. To the westward of Stirling there is a large peat-bog, a great part of which has been flooded away by raising water from the river Teith and discharging it into the Forth, the under soil of clay being then cultivated. The clergyman of the parish standing by while the workmen were forming a ditch in this clay, saw some seeds in the clay which was thrown out of the ditch: he took some of them up and sowed them; they germinated, and produced a crop of *Chrysanthemum segetum*. What a period of years must have elapsed while the seeds were getting their covering of clay, and while this clay became buried under fourteen feet of peat-earth!"

In Dr. Weissenborn's paper adverted to, there is no allusion to the circumstance of plants, in the instances which he enumerates, being developed in the ordinary manner: whereas it is clear that all those animals which require to be tended by a parent must have been first called into being in the adult state, or they could not have subsisted. Even if we could imagine, with Dr. Weissenborn, that a combination of circumstances may suffice to produce an organized being, still it is necessary, in the case of most animals, and also numerous plants, that a plurality of individuals comprising the two sexes should independently originate, or their species could not be transmitted: hence we have not only to imagine an extraordinary coincidence of circumstances concurring to produce one adult elephant, (*i. e.* an animal old enough to support itself), but at least a couple of them, male and female! The very fact which Dr. Weissenborn calls particular attention to, of the admirably minute adaptation of every species to its indigenous abode, furnishes but another argument against the conclusions which he arrives at, when considered in relation to the definite and distinct general types or separate plans of structure on which they are so variously modified.

With reference to plants, Dr. Prichard continues (at p. 50), —"It would be easy to discover districts, situated respectively in North America and in Europe, or in Equinoctial America, Africa, and Asia, in which all the same physical conditions exist, namely, a parallel temperature and elevation, a similar soil, and the same degree of humidity in the atmosphere; yet the species of plants in these several districts will be far from being identical. The vegetable tribes will present, in each respectively, analogies of form and general character; but few, if any, of the same species will be found in localities thus separated.

"Instances may frequently be observed in which plants become naturalized in countries where they had never existed until they were conveyed by human agency, or by the accidental transportation of seed. When this has once happened, the results prove that the climate and all external conditions are perfectly congenial to their nature, since they have spread, in a short time, over extensive regions, and have appeared to supplant, in some places, the indigenous tribes. Previously to the importation of seeds, the physical conditions locally present had no power of producing such plants, nor does it appear that their existence is so connected with external conditions as to have been from the origin of things necessarily or naturally co-extensive with them. When introduced they multiply just as horses and oxen from Europe have produced herds which cover the immense plains of Paraguay."

That the creative energy is at present in operation, it does not appear to me that we are in possession of a single fact, beyond the results afforded by the study of fossil remains, which can justify us in entertaining the supposition: and with regard to the general proposition contended for by Dr. Weissenborn, Cuvier has profoundly remarked, that—"La vie exerçant sur les élémens qui font à chaque instant partie du corps vivant, et sur ceux qu'elle y attire, *une action contraire* à ce que produiraient sans elles les affinités chimiques ordinaires, *il repugne qu'elle puisse être elle-même produite par ces affinités*, et cependant l'on ne connaît dans la nature aucune autre force capable de réunir des molécules auparavant séparées.*" The force of this reflection will appear the more we consider it.—*Edw d. Blyth, Aug. 3rd,* 1838.

*Observations on the Oubudi, or Great Cashew Tree of Guiana*, a new and non-descript species of *Anacardium;* natural order *Terebinthaceæ.*—There is, I believe, but one species of *Anacardium* known to botanists; namely, the *A. occidentale*, or the common cashew,—*Meray* of the natives of Guiana: this being generally considered as identical with, or as a mere variety of the oriental cashew, or *Cassurium.* Besides this, however, I have noticed in various parts of the forests of Guiana, and not far distant from the European settlements, what appears to be a nondescript species of this genus;—a large tree, growing to the height of a hundred feet or more, and about four or five feet in diameter; its trunk being often observed straight and undivided to the height of sixty or seventy feet, where it begins to throw out its large and widely spreading branches; altogether resembling the oak in general contour, but much larger.†

Of this interesting tree I purpose here to offer some elucidation. The *flowers* are placed on large, divaricate, terminal panicles, similar to those of *A. occidentale;* their situation, colour, size, and fragrance being likewise similar. The *calyx* is five-parted, acute, very small. The *corolla* consists of five lanced, acute petals, thrice the length of the cup. The *stamina* are nine in number, unequal, growing upon a short pedicil or elevated ridge, which encircles the germ; two of them are often wanting; and one only,—a larger stamen with a twin anther, appears to be fertile. The *germ* is obovate, compressed, and large; on one side, near the summit, is placed the *style*, which has a capitate stigma, giving to the germ the appearance of a beak. The *pericarp* is a reniform nut, seat-

* 'Introduction,' pp. 14, 15.

† In a paper read before the Medico-Botanical Society, in 1832, as well as in an incidental notice in my pamphlet on Guiana, I have called this tree *Anacardium giganteum.*

ed on a large, pyriform, juicy *receptacle*, which is of a bright purple colour, and of the most delicious flavour.* The *embryo, cotyledons*, and *radicle* are nearly the same as in the meray, or common cashew.

The *leaves* are scattered near the ends of the branches; they are smooth and shining on the upper surface, of a deep green hue, obovate, entire, rounded at the extremity, narrowing or cuneate towards the base, and furnished with short, channelled petioles. The *branches* are stout, and of a fragile, spongy texture. The *bark* is very thick, of a deep red colour, astringent and slightly bitter, covered with a furrowed cuticle.—The *wood* of the trunk is white, light, soft, and easily wrought, not unlike deal, or the American white pine, although softer than either of these woods; it will furnish tolerable boards and plank, and serves for canoes, but is subject to be bored by the *Teredo*, and other species of worms.

Common report says that this tree flowers only once in three years; this, however, is not true. It flowers every year, regularly in the months of January and February, although in moist seasons it is subject to the blast or blight. There is no tree in the forest, I presume, that does not put forth flowers annually.

No tree affords a better shade, or a more delicious fruit, than the one under consideration. The natives prepare a most excellent wine from its fruit or pomaceous product; and it affords a rich and luscious harvest to a great diversity of birds and other animals, particularly the pecaric and mypoorie, (the bush-hog and the tapir), which the Indians say become very fat during an abundant crop of this dainty fruit.

Another species of *Anacardium* called "*Mercy de montania*," grows on the mountains of Paraguay and Pacaraimo, to the southward of the Orinoko. This is likewise a tall tree, but of more slender form than the oubudi; its fruit and leaves being similar to those of the latter. This mountain species may not improbably be identical with *Rhinocarpus* of Humboldt and Bonpland; and if so, no good reason, I should think, could be assigned for forming a new genus. May not these eminent travellers have erred by overlooking the style? For it is the deflection and lateral position of this part which give to the germ the peculiar snout-like form, from which, I presume, they have taken the name *Rhinocarpus*. Mistakes

* Botanists will not admit the term *fruit* to be applicable to this anomalous kind of receptacle in the *Anacardium*; yet, as being a large, coloured, sweet and juicy pomiform product, it seems most natural to consider it a sort of fruit. Instead, however, of the seed being borne *within*, it is placed *upon*, the *pomum*.

indeed, as well as a fondness for new names, not unfrequently swell the list of genera and species. In *Rhinocarpus*, we are told, the stamens are alternately sterile; a knowledge of its fruit appears still to be a *desideratum*.

*Remarks on Tubularia indivisa.*—A few days since I met with an unusually large specimen of *Tubularia indivisa*. I found it in a pool at low water, at one of our spring tides.—I waited until the hole was dry round its circumference, in order to ascertain if anything were growing in a place so well adapted for delicate animals to live in, undisturbed; for however rough the sea may be, the water in this pool, which is about ten feet deep, is comparatively quiet. I need hardly say how delighted I was to find about twenty clusters of these animals growing round the circumference of the pool, at about four feet from the surface. I had only time to strip and procure two clusters, before the tide returned, and I was obliged to make a hasty retreat. I have been six times since, (a distance of seven miles), to the same place, and although I chose the lowest tides, this hole has been uncovered but once, and then I procured several groups of this *Polypus*, leaving plenty to keep up the stock.

When I first found them (in May) they were evidently in flower, if I may use the expression; for the specimens which I have since obtained, are not half the size of those which I sent to you, although I observed no difference when I first saw them.

I am of opinion that the specimens which I sent to you (from the river Dart) are dwarf specimens of this *Tubularia;* their small size being accounted for by the friction to which they are exposed, as they were found growing on the chains of the floating bridge. I mean to dredge the river Dart, in order to satisfy myself if there are any larger specimens adhering to the stones in the neighbourhood of the chains.—This *Tubularia* is by far the most beautiful of the *Polypiferæ;* it is figured in Ellis's Corals, but so imperfectly as hardly to be recognized. The first specimens that I procured, I took home in a jar of sea water; but as I could not imitate the tide, they began to droop in two days, before I could domesticate them, as I have done the *Caryophillia* and several *Actiniæ*. Their heads fell off on the second day, leaving a thin film surrounding the top of the tube. On the third day this film increased in size; and on the fourth a small red substance was seen growing in the pink liquor with which the tube was filled. On the fifth day this increased in size, and put on the shape of the first body, but smaller. On the seventh day it burst the film; and on the eighth a perfect *Po-*

*lypus* was again formed, but with twelve feelers instead of forty; but in every respect adapted to perform its functions of expansion and contraction, &c.

Between the central process and the feelers of the circumference, are a number of small cells: these were enlarged when I first saw the specimen, and had the appearance of a bud. I should be inclined to fancy that the way in which the young of this *Polypus* are produced, is this: these cells enlarge, and after a certain time their contents either become matured and fall off, like a flower, or they burst, and let out either an egg or a *Polypus*, if the young be hatched alive before expulsion. My reason for supposing that this enlargement of the cells upon the body of the *Tubularia*, is their mode of propagation, is strengthened by the fact that none of those which I last found had their cells in this state, *their* bodies being scarcely half the size of the former ones, as you will see by the specimens which accompany this description. —*J. B. Harvey.—Teignmouth, Devonshire, July 20th*, 1838.

*Notes on Birds.*—The carrion crow was observed, last summer, in the grounds of Sir Walter Carew, at Haccombe, to steal a young duck; which it pounced upon while in the pond, and carried off in its bill. The crow did not drop the duck in order to kill it, but laid it down on the ground, walking backwards and forwards and treading upon it, until it was dead, when it was taken to the nest.

Mr. Wingett, Steward to Mr. Templer, of Lindridge, remarked, in various years, that certain trees were not built upon by the rooks, and if one built a nest, the others destroyed it. He invariably found that such trees were decayed, and were generally blown down during some storm.

Miss Kingston, of Islington, assures me that she has very frequently seen the cuckoo fed by the wryneck. The latter would lay down a worm, and the cuckoo, before picking it up, fluttered its wings like a young bird while its parent is feeding it.—*Idem.*

*White Light from burning Corallines.*—An intelligent friend, Mr. Burnett, lately directed my attention to the very beautiful white light produced by holding pieces of *Corallina officinalis* close to the flame of a candle. I have not yet had sufficient time to make many experiments with the different corallines found near us. I have tried the *Sertulariæ*, but it appears that they do not contain sufficient phosphate of lime in their composition to produce the light. Upon a hasty consideration, it appears to me to be a very beautiful practical illustration of the hydro-oxygen light; the hydrogen being evolved by the candle, and the oxygen contained in the coral and in the surrounding atmosphere, which, being decomposed, gives out a sufficient quantity of each to unite in the proportions necessary to form this beautiful light. I may be wrong in my solution of the cause, but the light is so very brilliant, and so easily produced, that I shall be satisfied if I have the good fortune to draw the attention of any chemist to the fact. I have sent you several specimens for distribution among your friends, and will procure more for you if you wish.—*Idem*.

*Letter from Dr. Weissenborn.*—It was not till yesterday that I had an opportunity of seeing the numbers of your Journal from April to July inclusive; and I feel particularly obliged to you for the insertion of my articles, as I am quite aware that, whatever share of intrinsic merit they may possess, the concomitant circumstances must come in for a large one, to make them sufficiently interesting to a public, whose Journals have become the depositories of almost all that genius and talent, assisted by science, successively produce in your country.

In perusing the article on the *Bos urus* I have found a few errors of the press, which I shall avail myself of this opportunity to point out. At p. 239, l. 12, (May number), read '*Hæmus*' for '*Hacmus;*' p. 244, l. 23, read '*Monapos*' for '*Monassos;*' p. 246, l. 4 of the notes, read '*Sphæra*' for '*Sphacera;*' same page l. 15, read '*acciperentur*' for '*accipirentur;*' l. 17, read '*armenta*' for '*arminta;*' p. 251, l. 26, and p. 252, l. 2, read '*Masovia*' for '*Muscovia;*' p. 252, l. 12, read '*rather absent*' for '*absent.*' Herberstein does not say that he was absent when he received the present in question, but it appears from what he states about it, that he paid little attention to the carcass, which was sent to his kitchen. See also the first note on p. 252. At p. 306, l. 24, (June), read '*and the frontal bone is convex*,' instead of '*and are convex;*' p. 312, l. 28, read '*an entozoon*' for '*or entozoon.*'

My opinion that the *Uerox* of Mount Caucasus is of a species different from that of Lithuania, which had already received some confirmation by Prof. Nordmann's statement, (see July No. 'Mag. Nat. Hist.'), "that the former descends into the valleys in consequence of much snow falling in the mountains," which proves it to be a mountain animal,—has just received additional support through a communication in the June No. (1838) of the "Preussische Provinzialblätter," by Dr. H. Rathke, the Director of the Zoological Museum of Königsberg, in Prussia. Among the remarks which he makes on the stuffed specimen of the *Bos urus* which has lately been added to the collection, I find that Dr. Koch, who has lately returned from a two years' residence in Caucasia, describes the *Urox* of that country as being essentially different from that of Lithuania.—*W. Weissenborn.—Weimar, Aug. 9th,* 1838.

*Instinct of Animals.*—The following curious statement is copied from a letter which the late William Tischbein, the well-known animal-painter, wrote in explanation of one of his most beautiful coloured sketches, now in the possession of Mr. Meyer, of Hildburghausen. It represents five little red mice, in the presence of a young cat. "That instinct is an inherent or innate quality of animals, is clearly proved by experience. The cat possesses the instinct of catching and eating mice, and the mouse that of shunning the cat as its most dangerous enemy. Once, in Rome, I happened to open a drawer which I seldom had occasion to use, when I saw a mouse jumping out of it, and found among the papers a nest with five young mice, naked and blind, and of a pale flesh colour. I placed them on a table, handled them, &c., and they evinced no symptoms of fright, nor any inclination to get away, but only appeared eager to approach each other for the sake of warmth. There happened to be in the house a very young cat, which had never tasted anything but milk; I placed it near the little mice, by way of experiment, but to my astonishment it did not even look at them, nor perceive them, even when I turned its eyes in the proper direction, until at last, when I had repeatedly approached its nose to the mice, it suddenly caught a scent which made it tremble with desire. The propensity became more and more violent, and the cat smelled at the mice, touching them with its nose, when all at once, the pale-coloured little creatures became suffused with blood, and began to make great exertions to get out of the way of imminent danger, whilst the cat as eagerly followed them.—*Id.*

*Pulmonary Orifice in Insects.*—In searching for facts to illustrate a course of entomological lectures that I have had in preparation some months, I discovered in the *abdomen* of *Abraxas grossulariata*, a cavity in the *venter*, immediately behind the *mesopedes*. It may be seen in most insects, either on the *venter*, or the sides thereabout; some have it guarded by a scale, others fringed with hairs; a tensely stretched film may be perceived within it in *Plusia Gamma*. It occurs in *Smerinthus populi*, *Musca domestica*, *Vespa vulgaris*, *Libellula depressa*, *Mamestra brassica*, &c. By examining the interior we shall find it to assist in the aeration of the blood. —*Leonard W. Clarke.*

# THE MAGAZINE

OF

# NATURAL HISTORY.

OCTOBER, 1838.


ART. I.—*Notices of Irish Entozoa.* By JAMES L. DRUMMOND, M.D., Professor of Anatomy in the Royal Belfast Institution, President of the Belfast Natural History Society, &c.

IN the present paper and in those which shall follow relating to *Entozoa*, it is my intention to adopt almost solely the classification and nomenclature of Rudolphi, not that I consider either of these as being perfect, but because this branch of Zoology is still in too backward a state to admit of much certain, or probably permanent change, from the system laid down by that illustrious naturalist. I have chosen the term "Notices," as being in truth that which will best express the character of the communications I shall have to make, namely, not a systematic and connected enumeration of orders, genera, and species, but such facts and observations as may be the fruit of my inquiries, however isolated these may be from any determinate arrangement. Without further preamble, therefore, I proceed to mention first, an intestinal worm which is particularly frequent in fishes of the cod tribe; viz. the *Echinorynchus Acus.*

The genus *Echinorynchus* is the only one included in the second order of Rudolphi's arrangement of the *Entozoa*, which order is by him thus characterized.

## Ordo II.

### *Acanthocephala.*

"Corpus teretiusculum, utriculare, elasticum. Proboscis seriatim uncinata retractilis. Individua alia mascula, alia fœminea." 'Entoz. Synops.' p. 63.

At page 71 of the work cited the present species is thus defined.

"*Echinorynchus Acus. Ech.* Proboscide lineari, uncinorum seriebus viginti, collo nullo, corpore longissimo, retrorsum subattenuato."

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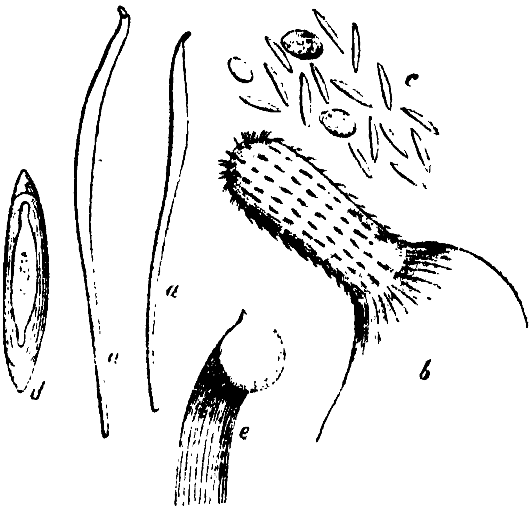


*a*, Two figures of *Echinorhynchus Acus*, natural size. *b*, Proboscis magnified. *c*, *Ova* and supposed cotyledons. *d*, An *ovum* magnified 500 diameters. *e*, Tail of male.

It is stated as being found in the intestines of the haddock, the variable cod, the bearded cod, the whiting, hake, ling, the green cod, and also in those of the *Cottus Scorpius* and the *Lophius piscatorius.* To these habitats I have to add that it is almost constantly abundant in the common cod, and in the coal-fish (*Merlangus carbonarius*).

It is useful to have some preparatory knowledge in reference to this species, that we may be always aware of its presence, for so unlike a worm does it frequently appear on opening the intestine, that it might readily be overlooked. It is then almost always flaccid, shrivelled, squalid, flat, and inert, having little resemblance to a living being. But when the contents of the intestine have lain a few minutes in water, the appearance is widely altered, and instead of an apparently inanimate mass of sordid matter, we find also a number of white, rigid, elastic, straight worms, from one to two inches, or more, in length, and above half a line in diameter at their broadest part.

While, then, the worm in its natural state, is soft, yielding, rugose, and without any strongly marked outline, it becomes when immersed for some time in fresh water the very reverse; its form is then very distinct, its magnitude greatly increased, its substance dense and elastic, and its whole appearance such as to strike at once the most undiscerning eye.

This property belonging to the *Echinorynchus* of expanding and becoming rigid in water has been long remarked. Thus Müller in the first volume of the 'Zoologia Danica,' p. 47, says of his *Echinorynchus candidus*, which is the present species, "Corpus teres fere æquale, in vivis subrugosum, in spiras contortum, album, subgriseum, morte vero instante, et post mortem, vel aquæ fluviali immissum rigescit, rectaque extenditur; coloremque candidum assumit." There is a mistake here respecting the animal becoming rigid during or after death, for it is only when immersed in fresh water that the change takes place, and if the specimen die without being so situated, no such alteration happens. In the same work Müller describes the *Echinorynchus Acus*, also, under another name, viz., *Ech. lineolatus*, (p. 48), and as a species distinct from his *Ech. candidus*, and says that worms of this kind are rugose, "aquæ vero fluviatili immissi rugositatem et spiralem contorsionem amittebant, recti brevi et rigidi extensi, glabri facti sunt."

Rudolphi states farther of the *Echinorynchi* in general, that according to the experiments made by Treutler and himself, a part of the worm cut off becomes equally turgid as in the entire animal, and that if a part be intercepted by a ligature, or the proboscis be cut off, or the neck tied, the same thing occurs; whence he infers that the pores absorb equally on all parts of the body. Vide 'Entoz. Hist. Nat.' vol. 1, p. 254.*

I find much difficulty in attempting to account for this remarkable imbibiton of water. It is a process evidently different from the absorption of fluids by a vital action, as it takes place as readily in the dead worm as in the living. I am much inclined to attribute it to *endosmosis*, though I have not been able to ascertain the existence of any counter current of fluid from the interior. One circumstance, however, which may seem favorable to this idea is, that in various fluids

*I have repeated these experiments and obtained similar results.—J. L. D.

which have a greater density than fresh water, the change does not take place. Müller remarks, in describing his *Ech. candidus*,* that specimens which had been distended by immersion in fresh, and then removed into sea water again, became lax and corrugated. I have made a similar experiment frequently, by placing distended specimens in a solution of common salt, of as nearly the strength of sea water as I could determine by its taste, and a similar result followed. The specimens, from being swelled to their utmost extent, from being firm, rigid, smooth, without the slightest appearance of motion or life, and with the proboscis extended, soon became flaccid, with the proboscis drawn in, the body shortened to half its previous length, curved, rugose, and exhibiting life and motion.

Such being the effects produced on these animals *after* distention, it may be inferred, that if removed at once from their natural habitat into salt water, they would *not* plump up, as in fresh; and I find that when so treated they become even more shrivelled than before; and also, that they will then continue to live for several days, a circumstance which I have found very convenient, as they can thus be preserved for observation or experiment.† On placing a number of recent specimens in skimmed milk, I found that no absorption took place, they remained quite flaccid, and on the following day seemed perfectly dead, but on being laid in fresh water they plumped up as much as if they had been immersed in it at first. In water slightly sweetened with sugar, and in weak solutions of sulphate of soda, sulphate of magnesia, carbonate of soda, and nitrate of potash, the same results followed as in solution of common salt.

I may remark here, that the imbibition of water is not confined to the *Echinorynchi*. I have observed it scarcely less remarkable in some of the cavitary *Entozoa*, especially the *Cucullani*, and from reiterated observation, I am satisfied that the disruption of the body, with exclusion of the ovaries, and a loop of the intestine, which has so often been remarked,‡

* Vide Zool. Dan. vol. I. p. 47.

† By this simple expedient I have been enabled to preserve various species, such, for instance, as the delicate *Bothriocephali* of the cartilaginous fishes, for a day or two living, whereas in fresh water they scarcely survive an hour. The *Echinorynchus Acus* I have kept living for even eight days.

‡ Rudolphi has the following remark relating to the *Cucullanus elegans*, a species found in the perch, and some other fresh water fishes. "Matrem prolam suam per vulvam edidisse nunquam vidi, neque alius quidem observavit, sed ipsa loco incerto rumpitur, et oviductus prolapsi pluribus locis pariter disrupti motu undulatorio eandem effundunt, ovorum tunicis adhærentum." Entoz. Hist. Nat. vol. II. part I. p. 105.

is entirely owing to a forcible distention of the worm from imbibed water. I have never known nor heard of any instance of an *Entozoon* being seen in this state in its natural habitat, and I believe that it will invariably be found that where the disruption has occurred, the animal had been previously exposed to the influence of fresh water. Moreover, in some *Cucullani* which I lately obtained from the intestines of a very large conger eel, (but the species I have not yet determined), the distention from fresh water, and a return to the flaccid state in the salt solution took place exactly as in the *Echinorynchi;* and of two specimens which burst in a short time, in distilled water, one was a male, (as was evident from the exserted *penis*), and in it the spermatic tubes were exploded from the rupture, along with a portion of the intestine, the latter in form of a loop, owing to the continuity being unbroken. In a future paper I will have to recur to this subject in referring to a very beautiful and singular phenomenon connected with the protrusion of the ovaries in the *Cucullanus Platissæ.*

To return to our more immediate subject. The female *Echinorynchus Acus* is above two inches in length, and is said to attain the length even of three inches, but this I have not observed. The male is generally about half an inch long but sometimes nearly an inch. The colour is very various, but generally white when distended, though frequently accompanied at the same time by a tinge of orange, pink, or cinereous. Sometimes the whole animal is reddish orange, (especially the male), and sometimes the whole is ivory white, with a solitary minute crimson dot here and there. Two oblong longitudinal orange spots, more or less vivid, are placed immediately behind the root of the proboscis; these however are sometimes very faint, and sometimes have the appearance of a single mark. In the undistended state the colour of the worm is not unfrequently a dirty umber, and so disposed as to give an annulated appearance to the specimen; but, in short, the colour is extremely variable, though whether as Fabricius conceived this is dependent on that of the contents of the intestine, I am not fully satisfied. It is certain that in a mass of individuals found in the same portion of intestine, considerable diversity of colour prevails, and where there has been only a transparent *mucus* present, I have found specimens of a pure white, and others of a bright orange.

The sexes differ much from each other in thickness as well as length, the male being of nearly the same diameter throughout, while the female is anteriorly much thicker than elsewhere.

The *proboscis* in the microscope, especially when the worm has little colour, is a very beautiful object. It is cylindrical, a little thickened anteriorly, crystalline, and armed with longitudinal rows of solitary, transparent, sharp, rigid hooks, bent backwards. These hooks alternate with those of each neighbouring series, and hence each transverse row is not directly across the proboscis, but runs obliquely, as if it were a portion of a spiral convolution. When the worm is in the flaccid state, the proboscis is generally retracted, and of course invisible; but when the specimen is distended it is always protruded, and in an oblique direction. Cloquet, in his masterly account of the *Echinorynchus Gigas** has described two kinds of motion belonging to the proboscis, one by which the whole organ is at the same time protruded or retracted without any alteration in its form. This is effected by eight muscles, four protractors which protrude it, and as many retractors which draw it in. The second motion is of a different kind, but not less necessary to the animal; in it the proboscis is drawn in by inversion upon itself, so that what was its outer surface when extended, becomes its inner when retracted, and *vice versâ*, when it is again protruded the inner surface becomes the outer. It is an operation similar to that by which a snail draws in and pushes out its horns.

This motion of the proboscis in the *Echinorynchus Acus* has a very beautiful effect in the microscope, and a sure way of seeing it is this.—A specimen is to be taken from the intestine, or, what is better, from the salt solution, as then it will be freer from foreign matter, it is then to be placed on a slip of glass, and its anterior end brought within the focus of the microscope; successive drops of fresh water are then to be applied with a hair pencil. In a few moments the animal shews symptoms of uneasiness, and begins to unfold and retract the proboscis very often. The operation is generally partial at first, but the instrument is soon launched out with great force, and to its utmost extent, when a very evident constriction or neck will be seen at its base. The power of unfolding and retracting it, however, in this manner soon becomes more difficult, till at last it cannot be inverted at all, and consequently, it continues fully distended; and then it may be seen protruded and drawn in alternately, but as a whole, and not by a successive unfolding and drawing in of its parts. The absorption of water still going on, the distention at length becomes so great, that the proboscis remains

* Anatomie des Vers Intestinaux, Ascaride Lombricoïde et Echinorhynque Géant. Paris, 1824.

permanently extended, unless we put the specimen into the salt solution for some time, and then the same phenomena may be seen repeated.

I cannot pass over this double kind of motion in the proboscis of the *Echinorynchus*, without adverting to the wonderful design and contrivance evinced therein. On the slightest glance, it is obvious that the object of the hooked apparatus is to fix the animal in the intestinal coats, and thereby prevent its being carried off by the peristaltic action, and the mechanical pressure of the *ingesta* in their passage. But suppose that the worm could only move the proboscis as a whole, we might then indeed conceive that by simply pushing it forwards against the mucous coat, there might be a chance on drawing it back of fixing some of its hooks, but having done so, how is it to make farther progress into the intestinal walls? The proboscis having this only motion would be very inefficient, but by its more complicated economy, it is perfectly adapted to its intended ends. It is not by the point, nor by the sides of the instrument, but by the circumference of its base, that it first grapples with the coats of the intestine.

Let us suppose then that an *Echinorynchus* is commencing the operation of fixing its proboscis in the intestinal coat; the instrument is lying inverted in its sheath, in the anterior extremity of the animal, and its point is of course directed backwards, as the end of the finger of a glove turned outside in would be directed towards the wrist. The base, then, of the proboscis thus situated, is the first part which comes in contact with the mucous coat, and when the unfurling begins, the hooks surrounding it are the first that are pushed into the membrane, and as the eversion continues, the other and more anterior hooks are successively expanded, so that those on the point of the proboscis are the last which penetrate the intestine, as those upon the base were the first. And now, I conceive, comes the great utility of the motion of the proboscis *en masse*, when it is now drawn back as a whole, the consequence will be, that the hooks will be carried farther into the intestinal walls, than they could be from the force applied by the everting motion alone, and thus a more perfect hold will be given.

Again, we find a most perfect adaptation of the form of the hooks to their office; their shape is very different from that of a fishing hook, which would not at all answer. On the contrary, they are curved only at their base, the rest and longer part being nearly straight. By this formation they occupy very little room in the inverted state of the proboscis, and during its eversion their points are more directly pressed against the intestinal coat, and when the entire proboscis is retracted at once, a greater effect will be produced, the resistance being opposed to their long axis. When the animal wishes to let go its hold of the intestine, and shift its quarters, it has only to *reverse* the order of action by which it became fixed.

It is probable that the *Echinorynchi* soon become sensible of the death of the animal they inhabit, which I would infer from the circumstance of their being generally found loose in the intestine. I have seen the present species sometimes adhering in considerable number, but much more frequently lying detached, and often many individuals clustered together so as to occupy almost the whole width of the intestine. It is difficult to conceive how such numbers as often occur can adhere to the intestine without causing much mischief, and yet the fishes in which they are most numerous, seem to be perfectly healthy, and well nourished. I have seldom examined a codling, without obtaining from ten to one hundred specimens of *Echinorynchus Acus*, and on the first of the present month, I found 216 in one which was under two lbs. weight, and on the fourth, in another a little larger, I counted 219. I have not yet observed it in the haddock, which I attribute to its feeding on *Ophiuræ*, with fragments of which the stomach and intestines of those I have hitherto examined were literally crammed. These hard bodies act mechanically as a vermifuge, and to a similar cause I believe it to be owing, that I have not yet observed an *Entozoon* in the alimentary canal of the gilaroo trout, or the thick-lipped gray mullet, (*Mugil Chelo*), both of which subsist principally on *Testacea*.*

Ova.—When the female *Echinorynchus*, distended with water, is either cut across, or an incision made into its side, a fluid rushes out, which to the naked eye has the appearance of a milky cloud, but under the microscope this is found chiefly to consist of thousands of *ova*, of a long, linear, elliptical form, transparent, and of various dimensions, some being many times larger than others. Intermixed with these spicular *ova*, are observed rounded or oval bodies, of a much greater diameter, and having a spongy or cellular appearance, (*f.* 24, *c.*). Of the spicular *ova* the smaller are transparent throughout, but the largest, which seem to be in their full state of developement, have an appearance under a magnify-

* See the excellent account of the *Mugil Chelo* given by my indefatigable friend, W. Thompson, Esq., in the first volume of the Annals of Natural History, page 360, *et. seq.*

ing power of 500 diameters, such as is represented at *f.* 24. *d.*

That the spicular bodies are the true *ova*, I believe there can be little doubt; but all that has been said respecting the oval bodies is purely conjectural. That they are *cotyledons* or *placentulæ* as Rudolphi* and some other writers have imagined, I see no grounds for believing. That the spicular *ova* are ever inserted in them as Rudolphi has stated, ("quibus interdum etiam ovula inserta videmus"), is, I am satisfied, a mistake which originated probably from viewing them with too low a magnifier. In the compound microscope they are seen to be quite unconnected by agitating in any way the water around them. One of the larger bodies lying over or under one or more of the spicular, will give the appearance of an intimate union, which is altogether deceptive. When the *ova* are dried on a slip of glass, they recover perfectly their original appearance when a little water is applied to them; but the oval bodies continue flattened, and seem more cellular than when recent.

How are the *ova* of the *Echinorynchus* discharged? Rudolphi and some of the best helminthologists have imagined that they were ejected from the proboscis, a notion which I conceive could only have arisen from the circumstance that no other aperture for their exit could be found. "Ostio isto negato, vermis undique clausus foret, nam peculiare non habetur vulvæ vel ani foramen." Rud. 'Ent. Hist. Nat.' v. i. p. 253. He states also, page 292, that according to the experiments of Gœze, Zeder, and himself, when the body of the *Echinorynchus Gigas* is compressed with the fingers, the ova are seen to be disgorged from the apex of the proboscis. Cloquet found no such result, and he correctly, I believe, supposes that a fluid containing round globules which escapes from the proboscis on pressure, and which sometimes is of a milky colour, had given rise to the mistake.† I have myself examined the *Echinorynchus Acus* with this view, and have compressed the worm between plates of glass till the body has burst, but without any appearance whatever of the escape of a single *ovum* from the proboscis.

The ovary of the *Echinorynchus* has been long known as a canal of delicate membrane, containing *ova* extending from the sheath of the proboscis to the apex of the tail,‡ and Clo-

* Entoz. Hist. Nat. vol. I. p. 293.

† "Les auteurs qui disent avoir fait sortir les œufs par le pore de la trompe, en comprimant le corps du ver, ont sans doute pris pour eux le fluide laiteux qui en suinte assez souvent pendant cette experience." Op. Cit. p. 103, note

‡ Rudolphi 'Ent. Hist. Nat.' vol. I. p. 292.

quet observed a scarcely discernible pore opening at the latter situation, but did not observe the escape of any *ova* from it. He remarks, page 101, "Mais une autre question s'offre naturellement ici, et me parait aussi importante à résoudre que les précédentes: c'est la manière dont les œufs fécondés sortent du corps. Est ce par la trompe, comme le veulent quelques auteurs, ou bien par le canal qui termine l'ovaire et s'ouvre à l'exterieur, par un pore à peine sensible sur le plus grand nombre des individus?"

"J'ai cherché en vain, sur tous les échinorhynques vivants que j'ai eus à ma disposition, à voir sortir les œufs par la trompe et par la queue."

That the *ova* of the *Echinorynchi* are discharged as might be naturally expected from a caudal pore, is sufficiently clear from the following facts taken from my diary. On the fourth of the present month, I examined in the microscope a number of specimens of the *Echinorynchus Acus*, which had been twenty-four hours in the salt solution, distending them on a slip of glass as before explained, by applying drops of fresh water at intervals. In the examination of one specimen I saw eight *ova* near the tail, but could not ascertain whence they came. In that of another, thirty-two *ova* were in the same situation, but none near any other part of the animal. In examining a third, which I treated with distilled water, and kept my eye steadily directed to the caudal end, I observed after the lapse of a few minutes, 150 *ova* of different sizes, ejected from the central point of the tail in one rush. From a fourth specimen I obtained a similar result; fifty-eight eggs were ejected, some in rapid succession, and others one by one, each starting out with a sudden jerk. In none of these experiments was there any appearance of the supposed cotyledonous bodies.

(*To be continued*).

*Belfast*, *September*, 1838.

## ART. II.—*On the Ornithology of Blackburn, and the North of Lancashire.* By JOHN SKAIFE, Esq.

(*Continued from page* 433).

### ORDER III.—*SCANSORES.*

Gen. PICUS.

1. *Picus viridis.* Green Woodpecker. Very rare.

2. *Picus major.* Greater spotted Woodpecker. Occasionally met with, but rare.

Gen. Yunx.

3. *Yunx Torquilla.* Wryneck. Very rare.

Gen. Cuculus.

4. *Cuculus canorus.* Cuckoo. Very common.*

Order IV.—*GALLINÆ.*

Gen. Tetrao.—Sub-gen. 1. *Lagopus.*†

1. *Lagopus Britannicus.* Red Grouse. The only species of grouse found in Lancashire. It is met with sparingly on the moors to the south of Blackburn, and is very abundant in the forest of Bowland.‡

Gen. Perdix.—Sub-gen. 1 *Perdix.*

2. *Perdix cinerea.* Common or grey Partridge. Abundant.§

Sub-gen. 2. *Coturnix.*

3. *Coturnix dactylisonans.* Common Quail. Very rare. A few years since I shot one in the neighbourhood of Lancaster, and this is the only specimen that I could ever meet with, though I have heard of odd ones being shot occasionally by sportsmen, when in pursuit of the partridge. Though rare, it still is sufficient to prove the fact of this bird being met with as far north as Lancaster.

Gen. Columba.

4. *Columba Palumbus.* Ring Dove. Common. This is the only species of wild pigeon met with in these parts. I have frequently heard of a stock dove being shot, but on minute enquiry and inspection, the so-called stock dove has invariably turned out to be the common ring dove.

Gen. Phasianus.

5. *Phasianus Colchicus.* Common Pheasant. Abundant. Though this bird is omitted in the lists of Mr. Eyton and Dr. Moore, I think it is fully entitled to rank as a British bird, from the abundance in which it is found in a state of nature, in most, or at

* I heard this bird uttering his well-known note at 1 o'clock, A. M. on Monday, May the 6th, 1833. The night was cold, but brilliantly clear and moonlight, the moon having been full on the 3rd of the same month.

† *Lagopus Britannicus.* I have adopted this word as being of more extended signification than *Scoticus*, which is decidedly faulty: one might as well at once say *Anglicus* or *Hibernicus*, as the bird is found abundantly in both England and Ireland. British this bird decidedly is, and exclusively so too, not being found on the continent, if I remember correctly. Dr. Leach was the first naturalist who applied the specific term *Britannicus* to the red grouse.

‡ In the autumn of the year 1835, an animal-preserver who resides at Accrington, six miles east of Blackburn, had in his possession four remarkable specimens of *Lagopus Britannicus.* The first was of a pure cream colour throughout, without spot or shade; the ground colour of the second was of the same dusky hue, but the bird was freckled and marked throughout with spots and streaks of light brown; the other two birds had the usual plumage of the grouse, except that the wings were white. These birds were all shot out of the same covey or pack that season, on the moorlands east of Blackburn.

§ Of the white partridge I have already made mention in the 'Magazine of Natural History,' vol. ii. n. s. page 332.

least in many, parts of England. In the preserves of Sir Thomas Hesketh, of Rufford Hall, a few miles south of Preston, the golden pheasant has become naturalized to a considerable extent; being rigidly preserved they multiply with great rapidity. Last shooting season but one I saw, in the hands of a bird preserver in Preston, a young male golden pheasant, a bird of the year, which had been shot by mistake by the gamekeeper of Sir Thomas Hesketh. I say by mistake, as the strictest injunctions are issued to prevent their destruction. It was a most beautiful bird; but never having seen it in that state of plumage, I could not make it out. It appeared to be in size about one third less than the hen of the common pheasant.

### Order V.—*GRALLÆ*.

#### Fam. i.—*Pressirostres*.

Gen. Charadrius.—Sub-gen. *Charadrius*.

1. *Charadrius Pluvialis*. Golden Plover. Common. These birds breed on most of the moorlands mentioned in my topographical sketch.
2. *Charadrius Morinellus*. Dottrel. Rare. The only specimens I possess were shot near Lytham. I believe these birds build in the mountains in Bowland, but am not quite certain: they certainly breed in Dent, that is, on Pemgant and the neighbouring mountains; as, a short time ago, I saw both old and young specimens sent from these localities.
3. *Charadrius Hiaticula*. Ringed Dottrel. Abundant about the estuary of the Ribble.

Gen. Vanellus.—Sub-gen. 1. *Squatarola*.

4. *Squatarola cinerea*. Grey Plover. Very rare now, though I remember, several years back, when I was in the habit of shooting waterfowl on the long line of coast between the embouchures of the Ribble and Mersey, seeing them in large flocks, and occasionally bringing down three or four at a shot.

Sub-gen. 2. *Vanellus*.

5. *Vanellus cristatus*. Lapwing. Very common. They breed abundantly on the moors.

Gen. Hæmatopus.

6. *Hæmatopus Ostralegus*. Oyster-catcher. Though not numerous, they are generally to be met with on the coast.

#### Fam. ii.—*Cultirostres*.

Gen. Ardea.—Sub-gen. 1. *Ardea*.

7. *Ardea cinerea*. Common Heron. Frequently met with, though I am not aware of any heronry in this neighbourhood nearer than one on the banks of the Wyre, some twenty miles north.

Sub-gen. 2. *Botaurus*.

8. *Botaurus stellaris*. Bittern. Rare. I have a splendid specimen shot at Heysham, on the southern shore of the Bay of Morecambe.

#### Fam. iii.—*Longirostres*.

Gen. Ibis.—Sub-gen. *Numenius*.

9. *Numenius arquata*. Curlew. Common enough on the coast. They breed on the mountains in Bowland. I have frequently encountered them on the moors in the breeding season.
10. *Numenius phæopus*. Whimbrel. Rare.

Gen. Scolopax.—Sub-gen. *Scolopax.*

11. *Scolopax rusticola.* Woodcock. Common.
12. *Scolopax major.* Solitary Snipe. Rare. The capture of three of these birds has come within my own observation. One was shot on a piece of swampy ground close to Blackburn, on Thursday, Sept. 25th, 1834, weight 8½ oz. avoirdupois: another was shot about ten months previously, near Whitewell, in Bowland: and a third specimen was killed about two years before, on the moors near Haslingden, nine miles S. E. of Blackburn.
13. *Scolopax Gallinago.* Common Snipe. Abundant.
14. *Scolopax Gallinula.* Jack Snipe. Common; though nothing near so abundant as *S. Gallinago.**

Gen. Limosa.

15. *Limosa rufa.* Bar-tailed Godwit. Now only thinly scattered on the coast, but I remember well the immense flocks I used formerly to meet with when shooting on the coast, as mentioned under the grey plover. The ruff, I believe, is not now found in any part of Lancashire; though at no very distant date met with on the borders of Martin Mere, an extensive lake or shallow piece of water south of the Ribble, now drained and enclosed.

Gen. Tringa.

16. *Tringa Canutus.* Knot. Rare.

* *Scolopax Sabini.* In the winter of 1823, I was shooting woodcocks with a friend in the north of Lancashire, some three miles from the Westmoreland border. My friend was an old sportsman, and a dead shot; for my own part I possess no such dexterity. The ground we were shooting over was an immense wood, upwards of a mile in length, traversed by numerous little rills of water; without the wood were small spots of swampy ground, and here and there small patches of brushwood. The country generally was hilly. Some of the swamps were literally alive with snipes; of their numbers some idea may be formed from the fact of our shooting fourteen in a space of less than half an acre. In the wood we met with a considerable number of woodcocks. I observed one bird which we flushed three or four times, at a distance of not more than ten yards; it attracted my notice from its small size and dark colour: I was anxious to obtain it, and at last my friend brought it down by a well-directed shot. It flew differently from the other woodcocks; only a short distance at a time, and confined itself principally to the edge of the wood. To my surprise, when I examined it I found it not above half the size of the common woodcock, and of a much darker hue; my friend said it was the small black woodcock, a very rare bird, which he had not met with above twice or three times before, although hundreds of woodcocks and thousands of snipes had fallen before his gun. With this explanation, though anything but satisfactory, I was obliged to be content. What it was I had no means of ascertaining; I had neither figure nor description of anything like it: and truly I might well be puzzled with the bird, for I am now quite satisfied that it was a specimen of the *Scolopax Sabini.* At that period Bewick's figure, which would have been a sufficient guide, was not published. When I set my eyes on Gould's charming figure of *Scolopax Sabini*, I recognized my bird in a moment. I skinned the bird, but as I only rubbed the skin over with pepper, snuff, and alum, it went to decay. Of late years I have looked over hundreds of woodcocks in the hands of the dealers, and made minute enquiries amongst my sporting friends, in the hope of meeting with a second specimen, but in vain.

17. *Tringa subarquata*. Pygmy Curlew. Occasionally met with in the summer.
18. *Tringa alpina*. Dunlin or Purre. Common. It may give some idea of the immense number of these birds, when I state that the week before last a gentleman near Lytham, with a common fowling piece, killed thirty-four at one shot.
19. *Tringa minuta*. Little Stint. Rare.

Gen. Arenaria.

20. *Arenaria Calidris*. Sanderling. Sparingly scattered on the coast.

Gen. Phalaropus.

21. *Phalaropus lobatus*. Grey Phalarope. Rare. I have two specimens; one killed near Lytham, the other on Lancaster sands.

Gen. Strepsilas.

22. *Strepsilas interpres*. Turnstone. Though not numerous, specimens are always attainable in the spring.

Gen. Totanus.

23. *Totanus Calidris*. Red-shank. Frequently met with on the coast.
24. *Totanus ochropus*. Green Sandpiper. Very rare in these parts. For a notice of the capture of two, vide 'Mag. Nat. Hist.' vol. i., n. s., p. 555.
25. *Totanus hypoleucos*. Common Sandpiper. Met with abundantly in all our brooks and rivers.

Fam. iv.—*Macrodactyla*.

Gen. Rallus.—Sub-gen. 1. *Rallus*.

26. *Rallus aquaticus*. Water Rail. Common.

Sub-gen. 2. *Crex*.

27. *Crex pratensis*. Land Rail. Generally speaking plentiful enough in the summer, but this year, from some unknown cause, they are remarkably scarce. I have heard them in but four localities.
28. *Crex Porzana*. Spotted Rail. Rare: though I have been informed by some farmers that in the neighbourhood of Martin's Meer they are as abundant as *Rallus aquaticus*.

Gen. Gallinula.

29. *Gallinula chloropus*. Water Hen. Abundant.

Gen. Fulica.

30. *Fulica atra*. Coot. Very rare.

## ORDER VI.—*PALMIPEDES*.

Fam. i.—*Brachyptera*.

Gen. Podiceps.

1. *Podiceps cristatus*. Crested Grebe. Very rare.
2. *Podiceps rubricollis*. Red-necked Grebe. Very rare. The only specimen that I ever met with, I obtained last winter in the market at Preston, on January the 23rd, 1838.
3. *Podiceps minor*. Little Grebe. Common. In this neighbourhood it is frequently met with in the water-lodges formed in the hills for the purpose of supplying the factories, bleach-works, &c.

Gen. Colymbus.

4. *Colymbus glacialis*. Northern Diver. Very rare. A few years since an adult specimen was taken in the Fylde country, and since then two young specimens have been caught at the mouth of the Ribble.
5. *Colymbus arcticus*. Black-throated Diver. Very rare. In the winter of 1835-6 I saw a remarkably fine young specimen in the hands of an animal-preserver of Preston: it was captured below Lytham.

6. *Colymbus septentrionalis.* Red-throated Diver. Very rare. Within the last three years I have seen three specimens, all young birds, taken on the coast.

Gen. Uria.

7. *Uria Troile.* Foolish Guillemot. Rather common. Frequently taken in the before-named lodges.

Gen. Mergulus.

8. *Mergulus melanoleucos.* Little Auk. Very rare. I have a beautiful specimen in its winter plumage, that is, with the white throat, taken alive on Lancaster sands, the day after a severe storm. It lived three days, and was then put to death.

Gen. Fratercula.

9. *Fratercula arctica.* Puffin. Rare. Obtained occasionally in the estuary of the Ribble, after severe weather; probably driven from the neighbouring rocky coast of Wales, where they are so numerous that a small rocky islet, on which they breed in prodigious numbers, is called after them "Puffin Island."

Gen. Alca.

10. *Alca Torda.* Razor-billed Auk, and Black-billed Auk; for they are undoubtedly one bird. Though not exactly common, they may frequently be obtained on the coast, especially by sailing in a boat a few miles from the land.

Fam. ii.—*Longipennata.*

Gen. Procellaria.—Sub-gen. *Thalassidroma.*

11. *Thalassidroma pelagica.* Stormy Petrel. Very rare, but occasionally obtained on the coast and still more rarely inland, driven there by stress of weather. Vide 'Mag. Nat. Hist.' vol. ii. n. s. p. 332.

12. *Thalassidroma Bullockii.* Fork-tailed Petrel. Very rare. The same remarks will apply to this as to the last species. Vide 'Mag. Nat. Hist.' vol. i. n. s. p. 555.

Gen. Lestris.

13. *Lestris Richardsonii.* Richardson's Lestris. Very rare. I may say with Dr. Moore, *if* the young of this bird and the black-toed gull of Bewick are identical, (and I confess myself unable, even with the assistance of Gould's exquisite plate, and that of Swainson, to determine the point satisfactorily), I some time since saw two specimens which were taken on Lancaster sands.

14. *Lestris parasiticus.* Arctic Gull. Very rare. Two adult specimens of this bird, shot on the coast, have come under my observation.

15. *Lestris pomarinus.* Pomarine Gull. Equally rare with the preceding. For the capture of two specimens vide the 'Magazine of Natural History,' vol. ii. n. s. p. 333.

Gen. Larus.—Sub-gen. 1, *Rissa.*

16. *Rissa cinerea.* Kittiwake. Rare. Two beautiful specimens of the young bird were shot on a water-lodge, two miles from Blackburn; the first in the winter of 1836-7, the second in the spring of 1837. They are also occasionally but very rarely met with on the coast.

Sub-gen. 2, *Larus.*

17. *Larus canus.* Common Gull. Abundant. I have frequently observed them in great numbers, following the plough and picking up insects.

18. *Larus argentatus.* Herring Gull. Common.

19. *Larus fuscus.* Lesser black-backed Gull. Frequently met with on the coast.

20. *Larus marinus*. Greater black-backed Gull. Though not exactly common, these birds are generally to be met with on the coast. Last week, at Blackpool, I saw fourteen together in a flock; being without a gun they suffered me to approach very near. Out of the fourteen only three were in the adult plumage. When flying they presented a most enormous expanse of wing.
21. *Larus glaucus*. Glaucous Gull. Very rare. This is the most scarce of all the gulls proper.

Sub-gen. 3, *Chroicocephalus*.

22. *Chroicocephalus rudibundus*. Black-headed and red-legged Gull. Common. Dr. Moore observes that in Devonshire this bird is very scarce in the summer plumage; now on our coasts the reverse obtains, and they are generally observed in the summer plumage, that is, with the black hood. On my recent visit to Blackpool I observed numbers of them in this state of plumage; I suppose this is owing to their breeding somewhere about these parts. It is well known that they do breed on the rocky coast of Wales to the south, and on the isle of Walney to the north, as also in the isle of Man. This is one of the great advantages of local *Faunæ*, that the habits and haunts of birds can be observed in so many points simultaneously.

Gen. Sterna.

23. *Sterna Anglica*. Gull-billed Tern. Very rare. I have one specimen shot at Blackpool in the summer of 1832.
24. *Sterna cantiaca*. Sandwich Tern. Equally rare with *S. Anglica*.
25. *Sterna arctica*. Arctic Tern. Frequently met with on our coasts but generally confounded with *Sterna marina*. I have seen several specimens shot at or near Blackpool; and until the publication of Gould's beautiful plate of this bird, I fell into the common error of confounding it with the common tern, but can now easily make the distinction.
26. *Sterna marina*. Great Tern or Common Tern. Abundant.
27. *Sterna minuta*. Little Tern. Very common.
28. *Sterna nigra*. Black Tern. Rare. I have one specimen shot in the spring of 1832, on a bleach-works lodge.

Fam. iii.—*Totipalmata*.

Gen. Phalacrororax.

29. *Phalacrororax Carbo*. Cormorant. Often met with on the coast.

Gen. Sula.

30. *Sula bassana*. Gannet. Very rare; occasionally shot in the estuary of the Ribble after severe storms. In the spring of 1837 one was taken in a rabbit-hole, near Lytham, into which it ran for shelter on being pursued.

Fam. iv.—*Lamellirostres*.

Gen. Mergus.

31. *Mergus Merganser*. Goosander. Though not common it has several times been taken on the Ribble and Hodder. I have a fine specimen of the male shot some years ago on the Hodder, in Bowland.
32. *Mergus serrator*. Red-breasted Merganser. Very rare. For the capture of the only one that I ever met with, vide the 'Magazine of Natural History,' vol. ii. n. s. page 333.
33. *Mergus albellus*. Smew. Rare. For the capture of two vide the 'Magazine of Natural History,' vol. ii. n. s. page 331.

Gen. Fuligula.

34. *Fuligula ferina*. Pochard. Obtained occasionally on the coast.

35. *Fuligula cristata.* Tufted Duck. Rare.
36. *Fuligula Gesneri.* Scaup Duck. Rare.

Gen. OIDEMIA.

37. *Oidemia nigra.* Scoter. Rare: I have met with four specimens.
38. *Oidemia fusca.* Great black Duck, or Velvet Duck. Very rare: I have met with one specimen.

Gen. CLANGULA.

39. *Clangula chrysophthalmos.* Golden Eye. Frequently obtained in the winter.

Gen. ANAS.—Sub-gen. 1. *Mareca.*

40. *Mareca Penelope.* Widgeon. Common.

Sub-gen. 2, *Querquedula.*

41. *Querquedula Crecca.* Teal. Common.

Sub-gen. 3, *Chauliodus.*

42. *Chauliodus strepera.* Gadwell. Very rare.

Sub-gen. 4, *Rhynchaspis.*

43. *Rhynchaspis clypeata.* Shoveller. Very rare.

Sub-gen. 5, *Anas.*

44. *Anas Boschas.* Wild Duck. They breed abundantly with us.

Gen. TADORNA.

45. *Tadorna Bellonii.* Shieldrake. Frequently met with. On the coast about Lytham, and again about the mouth of the Wyre, are numerous sand hills, which are converted into rabbit-warrens, and being rigidly preserved the shieldrakes breed there regularly.

*Gen. ANSER.—Sub-gen. 1, *Anser.*

46. *Anser segetum.* Bean Goose. Rare. I saw one in the hands of an animal-preserver in Preston, last winter.
47. *Anser palustris.* Wild Goose. Frequently passes over and through the country in immense flocks.

Sub-gen. 2, *Bernicla.*

48. *Bernicla leucopsis.* Bernacle Goose. Rare.
49. *Bernicla Brenta.* Brent Goose. Frequently met with. Last winter, in Preston, I saw several brent geese, but looked in vain for a specimen of the bernacle. I find from several writers that the brents and bernacles were once abundant in Lancashire; times have sadly changed for the worse since those days.

Gen. CYGNUS.

50. *Cygnus ferus.* Wild Swan. Very rare. For particulars respecting their capture last winter, vide 'Magazine of Natural History,' vol. ii. N. S. page 333.

* Canada Goose. I have not inserted this bird in the text, though I agree with Bewick, and a writer in a former volume of this Magazine, that it is a good British bird, and, par consequence, a Lancashire bird. Vide 'Magazine of Natural History,' vol. ii. N. S. page 334.

Since the first part of this article was published, I have seen a pied flycatcher, which was shot two miles west of Blackburn, a few years ago. A white sparrow was shot in September, 1836, in Lower Darwen, two miles south of Blackburn. Four years since I had a beautiful pied blackbird; the wings were white, and there were large patches of white on other parts of the body: as, however, it was badly preserved, and the moth began to make its appearance, I was obliged to destroy it: the person who is in possession of the white sparrow, has also a blackbird in the state of plumage just named.

*(To be continued.)*

**Art. III.**—*On the peculiar Insulation of the Nervous Currents in the Chameleon; with some Observations on Change of Colour in that Creature.* By W. Weissenborn, D. Ph.

Among the manifold conditions connected with the change of colour in the chameleon, and which I had ample opportunities of observing for nine months in the years 1834-5, during which time I had a living specimen in my possession, there was none which struck me more forcibly as being curious than that one lateral half of the animal is often of a colour decidedly different from that of the other. In an article on the habits, colours, tongue, &c., of the chameleon, which I published in M. von Froriep's 'Notizen aus dem Gebiete der Natur- und Heilkunde,' Nos. 965 and 966, June, 1835, I stated that this peculiarity ought to be ascribed to a particular organization, in consequence of which the involuntary nervous currents can be excited in one half of the animal's body, independently of those in the other. I now feel prompted to lay a somewhat greater stress on this point, to establish it more fully, and to call the attention of the readers of this Journal to it, as I believe that no animal is better adapted for being made instrumental in promoting the solution of an important problem lately proposed by M. Matteucci, as to the mode of operation of the galvanic currents in the frog and other animals. In the state to which the question has latterly been advanced, almost exclusively, by the ingenious researches of that philosopher, who, after inventing an apparatus by means of which he obtained sparks from the *Torpedo*, has lately deduced the most interesting laws from the mode in which the nervous currents of the frog affect the galvanometer, the ultimate solution of the problem rests now chiefly on our overcoming two serious difficulties.—On the one hand, the electrical currents in animals must, of course, describe a full circuit. We therefore want to point out two systems of organs, two peculiar sets of nervous filaments, one of which serves to conduct the currents from their centre towards the periphery, whereas the other must be instrumental in conducting them back towards the centre.—On the other hand, we have to show how an electrical current can pervade a nerve, or any other organized substance of equal conducting power, without being dissipated in the rest of the organs.

As to the former point, M. Matteucci adverts to different circumstances which may assist us in our investigations; for instance, the peculiar functions of the well-known two different sets of nerves, the propagation of sensation and contraction on each side of a ligature tied round a nerve, as well as to the curious law established by Lehot and Marianini :* as to the latter, I think the physiological conditions through which the circulation of the nervous currents in the chameleon is effected, with reference to each lateral half, divided from the other by the perpendicular mesial plane of the body, would, if known, throw much light on the general conditions on which the limitation of the electrical currents in animals depend.

The remote cause of the difference of colour in the two lateral halves of the chameleon may, in most cases, be distinctly referred to the manner in which the light acts upon the animal. The statement of Murray, that the side turned towards the light is always of a darker colour than the other, is perfectly true. This rule holds good, as well with reference to the direct and diffused light of the sun or moon, as to artificial light. Even when the animal was moving in the walks of my garden, and happened to approach near enough to the border to be shaded on one side by the box edging, that side would instantly become less darkly coloured than the other. As however the light in these cases but seldom illumines exactly one lateral half of the animal in a more powerful manner than the other, whereas the mesial line is constantly the line of demarcation between the two different shades of colour, we must evidently refer the different effects to two different centres, from which the nervous currents can only radiate, under such circumstances, towards the organs situated on one side of the mesial plane respectively.

Over these centres, without doubt, the organ of vision immediately presides; and indeed we ought not to wonder that the action of light has such powerful effects on the highly irritable organism of the chameleon, considering that the eye is by far the most active, and one of the most highly developed organs. The lungs are, under such circumstances, but secondarily affected; but they are likewise more strongly excited on the darker side, which is constantly more convex than the other.

Many other circumstances may be brought forward in favour of the opinion that the nervous currents in one lateral half of the chameleon, are going on independently of those in the other; and that the animal has two lateral centres of perception, sensation, and motion, besides the common one, in which must reside the faculty of concentration. Notwith-

* Bibliothèque Univ. de Genève, May, 1838.

standing the strictly symmetrical structure of the chameleon, as to its two lateral halves, the eyes move independently of each other, and convey different impressions to their respective centres of perception. The consequence is, that when the animal is *agitated*, its movements appear like those of two animals glued together. Each half wishes to move its own way, and there is no symmetry of action. The result not being in the direction of the diagonal determined by the parellellogram of simultaneous or well-regulated forces, is seldom in harmony with what, in the opinion of the observer, the whole animal ought to do. The chameleon is therefore not able to swim, like other animals; it is so frightened if put into water, that the faculty of concentration is lost, and it tumbles about as if in a state of intoxication. On the other hand, when the creature is undisturbed, the eye which receives the strongest impression propagates it to the common centre, and prevails upon the other eye to follow that impression, and direct itself towards the same object; and if this object be prey of any kind, the mesial line of the head is moved in the direction of it, whereupon the two visual rays form the angle into the vertex of which the butt-end of the tongue is projected like a bolt.

The chameleon, moreover, may be asleep on one side and awake on the other. When cautiously approaching my specimen at night, with a candle, so as not to awaken the whole animal by the shaking of the room, the eye turned towards the flame would open, and begin to move, and the corresponding side to change its colour; whereas the other side would remain for several seconds longer in its torpid and unchangeable state, with its eye shut.

In short, I could never look at my chameleon without supposing it to look like twins adhering longitudinally to each other, the more so, as the *linea alba* is like a strong suture; the palate longitudinally cleft; and the toes in the hind feet inversely divided as to those of the fore feet. In the latter, two toes belong to the external, and three to the internal division; whereas in the hind feet the respective numbers are inverted: and I am inclined to think that the anatomy of the embryo of the chameleon would lead to interesting results in this respect.*

I ought to remark that I have several times felt what I

* I had no opportunity of dissecting the chameleon, having only the loan of my specimen during its life, on a promise that I would send the carcass to the Museum of Schneppenthal. I have only dissected and prepared the tongue and its appendages.

thought was a slight electrical shock, when touching my chameleon with the forefinger and thumb applied to the opposite halves of the animal. On such occasions I have felt a slight thrilling sensation, which struck me sufficiently to cause me to invite M. Soret, of Geneva, who was then at Weimar, and provided with the proper instruments, to submit the chameleon to the test of the galvanometer. He had, however, so little confidence in the success of the experiment, that I would not have urged the point, had I not been much more confident myself.

I think it not unlikely that the nervous currents may *directly* co-operate in effecting the changes of colour in the chameleon, or such tissues of other animals as are subject to discoloration from various affections. The experiments of M. Matteucci show that such changes may be effected by the animal electricity, on the accession of certain chemical substances, and we need only suppose that such substances are mixed with the juices of the chameleon, (one of them, oxygen, certainly is so), and that these juices are instrumental in completing the electrical circle, in order to account more fully for the phenomenon in question.

My own observations on these changes all tend to prove that they depend altogether on the degree in which the nervous system is stimulated or inactive. This principle is called into operation by more remote causes, as heat, light, and mental affections; and is instrumental in creating other and more immediate causes, as by causing the cutaneous tissues to become filled with gaseous and liquid fluids, or by effecting the possible chemical actions and reactions which may take place in various ways, under the influence of the nervous currents, according to their intensity or quantity.

According to this view, I cannot but doubt the universality of the principle on which Mr. Milne-Edwards has lately tried to explain *all* the changes of colour in the Chameleon, by showing that there exist in the skin of this creature two layers of membranous pigment placed the one above the other, but arranged in such a way as to appear simultaneously under the scarf skin, and sometimes so that the one may conceal the other, and by assuming that *every thing remarkable* in the changes of colour may be explained by the appearance of the pigment of the deeper (violet or blackish-red) layer, to an extent more or less considerable, in the midst of the pigment of the superficial (greyish, or more or less yellowish or white) layer, or from its disappearance underneath that layer. ('Edinb. New Philos. Journal,' July—Oct., 1834).

Admitting that there are two pigments, a dark and a pale one, each contained in a separate system of cells or follicles, by means of which Mr. Milne-Edwards could make the colour of a piece of skin, detached from the body, change from the yellowish grey to the violet red, by pressing the deeper pigment towards the upper surface of the skin, yet these pigments themselves must possess the faculty of changing their hues, as no mechanical mixture of two given colours could produce those various tints which the skin of the chameleon exhibits at different times, and among which I have even observed the *pure primary yellow and red*. By the anatomical discoveries of Mr. Milne-Edwards, the solution of the question has, no doubt, been greatly advanced; but there are points which must be explained, before we can say that we understand the phenomenon.

In availing myself of Mr. Milne-Edwards's discoveries, so far as I think they are founded in fact, I am led by my own observations to suppose that the layer of the cutaneous system which contains the superficial or whitish pigment, (exhibiting different tints under different circumstances), always determines the general colour of the animal, when the latter is quite *undisturbed*, *relaxed*, or *torpid*, in consequence of the absence of external or internal irritation; whereas one or more hues, determined by the rising of the darker (likewise changeable) pigment, begin to develope themselves, and proceed to a limit, determined by the degree and manner in which the chameleon is affected, as soon as the organism and tissue (probably erectile) containing the darker pigment is *stimulated*,or also the superficial tissue containing the pale pigment is depressed by the condition of the integuments. But in all these changes, from the whitest to the darkest hue, heat, light, the quantity of air which the animal inspires, and the different mental affections, as anger, fear, &c., act a very prominent part.*

To enable the reader to judge better of the view I have taken, I shall enumerate some of the circumstances under

* I may here observe that although the horny tubercles give rise to viridescent colours under the direct influence of the sun-beams, yet the pigments in general present the true colour which they would show if naked. In one instance, after my specimen had been very dark, in consequence of its vitality having been fully excited, I perceived, on its subsequently becoming relaxed and whitish, that three or four tubercles remained black.—The skin being cast a month after, I convinced myself that the pigment must have burst, as several follicles were adhering in a dry state to the inner surface of these tubercles, the others being perfectly colourless.

which the chameleon exhibits its almost uniform pale colour, as well as those under which it assumes a different hue.

I.—the colour of the chameleon is of the pale, almost uniform kind:—

*a.* During sleep. (As long as the animal is sleeping, its organism is extremely torpid, its large and thin purse-like appendages contain a considerable quantity of air, which is so slowly deprived of its oxygen, that the process of respiration is interrupted. I have watched the animal in this state many times, for fifteen minutes or longer, but I have never seen it respire. We may therefore suppose that the rest of the involuntary functions are also greatly abolished, in consequence of the nervous currents being extremely weak. When, however, some external agent, as moonlight, artificial light, shaking of the room, &c., disturbs the sleep of the chameleon, I have always observed its colour to be different from the normal pale hue. It was then commonly painted with green spots and stripes.)

*b.* When the chameleon had been wrapped for some time in flannel, &c., so as to exclude light, air, and other stimulating agents, and had been left quiet in that state.

*c.* When the chameleon had been exposed *for a considerable time* to the direct influence of intense sunlight. (Its body would then always assume the pale yellowish white color, in consequence, no doubt, of the relaxation following the excess of stimulus to which its organism had been exposed.—The animal then looked like a lump of mortar).

*e.* When dead.*

II.—The pale colour is exchanged for other hues under the following circumstances:—

*a.* When the animal was taken out of a flannel wrapper, and suddenly exposed to the rays of the sun; the half turned towards the sun would, within a minute, become bluish black, after having successively exhibited grey, greyish red, drab-violet, and other tints; whereas the other half, *within the time stated*, took a deeper colour, but did not advance beyond greyish brown. (In this experiment the greater activity

* My specimen died in a rabid fit, which lasted more than twenty-four hours, and during which, though blind, the animal would bite at every object that came within the reach of its jaws. It would not quit its hold for many minutes. The disease began with *œdema* of the eyes, and its last form was perhaps developed by my endeavouring to cure the animal with large doses of a solution of phosphorus in sweet oil. The excessive irritability of the chameleon was most strikingly evinced in this last stage.

with which the nervous currents operate in the one lateral half of the chameleon, is most beautifully exhibited, the corresponding side becoming, at the same time, considerably more inflated than the other).

*b.* After the body has been heated by the sun to an equable temperature of about 26° R. (90½ F.), the animal is in the fullest possession of its vital powers and functions, and its colours are then most strikingly contrasted. The trapezoid spots, situated in two longitudinal rows, (of 5 each), on each side of the trunk, the colour of which, under all circumstances, differs more or less from that of the surrounding skin, then appear like plates of chalk on a ground of charcoal.—(This state of colour was suddenly brought about when a dog ran towards the chameleon, whilst it was in a walk of my garden, in warm weather. The cause of its terror being removed, the colours soon subsided into a more equable state. The chameleon very soon became accustomed to the dog).

*c.* When I took the chameleon in my hand, it being of its pale colour, its respiration became accelerated and fuller, and the change of colour which took place immediately, gave it the spotted appearance of a trout.

*d.* At temperatures of less that 15° R., (63¾ F.), and in a diffused light, the general colour of the animal was usually bluish black, and the two constant rows of trapezoid spots almost vanished from sight. The eye of the chameleon still showed sufficient activity, within certain limits of a low temperature, proving that the nervous currents were not interrupted, even at 10° R., (54½ F.), the animal never being exposed to a much lower temperature so long as I had it. (In this case I am inclined to ascribe the dark colour to the contraction of the integuments, whereby the pale pigment is depressed, and the dark one meets the horny tubercles; for on cautiously warming the chameleon, it becomes generally paler, though much spotted and striped with green, red, violet, &c.).

*e.* On approaching the pale-coloured sleeping chameleon with a candle, and shaking the room by one's step, one would generally see it awake, and become of a greyish, and subsequently of a darker colour.

*f.* If thrown into water at a common temperature, or exposed to rain, it exhibited a beautiful dark ashy-blue colour, with bright red and green spots and stripes. (The animal was much agitated, and the integuments of course contracted; the inspiration was very full).

*g.* If electrified on an insulated stand, the chameleon showed changes of colour, which it would be endless to describe, as I have not observed any striking constancy in their tints or distribution.

*Weimar, Aug. 24th*, 1838.

## Art. IV.—*On the Deposits containing Carnivora and other Mammalia in the Valley of the Thames.* By John Morris, Esq.

The valley of the Thames contains, in many parts, an old alluvial deposit, from which considerable quantities of brick earth are obtained, not only on the banks of the river itself, but also along the courses of those streams which empty themselves into it. In this deposit are found, rather abundantly, the bones of *Mammalia* associated with extinct and recent freshwater shells; those of more common occurrence belong to the *Ruminantia*, *Pachydermata*, and *Rodentia*, but recent researches have produced from this deposit remains of *Carnivora*, as the bear, hyæna, &c., which have generally been considered as belonging only to cavern-deposits; they have been chiefly noticed in the following localities.

The strata at Brentford were first described in a paper by Mr. Trimmer, to the Royal Society, in 1813, and consist as follow;—in the first field half a mile north of the Thames, surface twenty-five feet above low water:—

Sandy loam, lowest 2 feet calcareous....................6 to 7 feet.
Sandy gravel,..............Shells and bones,....................a few inches.
Calcareous loam, Bones of ox and deer with shells............1 to 5 feet.
A layer of peat here and there intervenes between this stratum and the next below.
Gravel, (sand and clay intermixed)
Teeth and bones of two species of elephant..............
- - - - of hippopotamus........................ } 2 to 10 feet.
- - - - of ox......................................

The second field is one mile west of the former, one mile from the Thames, and a quarter of a mile east of the river Brent; height above the Thames, forty feet.

Sandy loam, slightly calcareous.......................................8 feet.
Sand becoming coarser towards lower part, and ending in sandy gravel.
Teeth and bones of hippopotamus abundant...........
- of elephant.
of deer.. } 3 to 8 feet.
- - - - of ox, with shells................
Sandy loam, highly calcareous, varying in thickness,
Bones of ox and deer, with shells..............................1 to 7 feet.
Gravel and clay not dug into in this field.

In the excavation* for the reservoir of the new water works close to Kew bridge, similar strata were dug into, containing bones of the elephant, ox, and deer, with some lignite, but no shells were observed; the thickness of the strata was about fifteen feet, and reposed on the London clay, on the surface of which were found two large boulders of druid sandstone.

In the excavations for buildings in many parts of London near the river, animal remains have been found; as at Waterloo Place, London Docks, Limehouse, Bethnal Green, &c.

The next large deposit of animal remains occurs at Ilford, in Essex, from whence an extensive collection has been obtained by Mr. Gibson, of Stratford; remains of the horse, elephant, (a tusk, 12 ft. 6 in. long), rhinoceros, deer, and two species of ox: the bones are found in every stage of growth, rarely broken or much rolled, and shells occur in abundance, a list of which, with the other localities, will be appended to this paper.

The physical character of the country between Stratford and Ilford is rather level, gravel-pits being worked from about twelve to twenty feet deep. It is here and there intersected by streams on the Stratford side, flowing to the river Roding, which runs at the entrance of Ilford, and empties itself into the Thames at Barking Levels. There are three principal brick-fields, the first, (Kilberton's), adjoining the river Roding; the second, (Thomson's), a little beyond the first, about five hundred yards from the river; and the third, (Curtis's), is situate beyond the town on the left hand side of the road. The strata of the three fields are nearly the same, merely varying a little in thickness in each. The following is the average.

Gravel and vegetable mould..........................................4 to 6 feet.
Brick earth with concretions.........................................5 to 15 feet.
Sand, greyish green and brown, with concretions.
Bones and shells, round the bones more white and clayey,.................................................................... 5 to 9 feet.
A vein of brick earth..................................................2 feet.
Gravel and drift sand, loamy and bluish coloured, forming the base.

Similar deposits occur at Wickham, in Kent, in a valley opening to the river, and consisting of brick earth, sand, and gravel, 25 feet thick, and containing remains of the horse, ox, and deer.

The deposit at Erith is situated to the south of the town, extending nearly to Crayford, and averaging about 300 yards wide. It reposes on the chalk, though sometimes separated from it by a bed of coarse sand, containing rolled specimens

* May, 1837.

of the plastic clay shells. The brick-fields belong to four different proprietors; the first is situated on the right of the road leading from Crayford to Erith, about half a mile north of the former village: it is the property of Mr. Stoneham. The excavation is about 300 feet square, with a depth of 69 feet to the chalk, being worked solely for the brick-earth it contains. The following are the beds which occur in an ascending order,—viz.

| | |
|---|---|
| Chalk. | |
| Rough gravel, quartz, &c. | 7 feet. |
| Sand, (tooth of elephant) | 3 feet. |
| Concreted sand, with sulphate of lime and veins of re-deposited chalk | 6 inches. |
| Brick-earth with veins | 25 feet. |
| Gravel, round and angular, with chalk pebbles, and bones.—Varies in thickness | 1 to 4 feet. |
| Brick earth; shells | 7 feet. |
| Dark coloured clay, containing shells and bones, (*Unio* of new species probably | 6 in. to 2 ft. |

The second (Hutchon's) is stratified as follows:—

| | |
|---|---|
| Vegetable mould, loam, &c | 3 feet. |
| Confused mass of gravel, shells, race, sandy concretions, round and angular flints, cemented by ferruginous sand, irregular | 4 to 5 feet. |
| Sand, more or less wavy, traversed by thin ferruginous veins, numerous shells, bones, and brick-earth in patches | 6 feet. |
| Race and pebbles in clay and sand, varying in thickness, and occasionally seen interstratified with wavy veins of sand; bones and shells,—*Cyrena*, *Cyclas*, *Unio*, &c | 1 to 3 feet. |
| Brick-earth, few pebbles and concretions | 7 feet. |
| Loamy sand, with veins of clay | 4 feet. |
| Gravelly sand | 8 feet. |
| Vein of sand | 1 foot. |
| Gravel and sand | 2 feet. |
| Iron flint bed, or bull's head | 1 to 2 feet. |
| Chalk excavated, few flints | 14 feet. |

Third field, Mr. Clarke's.

| | |
|---|---|
| Clay, loam, sand, gravel, broken shells, and concretions, very irregular | 12 feet. |
| Sandy gravel | 1 foot. |
| Blue and brown clay, here and there veins of small round and angular gravel | 8 feet. |
| Loamy sand and concretions | 5 feet. |
| Pebbles and sandy concretions | 1 foot. |
| Coarse grey sand with veins of pebbles and broken shells;—(*Cyrena*, *Cerithium*) | 12 feet. |
| Chalk. | |

Fourth field, Francis and White's.

| | |
|---|---|
| Gravel and sand, irregular and wavy | 12 feet. |
| Loamy sand and brick-earth, with concretions of both kinds, | 20 feet. |
| Ferruginous sand and shells | 6 feet. |
| Gravel. | |
| Chalk. | |

Animal remains are rather abundant in these deposits; a good collection being in the possession of Mr. Grantham, of Crayford. In which are the following:—

| | | | |
|---|---|---|---|
| Elephant, | *Humerus, femur, scapula,* teeth, tusk, &c. | Hyæna; | Teeth, &c. &c. |
| Irish Elk? | Horn. | Lion? | Ditto and jaw, &c. |
| Deer; | Ditto, &c. | Horse; | Various bones. |
| Rhinoceros; | Teeth, tusks, *phalanges.* | Ox; | Ditto. |

The mammaliferous deposit at Grays has been described in Loudon's 'Mag. Nat. Hist.' for 1836, as also that at Copford by Mr. Brown, and at Stutton by Mr. Wood, in the same work for 1834.

Fossil bones are found off the coast of Walton and Harwich; and on the Kentish side are constantly being dredged up at Hearne Bay: they occur also in the same county along the valleys of the Stour and Medway.*

The mineral character of the deposit at the various localities, especially where containing shells, is very similar. The bones, though dispersed through the whole, are more numerous in the bed of sand, which is either interstratified with, or underlies the brick-earth. This bed of sand is also of constant occurrence in other places yielding brick-earth along the valley where mammalian remains have not yet been noticed.

* 'Magazine of Natural History,' vol. ix. page 593.

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Fossil tooth of Bear, from Grays.

| *Carnivora.* | | | *Rodentia.* | *Ruminantia.* | | | *Solipeda.* | *Pachydermata.* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lion? | Hyæna | Bear | Vole | Irish Elk | Deer | Ox | Horse | Hippopotamus | Rhinoceros | Elephant | |
| | | | | | * | * | | * | | * | Brentford. |
| | | | | | | * | * | | | * | Wickham. |
| | | | | | * | * | * | | * | * | Ilford. |
| * | * | | * | * | * | * | * | | * | * | Erith. |
| | | * | | | * | * | * | * | * | * | Grays. |
| | | * | | | | * | | | | * | Whitstable. |
| | | | | | | | | | | *? | Copford. |
| | | | * | | * | | | | | * | Stutton. |
| | | | * | * | * | | | * | * | * | Harwich. |
| | | | | | * | * | | | | | Gravesend. |
| | | | | | | | | | | * | Nine Elms. |
| | | | | | | | | | | * | Lewisham. |
| | | | | | * | | * | | * | * | Kingsland. |

### A List of Shells occurring in the Mammaliferous Deposits.

E. Erith. G. Grays. C. Copford. S. Stutton. I. Ilford.

BIVALVE.

*Cyrena trigonula*. I. E. G. S.
*Cyclas obliqua*. S.
*cornea*. S. G.
*pusilla*. S.
*Pisidium amnica*. I. E. G. S.
*Anodon cygneus*. G. S. E.
*Unio pictorum*. G. S. I.
—— (new species?) Erith. *fig*. 27.

UNIVALVE.

*Succinea amphibia*. G. S.
*oblonga*. I.
*Helix hortensis*. I. S. G.
*lucida*. S.
*fusca*. S.
*rufescens*. G. S.
*paludosa*. S.
*hispida*. E. S. G. I.
*trochiformis*. S.
*Carychium minimum*. S. E. G.
*Pupa marginata*. S. E. G.
*sexdentata*. S.
*Bulimus lubricus*. S.
*Limax* S.
*Lymnea auricularia*. S. I.
*pereger*. S. C. I.
*fossaria*. S.
*palustris*. S. G.
*Planorbis carinatus*. S. E. G.
*corneus*. I. S. E.
*vortex*. S. E.
*contortus*. S.
*imbricatus*. S.
*nitidus*. S.
*Paludina impura*. S. G. E. I.
——? G.
*Valvata cristata*. S.
*piscinalis*. S. C.
*antiqua*, ? G. *fig*. 26.
*Ancylus lacustris*. S.
*fluviatilis*. S. G.

CRUSTACEA.

*Cypris* S.

Having in the preceding observations pointed out the localities, and described the mineral character of the mammaliferous stratum, it may be interesting to enquire into its comparative age, and the circumstances under which it was deposited. The remains, as before stated, belong chiefly to the *Ruminantia* and *Carnivora*, the former of which occur abundantly, but the latter are rather sparingly distributed. The bones are seldom much rolled or broken, but are generally well preserved, and frequently perfect; some indeed appear to have undergone partial decomposition, but this might have been occasioned by exposure to the atmosphere, previously to their becoming imbedded. With these remains are associated about thirty-eight species of terrestrial and fluviatile *Testacea*, all of which, with the exception of two species, are still in existence; and the extinction of these two is probably confined to this country, as one of them (*Cyrena*) appears to be closely allied to a species now living in the Nile, and the other (*Unio*) strikingly resembles one which inhabits the rivers of the south of France.*

The living genera of some of the *Mammalia* are now only found in or near the tropical regions; but as their remains are presumed to have belonged to extinct species, and being

* See observations by Mr. G. B. Sowerby.

accompanied by others which still inhabit the temperate zones, together with the evidence afforded by the *Testacea*, it is more reasonable to conclude that those species, from a peculiarity of constitution,* were enabled to endure a climate not widely differing from the present, than to infer that these latitudes formerly possessed a higher temperature.

It may not be irrelevant to remark, that in these deposits we find scarcely any trace of vegetable remains; and yet it is clear that vegetation was profusely abundant, if we reflect that the *Carnivora* must have been supported by numerous *Ruminantia*, which, from the uninjured state of their remains, there is every reason to conclude pastured in the valleys where they and their destroyers now lie entombed.

Professor Philips, in his 'Treatise on Geology,' p. 298, has the following passage.—"From the occurrence of the bones of land *Mammalia* among some of the diluvial gravel and clays, that the track of the watery currents was, in places at least, over the solid land; though it seems not *necessary* to imagine that the ossiferous accumulations in question, (Brandsburton gravel hills, Overton near York, Harwich, Ilford in Essex, Brentford, &c.), were heaped upon the land. They might be finally aggregated in the sea; and thus the seemingly contradictory evidence of marine shells and quadrupedal bones, in the same set of deposits, be reconciled." Now in the two last localities the bones are associated with *fresh-water* shells, and I have mentioned this error from a conviction that these remains are more constant and abundant in ancient fluviatile and lacustrine than in marine or diluvial accumulations, though it cannot be doubted that marine deposits co-existed.

The general occurrence of these fluviatile alluviums along the courses and margins of our present rivers, would lead us to infer that not much alteration has been effected in the physical features of the country since their deposition, although subsequently denuded and modified by existing streams; for at Erith they occur about 40 feet above the Thames, and at Maidstone more than 60 feet above the Medway.

* "Numerous circumstances, quite independent of osseous structure, might have caused animals of the same species to inhabit widely different climates: we must therefore proceed with the greatest caution, in speaking of the peculiarities of species which formerly existed, when we have no other circumstances to guide us than the mere structure of the skeleton." 'On the Wisdom and Goodness of God as displayed in the Animal Creation,' by C. M. Burnett, 1838. See also remarks by Dr. Fleming on animals of a near resemblance in form and structure, not having a similar geographical distribution. 'Edinb. New Phil. Journ.' 1829, No. 12, p. 282: and Lyell, 'Geol.' vol. i. p. 146.

Are then our gravel beds anterior or posterior to these fluviatile alluviums? Or is the mammaliferous stratum overlying the crag a marine deposition of the same period? The bones found at Whitstable being dredged from the bed of the sea, it is impossible to know whether they belong to an ancient fluviatile or to a marine deposit, which extended along this coast, as well as the opposite one of Norfolk and Suffolk, where mammalian remains are even more abundant. The connexion of these deposits with the ancient beds of gravel, is a subject requiring further elucidation, and I would beg to call the attention of geologists to some valuable observations by Croizet and Iobert* on similar fluviatile strata in the Auvergne district, which had been referred to diluvial action, and from whose work the following passage is quoted as bearing on the question.

"On a souvent, en effet, attribué aux eaux marines des effets qu'elles n'ont jamais produits. Lorsq'on a rencontré des masses alluviales de plusieurs centaines de mètres d'épaisseur, on a cru que des eaux d'une élévation immense avaient seules performer ces dépôts; on n'a pas même songé à rechercher si une partie du sol était alors à découvert, ou si la matière avait son origine et *sa source* dans le lieu même où elle s'était déposée, et la science ainsi détournée de sa véritable route, s'est perdue dans les systèmes."

*Kensington, August*, 1838.

### *Comparison of Cyrena, Valvata, and Unio, found at Grays, with recent Species.* By G. B. Sowerby, Esq., F.L.S., &c.

#### *Cyrena.*†

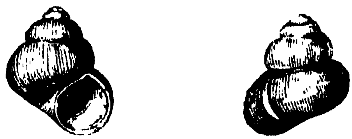
The nearest recent species known to me is one which abounds in the canal of Alexandria. The recent one is rather thinner and more perfectly equilateral than the fossil. The anterior side of the fossil is comparatively shorter than the same side of the recent species; and the posterior extremity is more truncated in the recent than in the fossil. All the teeth are larger and more prominent, and the fulcrum to which the ligament is attached, is smaller in the fossil than in the recent. The curve at the anterior part of the anterior

* 'Recherches sur les Ossem. Foss. du Dépt. du Puy de Dome,' 1828, p. 35, et p. 90-97.

† Several figures of this very interesting shell are given in the 'Magazine of Natural History,' vol. vii. page 275.—*Ed.*

elongated lateral tooth in the right valve of the recent, is much more strongly marked than in the fossil, and there is a corresponding difference in the anterior lateral tooth of the left valves. Several other marks of difference are to be observed in the forms of the hinge teeth.

## *Valvata.*



26

Fossil *Valvata* from Grays, Essex; magnified.

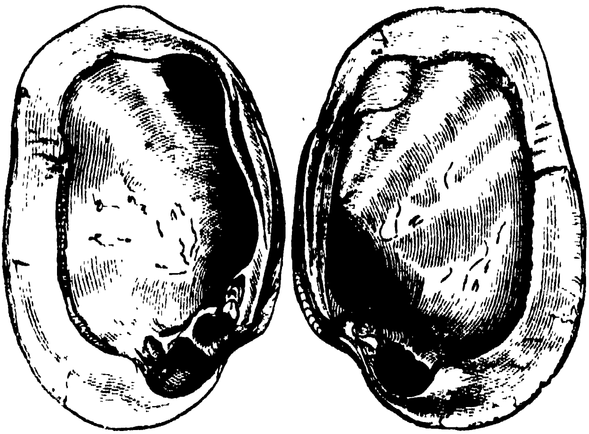
It appears that two recent species are commonly confounded under the name of *Valvata piscinalis*. This fossil differs from both in several particulars which I have pointed out in the following table, in which I have designated the fossil species as No. 1, the larger recent species as No. 2, and the smaller recent species as No. 3.

COMPARATIVE VIEW OF THE THREE *VALVATÆ*.

| | No. 1. | No. 2. | No. 3. |
|---|---|---|---|
| Length | 0.34 | 0.24 | 0.14 |
| Breadth | 0.26 | 0.24 | 0.16 |
| Sutures | deep | deep | much less deep |
| Volutions | gradually increasing rounded below, 6 in number. | regularly rounded 5 in number. | gradually increasg. 4½ in number. |
| Umbilicus | small | large | small |

## *Unio.*

The recent *Unio*, which approaches most nearly to this fossil, is the *Unio littoralis* of Draparnaud, which I have received from Auvergne. The approximation is certainly very close, nevertheless there are a few points of difference, which I will proceed to notice. In the first place, the posterior extremity is much more aslope in the *U. littoralis* than in the fossil; then the anterior muscular impression is wider, the lateral teeth are shorter, and the cardinal teeth are more prominent in the recent than in the fossil shell. The form and direction of the cardinal teeth and of the anterior slope are also different; the above are the most obvious marks of difference that are at present observable; it should, however, be remembered that the state of the fossil (though very good for a *Unio*) is such as to render it impossible to institute a comparison in all points.



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Valves of fossil *Unio* from Grays.

Art. V.—*Recent Researches in Fossil Zoology.* By Hermann Von Meyer.*

Under the name of *Palinurus Sueri*, Desmarest mentions a crab, which I find to constitute a peculiar genus: this I have called *Pemphia*, and upon it I intend to publish a detailed description. This genus, two species of which are already known to me, viz., *Pem. Sueri* and *Pem. Alberti*, has hitherto belonged to the muschelkalk. My *Pem. Alberti* has only been found in the dolomitic marl of the muschelkalk, near Horgen, in the Black Forest, and is very rare; whilst *Pem. Sueri*, of which I have examined more than a hundred specimens, chiefly found in Suabia, is principally abundant in the upper division of the muschelkalk formation, or chalk of Fredericshall. In other parts they are more scarce, and in some they have not been found at all in the muschelkalk of this age. I know also of this species in the dolomitic marl

* The English is that of Dr. I. Lenau, who, in conjunction with Count Munster and Hermann Von Meyer, is about to publish an extensive work on fossils, to which the present article has reference. Not having the original German manuscript to consult, we have been unable to correct some passages, the exact meaning of which is not clearly apparent.—*Ed.*

of the lower division of the muschelkalk, near Durlach, in the Grand Duchy of Baden, where it lies immediately upon the variegated sandstone, [bunter sandstein]. The muschelkalk has produced only this single species of the *Macroura;* but this formation likewise encloses *Crustacea* of the division of the *Entomostraca*, viz., the genus *Limulus*, of which Count Munster found a species, *Lim. priscus*, near Baireuth, and I examined another species in the dolomitic muschelkalk near Kottweil, which I intend to make known under the name of *Lim. agnotus*. These petrifactions are great rarities.

I am convinced, by the collections at Strasbourg, that the *Macroura* are older than the muschelkalk. I found in them crabs from the variegated sandstone of Souly-les-Bains, among which, one has some similarity to *Galathea*, and the other to *Gebia;* to these I shall give the names of *Galathea audax* and *Gebia obscura*. My *Erion Hackmanni* from the environs of Goppingen, a splendid specimen of which I have described in 'Act. Acad. Cur. Leop. Carol. Nat. Cur.' xviii. p. 263, *tt.* 11, 12, more usually occurs in lias; it has been found in the lias of Banz and the Ahorn valley, (Maple valley), near Rabenstein, and it is said to exist in the lias of Lyme Regis. The genus *Erion* is oftener embedded in Sollenhofer slate, but then it appears in other forms. Besides those already known, I have described a new species under the name of *Er. Schuberti*, and have further ascertained the existence of another, which is of a much larger size than *Er. Hackmanni*, and this I have named *Er. Rhemani*.

In the different structures of the Jura formation, or the oolitic range, a certain genus of *Macroura*, viz., my genus *Glyphea*, presents an extraordinary appearance. It is rich in species. The lias of Suabia has only two, viz., *Glyphea grandis*, the largest known to me, and a smaller species.— The others, arranged by me, are *Gly. Reglegani*, *ventrosa*, and *Munsteria*, from the ground at Chailles, in the department of the Haute-Saone, in France. *Glyphea Dressieri* from the ground at Chailles, near Besançon, and from the coral reef near Derneberg, [Hanover]. *Glyphea pustulosa* from the Bradford clay near Buxweiler, and the coral reef near Heldersheim; and *Glyphea Mandelslohi*, from the Oxford clay, from Ravenstein, Thurnan, and Mossingen.

I have also discovered another genus of fossil crabs, but have not yet been able to ascertain if it belongs to the *Macroura* or to the *Brachyura*. I have named it *Prosophon*, and am acquainted with three species; one, the *Pro. simplex*, is embedded in the Scyphian limestone belonging to the lower coral reef near Streitberg; the second species, *Pro. helies*, is found in the lower oolite of Caene, department of the Moselle; and the third, from a formation at Boucherons, in the Jura department, respecting which it could not be decided whether it belong to the Jura formation, or to the chalk, or to a creta-jurassic formation.

From the upper keuper, in the environs of Neuremberg, I have examined a nearly complete set of bones of the extremities, and the *vertebræ*, of a new gigantic saurian: I have named it *Plateosaurus*. These bones are furnished with a marrow-tube, now filled with carbonate of lime, and beautiful crystals of hydro-oxide of iron, * * similar to some which Phillips has examined, from the environs of Bristol.—The origin of these small and pretty crystals in the hermetically closed marrow-tubes of the *Reteosaurus* is very remarkable.

I made an interesting discovery in the fragment of a tooth of the *Mastodonsaurus*, taken from the alum slate near Geildorf. The substance is not homogeneous, but consists only of strong curved *lamellæ*, from the different substances of the teeth, presenting a curious appearance when examined with a magnifier on the surface of the fracture. I have moreover examined teeth of the *Mastodonsaurus* from the keuper sandstone near Wurzburg and Gotha, as well as from the muschelkalk.

The fossil remains of the muschelkalk, considered by Cuvier to be those of *Plesiosaurus* and *Chelonia gigantea*, do not belong to either of these genera. They really belong to the saurians which are partly formed after the type of the *Plesiosaurus*, from the great number of *vertebræ* of which the neck consists.

The muschelkalk generally produces a great number of saurians; descriptions of which, in conjunction with Count Munster, I intend to undertake and publish. The greater part of the material for this heavy task, is chiefly drawn from the extensive collections of the Count, formed during many years, principally from the *Nithosaurus* and *Dracosaurus* of the muschelkalk, near Baireuth, as well as from specimens in the collection of the Provincial Institution of that town. In the latter collection are a nearly complete *vertebra* and a skull of the *Nothosaurus*, and a lower jaw of the same animal.—But we do not intend to confine ourselves merely to the fossil bones of the muschelkalk, of the environs of Baireuth; we shall, on the contrary, endeavour to include in our examinations all the fossil bones which have been found in the muschelkalk of other localities, besides the remains of such clay and dolomitic marl of the Thuringian muschelkalk as are remarkable for the small size of their saurians. From these I have already described the fragments of a skull of my *Condriosaurus elevatus*, [Museum Senkenberg, I. s. 8, *t.* i. *fig.* 3, 4] of this *Saurus minor* I have likewise seen the lower jaw-bone. There have also been found in these marls of the muschelkalk near Guerfurt, and near Esperstat, remains of another *Saurus minor*, with tolerably strong teeth; these I shall describe as *Charitosaurus Ischidii.* From the variegated sandstone of Souly-les-Bains, I have seen fragments of larger and smaller saurians, which seem to be nearly related to those of the muschelkalk.

In a short time will appear, by the Count Munster and myself, some sheets entitled "Supplement to the Knowledge of Petrifactions," fifteen plates of which are already engraved.

This supplement, in which I have only undertaken to describe the *vertebrata* [Wirbel-thiere], contains the new species of fossil animals. I describe the saurians as distinct from those called *Plesioraurus Goldfusii*, and they are illustrated from the lithographic slate of Daiting; in addition are also a large and smaller turtle from the same formations as that of Solenhofen and Kehlheim, the structure of which is very interesting: for instance the vertebral plates [Wirbelplatten] of the turtle minor are small in a very remarkable degree, and differ among themselves, some are even wanting; and it also appears they have a peculiarity in their feet. Since I have been occupied in examining the turtles from the turf moors near Frankfort and Durheim, Mus. Senk. ii. s. 47, and that I have commenced restoring parts of their plastron [Panger-theile], I am able to show very distinctly which situations those isolated bone-plates have occupied, and by this means I have found it possible to bring into order and fix very distinctly the situation of the bone-plates, nay, even to arrange fragments of fossil turtles. Nevertheless it requires great caution in generalizing, as any remarkable deviation which single individuals show ought to be considered very carefully. For example, I find the skeleton of an *Emys* may often possess in certain parts the type of *Testudo*, and to such a degree that if these parts only were to be found as fossils, the most learned and skilful osteologist would not be able to tell whether the animals to which they belonged were *Emys* or *Testudo*, nay, he might probably decide for the latter, whilst the ground of such decisions would be simply individual variation, and not even a specific character. From this, and other individual appearances in the form and number of the single plates of the shell (mail) of the turtle, which we acknowledge in Natural

History as the basis of species or genera, which also prove the mistake of those arguments, founded on analogy, of which Cuvier could have had no idea, when he insisted on deciding the species itself from a small fragment, I have given a series of examples in my before-mentioned description of the turtles from the turf moors. During my journey in Switzerland, last June [1837], all the fossil bones from the tertiary formation of Switzerland, with some others from an older deposit, were opened to my examinations, and all requisite information was afforded me. I found amongst the various specimens a kind of slate, which incloses several fish and *Chelonia Knorri.* This kind of slate, which appears in the Plattenberg [Canton Glacis], is now determined to be limestone. Of these kind of turtles there exists only one representation in Andrews' 'Letters on Switzerland.' Upon this old figure rests the examination of Cuvier, and he gives a copy of it in his 'Oss. Foss.' I have now made a new drawing of this rare petrifaction, and have well examined the original itself. During my examination of the celebrated collection of Lavater at Zurich, I fortunately discovered in some plates [platten] of the Senhofer slate, several fragments of the *Pterodactylus,* which have not been noticed until now, although they certainly must have been long since in the collection. They consist of two plates, one containing the elongated digit, the other the *humerus* with the *radius* and the *ulna.* This finger differs so much from all those hitherto known of *Pterodactylus,* that it must be the remains of a new species, and which I shall describe more exactly as *Pterodactylus Lavateri.* This species resembles in size the *Pter. crassirostris,* or *Pter. medius.*

The observations about the construction of the *Pterodactylus* are quite new. I allude to the following which I made on the remains of the *Pterodactylus Macronyx* in the lias from the environs of Baireuth, *viz.* that certain bones are not only hollow, but that they also have air holes [Luftlœcher] in which they bear a great resemblance to certain bones of birds. I found likewise confirmed the truth of my conjectures respecting the fragments of the jaw bones in the same lias, and in the lias of Baney, that those teeth which Buckland [Geolog. Trans. iii. 2. s. 27, p. 3.] supposed to belong to *Pterodactylus Macronyx* are not from this animal. In the rich collection of fossil bones which M. Hugi, of Solothan, has collected from the Portland stone of the Jura, I found no bones of birds. All those which were considered as the remains of birds, are the bones of *Pterodactylus.* Some of the remains supposed to have been found in the

Portland stone of the said country, belong, without doubt, to *Mammalia*, and partly to the species only known in the tertiary formation. Still it remains to be shown that these remains of *Mammalia* have really been found in the *solid* banks of the Portland stone. Nevertheless, the nature of the masses which surround these remains, and the place in which they are situated, seem to prove that these *Mammalia* have been probably surrounded *later* by the *dissolved Portland stone*. We find in the Portland stone of the Jura mountains of Switzerland, and in some other places in Germany, especially in the Kahlenberg, teeth of a blunted conical form, dense and striped, belonging to the saurian which I designate *Machino Saurius Hugii*, it is characteristic of the said formations.

*(To be Continued.)*

Art. VI.—*Reply to Mr. Dalrymple "On an undescribed Muscle in the Eyes of Fishes."* By Dr. W. C. Wallace, Oculist.

In the 'Magazine of Natural History' for March last, Mr. Dalrymple states that some years ago he observed a small grey-coloured body attached to the lens of a pike, and that "the preparations then made were exhibited to some young American gentlemen attending the practice of the Moorfields Ophthalmic Hospital."

As an account of a similar body had been published in 'Silliman's Journal,' Mr. Dalrymple further states,—"From the circumstance of my not being being aware of being personally acquainted with Mr. Wallace, *I cannot help suspecting that he is one of the Americans to whom the observations made by me were imparted at the Ophthalmic Hospital some years ago.*"

I am not an American, therefore the gentlemen thus roundly accused are fully exculpated. As there was nothing on the subject in Mr. Dalrymple's book, a copy of my paper was forwarded to him soon after his publication appeared. If disposed to deviate so far from candour and courtesy as he has done, I might say, with far more plausibility, ***I cannot help suspecting that he is one of those to whom the observations made by me were imparted through the medium of 'Silliman's Journal' in*** **1834**, ***and now published as his own in the 'Magazine of Natural History' in*** **1838**.

In my paper I gave the following quotation, translated from Cuvier. "In a great number of fishes there is a falciform ligament, which passes through a slit in the *retina*, and penetrates the vitreous humour. It contains blood-vessels and nerves, and is attached to the capsule of the crystalline at its inferior surface, sometimes by a simple elevation, or by a fold a little more opaque; at other times by means of a grain or tubercle, transparent, and harder than the vitreous humour in which it is placed." "Jurin has named this the ganglion of the crystalline." Porterfield states that some have asserted there is a distinct instrument in fishes for regulating the *focus* of the *lens*, though he gives no credit to the assertion.

I admit that my publication was premature, and that it contains several inaccuracies which I shall endeavour to correct in another edition of my 'Treatise on the Eye.'

On the western shores of the Atlantic there are many fishes uncommon on the coast of Europe. In some of these the muscle is so large that there cannot be a doubt of its character; while in others it is so small, that unless exhibited on a larger scale its function might seem uncertain. Its position and attachments; its absence when there are other instruments for acting on the *lens*; and the origin of its nerve; are all in favour of the opinion which I advanced.

As when the crystalline *lens* is a sphere, and of course for the reflection of light presenting a medium of the same extent and density whichever way it be turned, more instruments than one for the regulation of its *focus* would be superfluous; so when the *lens* is greater than a sphere, as in the cuttle-fish, or less than a sphere, as in the porpoise, the shark, and in animals which live in air, the relative extent of the passage of light through the denser medium would be changed if acted upon only at one point, and the rays would not be brought to a *focus*. Accordingly we find that when the *lens* is greater or less than a sphere, there are from sixty to eighty instruments arranged round its circumference, and attached to the capsule. These instruments, (the ciliary processes), are fine membranes, very vascular, and surrounded by muscular fibres. The arteries which supply them pass to the ciliary body at the equator of the eye, and send off a branch to each membrane. When the returning veins are compressed by the muscular fibres, the processes become extended, and the *lens* is drawn forward. To the action of the single muscle there seems to be no other opposing force than the elasticity of the fine membranes of the vitreous humour: in like manner the elasticity of the membranes adhering to the posterior surface of the *lens*, draw it back when the muscular fibres surrounding the processes are relaxed. During the paralysing effects of *Belladonna* there is difficulty in distinguishing near objects; while, as has been observed by Professor Tully of Newhaven, aged persons can do without their spectacles during the operation of strychnine.

I have demonstrated the way in which the eye is adjusted to distances in different animals, to many gentlemen of the highest rank in the profession, and there was no difference of opinion about the structure and uses of the various parts of the organ. An attentive examination is all that is required to make the adjustment of the eye as plain as any other truth in physiology.

*New York, 3rd August,* 1838.

Art. VII.—*A few words of explanation in reference to Mr. Ogilby's Letter at p.* 492. By H. E. Strickland, Esq.

Mr. Ogilby's remarks in the last No. of this Magazine, compel me, much against my inclination, to say a few "more last words" on this exhausted subject. In the first place I must express my regret if anything I have written has given pain to Mr. Ogilby, for whom I have the greatest respect, and whom I never had the slightest wish to offend. Indeed so far am I from intending it in this instance, that I cannot yet perceive any just cause of offence in the passage which he has quoted. All that I said was, "I believe I am correct in stating that Erxleben *does* apply the term *Simia* to the orang outangs." This, which I stated on *belief*, Mr. Ogilby admits to be the *fact*, and yet he terms it a "flat contradiction" of his own assertions. All this misconception arises from my having inadvertently used the restricted term *orang outangs*, instead of the more general one *apes* or *tailless Quadrumana*. All that I intended to assert, and which I still maintain, is that the term *Simia* of Erxleben is, on the whole, equivalent to the term *Pithecus* of Ogilby, and ought, therefore, on the ground of priority, to supersede it. It is true that Mr. Ogilby in his last letter makes mention of the genera *Troglodytes* and *Hylobates*, as forming part of Erxleben's genus, but it will be seen that in his arrangement of the *Cheiropoda*, vol. i., n. s., p. 525, as well as in the 'Penny Cyclopædia,' article *Ape*, he includes them in his genus *Pithecus*. Therefore to state the case algebraically, let *Simia*, Erx., $=S$; *Pithecus*, Og., $=P$; *Pithecus*, Geoff. $=p$; *Troglodytes*, $=t$; *Hylobates*, $=h$. Then,

$$P = p + t + h,$$
$$\text{but} \quad S = p + t + h,^*$$
$$\text{therefore} \quad S = P. \qquad \text{Q. E. D.}$$

This is the same conclusion as that at which I arrived in my former communications, nor, if Erxleben's work had been at hand when I wrote them, should I have arrived at any other. Having therefore, as I trust, vindicated myself from the charge of a fallacious memory, and from the far greater one of a want of courtesy to Mr. Ogilby, I once more bid adieu to the subject.

P.S. If zoologists decide upon retaining the chimpanzee as a distinct genus, the generic term *Troglodytes* must be cancelled, having been long appropriated to a genus of birds.—Perhaps, therefore, the best way of making peace between contending parties will be to retain the term *Pithecus*, Geoff. for the orangs proper, and to bestow the term *Simia* on the chimpanzee, calling it *Simia troglodytes*.

*Cracombe, Evesham,*

*Sept.* 10*th*, 1838.

ART. VIII.—*Details of the First Excursion made this Summer by the Members of the Botanical Society of London: with Observations on varieties of Plants.* By DANIEL COOPER, Esq., A.L.S., Curator to the Society.†

THE first excursion made by the members of this Society was to a spot situated about twenty-five miles from London, called Woking. This spot was chosen on account of the easy access by the London and Southampton railway. Upon alighting at the station at Woking Common, and proceeding to the right of the carriage-road leading to Guildford, on to the common, great abundance of *Ulex nanus*, *Carex Œderi*, *Aira caryophyllea* and *Aira præcox* were observed. One of the party discovered a single specimen of *Teesdalia nudi-*

* I make no scruple in leaving *m* (*Macacus inuus*) out of this equation, because it does not even agree with Erxleben's definition, "*cauda nulla*," as it possesses a small caudal tubercle, besides having the general structure of *Macacus*. Therefore we must suppose that Erxleben classed it as a *Simia*, either through imperfect knowledge of the animal, or from having no better genus provided for it,—an arrangement which could not be defended at the present day. The mere removal of this species cannot therefore affect the integrity of the rest of Erxleben's genus *Simia*, as the true equivalent to *Pithecus*, Ogilb.

† Read before the Society August the 3rd, 1838.

*caulis*, which appeared to be very scarce in this locality, as no other specimen was noticed by any other individual.

Passing beneath the archway of the railroad, (the railroad dividing the common into two parts), and turning a short distance to the left, on the borders of small water-courses *Lycopodium clavatum* and *Lyc. Selago* are to be sparingly found; the latter species being exceedingly unfrequent in the neighbourhood of London, never having before met with it. It would be as well to state that it was not in fructification, while the other species, *Lyc. clavatum*, was in excellent condition. I do not see any reason why *Lycopodium inundatum*, which is so plentiful on Wimbledon and other commons around London, should not be found on Woking Common, as the subsoil and situation are very similar.

In the opposite direction, towards the small wooden bridge that crosses the canal, a large sandy plot of ground will be observed, abounding in *Littorella lacustris*, *Hypericum elodes*, *Anagallis tenella*, *Helosciadium inundatum*, *Carex stellulata*, *C. flava*, *C. Œderi*, *Juncus uliginosus* var. *bulbosus*, *Juncus bufonius*, *Eleocharis palustris* and *cæspitosa*, *Ranunculus Flammula* var. *reptans*, and *Scirpus fluitans*. In dry sandy ground *Blechnum boreale*. On the slopes of the canal near the wooden bridge, *Ervum hirsutum*, and the variety β of *Luzula campestris*, called *Luz. congesta*, from the flowers being capitate, and the *capituli* being collected into an orbicular sessile head. This is the *Luciola congesta* of 'English Botany,' plate 2718. In the canal *Myriophyllum spicatum*, *Ranunculus aquatilis* and *Potamogeton densum* were observed. I have no doubt that in the months of July and August this locality offers an extensive field for the practical botanist.

I must not however leave this locality without noticing a variety of the *Calluna vulgaris* altogether new to me, although mentioned by the older writers to occur occasionally on the heaths and commons in various parts of the country:—I allude to the β *Erica vulgaris* of Gerarde, 1380, and mentioned in Ray's 'Synopsis Stirpium Britannicarum,' p. 471, as follows.—

"Myricæ folio hirsuto, Carolus Bauhin, 485. Myricæ folio tomentosis et incanis foliis Clusii, Johannes Bauhin, 1, 355. Vulgaris hirsutior, Parkinson, 1480. Common rough-leaved heath. Cum priore, a qua certe non puto specie differe, (Doodio vero Synopsis ed. 2, Appendix, 345), diversa fuit visa, propterea præcipue quia per totum ericetum *Bagshot* ut et *Redhill*, per 6 aut 8 milliarum iter, vix alia occurrat Erica. Eaque Chamæcyparissum canitie æmuletur."

Again, in Ray's 'Catalogus Plantarum Angliæ,' 2nd edn., published in 1677, he further adds:—

"Locis incultis supra Windesoram invenit Clusius. Quin et passim occurrit non minus frequens quam vulgaris glabra, a qua, nostra sententia, non differt specifie, cum ei præter hirsutiem per omnia similis sit: nam glabra quoque alibi elatior est, alibi humilior et nunc dilutiore nunc saturatiore, ac proinde notæ illæ Clusii nihil valent."

Smith, in his 'English Flora,' vol. ii, p. 225, mentions the *Erica vulgaris hirsuta*, Ray's Synopsis; *Erica ciliaris*, Hudson, ed. 1, 144, not of Linnæus.

From these observations of the older botanists it appears that the variety *Calluna vulgaris hirsuta*, or as they term it, *Erica vulgaris hirsuta*, was known to them; and from the description given in the two works of Ray, corresponds exactly to the variety in question. But although this variety is mentioned as far back as the year 1677, yet it has not found a place in any of the recently published Floras. In Macgillevray's edition of Withering's Botany, published in 1833, there is no mention of it. Dr. Macreight, in his 'Manual of British Botany,' published in 1837, does not notice it. Nor does Dr. Lindley, in his 'Synopsis of the British Flora.' Dr. Hooker, however, in his 'British Flora,' 3rd ed., p. 181, mentions var. β, Smith, *as being hairy*, and states that it is the *Erica ciliaris* of Hudson, not of Linnæus. This extreme degree of hairiness is, I think, a sufficient character to warrant its introduction into the other British Floras, as the *Calluna vulgaris*, var. β, *hirsuta*, (Gerarde).

Proceeding by the carriage-road to Guildford, *Littorella lacustris* was also observed on the right, in low marshy spots by the wayside, near to the village of Stoke; together with *Hottonia palustris*, in a ditch by the road. Between Stoke and Merrow, shortly after leaving the former place, on the left is a barren piece of land, upon which was found *Trigonella ornithopodioïdes;* and on the right, a large marshy plot of ground, covered to the extent of two acres or more with *Littorella lacustris*, both in and out of the water.

Taking the path to the left, which leads to a large park, through which passes the river Wey, *Cardamine hirsuta*, *Ervum hirsutum*, and *Erv. tetraspermum* were observed.—In the meadows one specimen of *Orchis Morio* was found, with delicate fawn-coloured flowers, a state in which I had never before observed that plant. There were numerous specimens in the ordinary state, but only one with the fawn-coloured flowers. I cannot find this variety mentioned in any of our British Floras; I therefore conclude that it is exceedingly rare, as it would undoubtedly be recorded, if it were only for its extremely delicate colour. Numbers of the *Orchis mascula* were also found interspersed with it, as was also a white variety of *Ajuga reptans*.

The only remaining plant to be noticed is the ***Hyoscyamus niger***, three specimens of which were found nearer to Guildford.

## REVIEWS.

ART. I.--*The Honey Bee, its Natural History, Physiology, and Management.* By EDWARD BEVAN, M.D. London: Van Voorst. 1838. Small 8vo., pp. 447, with many woodcuts. [Second Edn].

2. *The Bee-Keeper's Manual; or Practical Hints on the Management and complete Preservation of the Honey Bee, and in particular in Collateral Hives.* By HENRY TAYLOR. London: Groombridge. 1838. 12mo., pp. 78, with woodcuts.

3. *A Short and Simple Letter to Cottagers, from a Conservative Bee-Keeper.* Sm 8vo., pp. 24.

THE honey bee, (*Apis mellifica*, Linn.), both in respect to its extraordinary economy and instincts, and to the various plans which have been suggested for the more successful cultivation of the insect, is an almost endless subject for the professed entomologist and the practical bee-keeper. The wonders of the hive have attracted the notice of the most philosophical naturalists, who have nevertheless left many intricate points in the natural history of the insect, unascertained.—The anatomist has investigated its structure, and the practical apiarian has endeavoured, in a variety of ways, to effect the very desirable end of obtaining the honey without destroying the insects. The two works last mentioned at the head of this article are of the latter kind, while the first is a complete summary of our knowledge of the honey bee in all its bearings.

Dr. Bevan's work, the first edition of which appeared several years ago, and which we are now happy to welcome in a second and improved edition, appears to us to be by far the best summary of bee-knowledge in our language. It is written in a straightforward style, destitute of that would-be philosophy and aiming at effect, which spoils so many good works. It has likewise the advantage of being well arranged, and is furnished with an ample index. In the present edition Dr. Bevan has received the assistance of several distinguished entomologists and eminent apiarians, and has embodied in his work much valuable matter which has appeared since the publication of the former edition.

In treating of the various individuals of which a hive is composed, we could have wished to see a further investigation into the nature of those individuals which are called *captains* and *black bees*. In like manner it would be very interesting to ascertain the peculiarities attendant upon the relative developement of the two kinds of workers, namely, the nursery bees and the wax workers. Every bee keeper is aware of the difference of these latter individuals, first pointed out by Huber, and very recently confirmed, as regards the humble bees, by Mr. Newport. In speaking of the developement of the queen bee, Dr. Bevan says,—"the most incomprehensible part of the process is that increasing the size and changing the direction of the cells, and feeding the *larvæ* with a more pungent food, should not only allow the sexual organs of the insect to be fully developed, but should alter the shape of her tongue, her jaws, and her sting, deprive her of the power of secreting wax, and obliterate the baskets which, but for the changes just referred to, would have been formed upon her thighs." Now it appears to us that this is not the "most incomprehensible part of the process;" the queen bee is normally a perfectly developed female;—the various queens produced in a hive are also normally perfect. The neuters, on the other hand, are normally imperfect; it is essential for the well being of the hive, that their sexual instincts should be obliterated; the hive could not exist were not this the case. Now we affirm that the most incomprehensible part of the process is, that in a community consisting of 52,001 individuals, (viz., 1 queen, 2,000 drones, and 50,000 workers), the surprising number of 50,000 of the inhabitants are reared up in a state of imperfection. Fed with a different kind of food, their structure is modified and their instincts completely altered. Now the knowledge we possess of the power which the bees enjoy of effecting this alteration, leads us to conjecture that they also possess a power of still further modifying the nature of the neuter bees themselves, so as to produce the different kinds of neuters mentioned above. We throw out this hint to the philosophical observer of the economy of the hive.

In the anatomical part of the work we find the descriptions of the various parts of the mouth much simplified; but the paragraphs in p. 297 appear to have been disarranged, for after describing the lower lip and *maxillæ*, which, when in action, conjointly constitute the bee's tongue as it is termed, there follows the description of the mandible, after which is a passage referring to "this compound and truly wonderful apparatus," meaning the tongue, trunk, or proboscis, independent of the mandibles.

We must not omit to notice the admirable taste in which the Dedication to the Queen is penned; one passage will show its style. "The queen bee of every bee community has been destined to fill her high station from a very early age, (not always from her birth); she has the most diligent attention bestowed upon her, to qualify her for the important functions which she has to perform: and she is, at all times, sedulously guarded from those hazards to which it is the lot of bees more humbly born and educated to be exposed. In all these particulars, I presume that a perfect analogy with your Majesty may be drawn."

Mr. Taylor's little work is written for the amateur bee-keeper; for although the principles it inculcates upon the humane or depriving system, are applicable to every hive, yet the cottager, we fear, will never be able to follow them out in practice. The elegant pavilion represented, with ground plans &c., is well adapted for a suburban garden, where everything is kept in trim order, but the greater number of bee-growers will, we fear, stick to the old plan of wicker hives, because they are old fashioned, and, what is of more consequence, because they are cheaper than the "improved collateral ventilating hives." Upon this subject, however, Mr. Taylor says, —"perhaps the hives in common use in most parts of this country, are the worst adapted to their wants and habits, and seldom last longer than three years, even when they are not sooner consigned to the brimstone pit of destruction. These are of straw, without any provision for enlargement and ventilation, and are altogether anything but ornamental to a neat garden." Thus if the cottager could but be induced to adopt the wooden ventilating hives, he would be a gainer in the end.

Mr. Taylor judiciously gives us directions for the management of the hive in each season of the year.

Without going to the length of an author who tells us of a bee-master who always saw the ghosts of the bees the night after he had burned them, the cottager should be instructed by line upon line, and precept upon precept, that he can obtain much more honey without killing the bees; and it is on this account that we approve of the two-penny tract, being the third on our list, printed for distribution by the Ashmolean Natural History Society, and understood to be from the pen of Mr. Cotton, of Christ Church; one of whose maxims is, never kill a bee; and who recommends the stupifying the bees by burnt puff-ball, when it is necessary to make any alteration in the hive.

ART. II.—*Letters on the Natural History of the Insects mentioned in Shakspeare's Plays; with Incidental Notices of the Entomology of Ireland.* By ROBERT PATTERSON, Treasurer of the Natural History Society of Belfast. London: Orr and Co.; 1838; pp. 270. 12mo., with woodcuts.

THERE are, we believe, some worshippers of our great bard, who conceive that because a number of passages occur in his plays having a legal turn of expression, he must have been brought up in an attorney's office. But the naturalist finds just as ample proof of a long study of nature in the pages of the bard of Avon; so that this line of argument only tends to prove that his was a mind of the keenest observation; thus, whilst Milton and the other poets had strung together in their descriptions the blossoms of spring and the flowers of summer, Shakspeare has placed in one group those only which may be found in bloom at the same time. On carefully perusing the plays of Shakspeare, the number of passages found by Mr. Patterson relating to natural objects, occupied "one hundred closely written pages of letter paper." From these he has selected those relating to insects, and has contrived to form them into a very pleasing little volume, which will be sure of a welcome, not only from the lovers of Shakspeare, who will find many obscure passages elucidated by the natural history of the insects, but also from the entomologist, who will be happy to see the objects of his pursuits in such a delightful garb. The manner in which the various passages are treated is very agreeable; and from the number of illustrations, some of which, (Queen Mab's triumph for instance), are very elegant, we should surmise that this will become a popular work. There are numerous original notices interspersed, one of which we have quoted below, as it bears upon the subject of one of Dr. Weissenborn's late papers communicated to this Magazine.

"On the site where the new wing of the Royal Academical Institution [of Belfast] now stands, my friend, the Rev. H. Montgomery, LL.D., was in the habit of raising a few culinary vegetables. In the spring of 1830, he sowed, at the usual period, a considerable quantity of parsley seed; it yielded no return. The ground was raked over again, and fresh seed sown, but with no better success. Between March and August the operation was repeated four times, the ground being twice dug over, but not a leaf appeared. The next year the same piece of ground was planted with peas and cabbages, but no parsley showed itself. Early in the spring of the third year, (1832), and without any further labour or care, save that of digging to prepare for another crop, the place was covered with one dense and luxuriant mass of parsley, so thick and plentiful, that every seed which had lain dormant for the preceding seasons, seemed to have been endued at once with all the power requisite for a vigorous and fertile existence."

Art. III.—1. *Die Forst-Insecten oder Abbildung und Beschrebung &c. Forest-Insects, or Descriptions and Figures of the Species of Insects which are obnoxious or beneficial to Forest Trees in Prussia, &c.* By I. T. C. Ratzeburg. 1st part, Beetles. Berlin: 1837; 4to., pp. 202, with 21 plates.

2. *Kort Underrattelse om Skandinariska Insekters, &c. Account of the various species of noxious and beneficial Insects found in Scandinavia.* By G. Dahlbom. Lund: 1837. 8vo. pp. 340, 2 pl.

On several former occasions we have taken occasion to show that the investigation of the species of obnoxious insects, in their different states, is the only satisfactory means of arriving at any possible method of checking their ravages; the works of Kollar, Hammerschmidt and Audouing having been cited to prove that this branch of Entomology was rapidly gaining ground. The two works noticed above are further evidences of the same fact. Dr. Ratzeburg's work is a valuable addition to our knowledge of the natural history of the lignivorous *Coleoptera*, complete memoirs of the different species being given, illustrated with beautiful figures, both of the insects, *larvæ*, *pupæ*, and details, and also of the modes of their attack. The work is especially valuable as containing accounts of the early states of such rare genera as *Thanasimus*, *Agrilus*, *Lymexylon*, *Hylecœtus*, *Apoderus*, *Anthribus*, *Apate*, *Platypus*, *Colydium*, *Bostrichus*, *Capercomus*, &c., as well as monographs, beautifully illustrated by that able artist, Weber, of the genera *Tornicus*, *Bylargus*, and other small *Xylophaga*.

The work of Dr. Dahlbom has the merit of being the first book of the kind published in Sweden, and it has met with the most flattering success, the whole impression having been already sold, as we learn from a correspondent at Lund, our own copy being, we believe, the only one which has arrived in this country. The work comprises insects of all the orders, a couple of pages being the ordinary space given to each species. Tables are given of the species arranged according to their noxious or beneficial qualities, and the nature of the injuries they commit, and the body of the work is arranged according to the system of Latreille.

ART. IV.—*A Dictionary of Arts, Manufactures, and Mines: containing a clear exposition of their principles and practice.* By ANDREW URE, M.D. Part 1. London: Longman & Co.

THAT the objects contemplated by the author in undertaking the present publication are of a very important and comprehensive kind, may be judged from the following passage in the Address. The Dictionary is,—

"*In the first place,* to instruct the manufacturer, metallurgist, and tradesman, in the principles of their respective processes, so as to render them in reality the masters of their business, and to emancipate them from a state of bondage to operatives, too commonly the slaves of blind prejudice and vicious routine;

"*Secondly,* to afford to merchants, brokers, drysalters, druggists and officers of the revenue, characteristic descriptions of the commodities which pass through their hands;

"*Thirdly,* by exhibiting some of the finest developements of chemistry and physics, to lay open an excellent practical school to students of those kindred sciences;

"*Fourthly,* to teach capitalists, who may be desirous of placing their funds in some productive bank of industry, to select judiciously among plausible claimants;

"*Fifthly,* to make gentlemen of the law well acquainted with the nature of those patent schemes which are so apt to become subjects of litigation;

"*Sixthly,* to present to legislators such a clear exposition of our staple manufactures as may prevent them from enacting laws which obstruct industry, or cherish one brauch of it to the injury of many others; and

"*Lastly,* to give the general reader, intent chiefly on intellectual cultivation, a view of many of the noblest achievements of science, where its boundless resources have most ingeniously effected those grand transformations of matter to which Great Britain owes her paramount wealth, rank, and power, among the kingdoms."

Dr. Ure has been for a long period actively and laboriously engaged in the prosecution of those departments of scientific research, immediately connected with the various chemical operations to which the products of our mines and manufactures are in so many instances subjected; and the right understanding of which, both as regards principle and practice, is of such vital importance to the economist. There is a large class of persons who will be glad to avail themselves of the information here put together; and so far as we are capable of forming an opinion from a casual perusal of some portions of the first part, the matter is well adapted for the attainment of the ends contemplated by the author. The great *desideratum* is to be sufficiently exact, and yet to compress the amount of matter within such limits as shall render the work neither inconveniently bulky nor expensive; but the difficulty of effecting this must always more or less be felt in the execution of comprehensive works, intended for practical purposes.

The principal articles are *Acetic Acid*, *Alcohol*, *Alum*, *Anchor*, *Amber*, *Anthracite*, *Assay*, and *Beer*.

In the account of *Artesian Wells*, the reader finds nothing to give him an idea of the depth to which they have been sunk by the process of boring, though the operation itself is fully described; nor is there a word said about the usual cost attending this important means of obtaining water; two points which we think might have been noticed with advantage.

ART. V.—*A General Outline of the Animal Kingdom.* By THOMAS RYMER JONES, F.Z.S. Part 1. London: John Van Voorst. 1838.

As an accompaniment to the valuable series of works on specific branches of British Zoology now in the course of publication by Mr. Van Voorst, the present outline of the Animal Kingdom by Professor Jones promises to be a most valuable acquisition; and its contents, we feel confident, will be made very generally available by those students of Natural History who, in directing their attention to the *organic* and *animate* portion of creation, do not rest satisfied with the mere acquirement of a familiarity with the subjects of some one or more restricted departments of so comprehensive a science as Zoology, but who would wish to gain some general insight into the various types of organisation, existing throughout the known animal world, and a knowledge of those principles of systematic arrangement, which are based upon the careful examination of the structure and functions peculiar to the respective classes composing it.

The first number includes a brief sketch of the principles of classification which will be adopted in the work, and the history of the sponges and polyps. The descriptive details are given in the most accurate and careful manner; there is an absence of everything like hasty generalization; while the matter indicates the author's qualifications for the task he is engaged upon, to be of a very high order. We may also add that the illustrations which accompany the letterpress, are drawn and engraved in the most faithful and beautiful manner.

ART. VI.—*The Zoological Gardens. A Hand-Book for Visitors.*— London: Robert Tyas. 1838.

THIS is a neat little volume, containing notices of all the more important animals at the Menagerie in the Regent's Park, accompanied with illustrations on wood. The cuts are not executed in a very superior manner, but are sufficiently accurate for the use of those who visit the gardens merely as a place of popular exhibition.

The author states in his Preface, that "to the Synopsis of the Society, and to the valuable work of Mr. Bennett, the subsecretary, he is especially indebted." As the work professes to be a compilation, a few errors in the scientific details may be readily excused; but the blunders which the author commits when speaking of the Society, are unpardonable. Visitors are told that the Society's Museum is in Bruton Street, at which place they can procure tickets of admission to the gardens; and the ground in the Regent's Park, occupied by the latter, is stated to have been *presented* to the Society by Government. Such erroneous statements in a person professing to write for the instruction of others, are inexcusable, because the means of procuring accurate information are so very easily accessible.

## SHORT COMMUNICATIONS.

*MR. SWAINSON's Reply to his Reviewers.*—We have received a letter from Mr. Swainson, stating in reference to the remarks in our last number, that he does not admit that any *experienced* naturalist has, after adopting his quinary theory, abandoned it; and wishing to know if our pages were open to him to reply to our own and our reviewer's observations. A discussion which must necessarily be carried on by the editor, and a reviewer writing anonymously, on the one side, and Mr. Swainson on the other, would make the controversy such a complicated business, that we have declined its renewal.—*Ed.*

[We regret that although we kept the press waiting as long as we possibly could, Dr. Drummond's article on the *Echinorynchus Acus* was worked off before we received his proof, containing the following addition, which should have appeared in page 524.—*Ed.*]

*ECHINORHYNCHUS ACUS.*—*Tail* obtuse, rounded, and frequently tipped with a brown or orange-coloured solid *operculum*, composed of foreign matter, probably mucus hardened. In the male, a transparent globular vescicle is often seen protruding obliquely, as is represented in *fig*. 24, *e*, p. 516. —*J. L. Drummond.*—*Belfast, Sept.* 23*rd*, 1838.

*Mr. Eyton's Arrangement of the Gulls.*—Having observed in your valuable Magazine, of last month, some elaborate remarks on my 'Arrangement of the British Gulls,' by Mr. M'Coy, I hope you will allow me the opportunity of stating that I believe his manifold difficulties will be at once accounted for, and an omission corrected, (to which I am obliged to him for calling my attention), which I had certainly overlooked in revision, by the insertion of "head coloured in the summer plumage," after the character at present given of *Zema.*—*T. C. Eyton.*—*Donnerville, Sept. 11th,* 1838.

*Gypaëtos barbatus.*—Last week a specimen of the *Gypaëtos barbatus* of immense size was shot among the rocks of the Stockhorn-mountain. Its height was more than 3ft., and it measured above 10ft. from tip to tip. This is probably the same individual which was observed in the months of May, 1837 and 1838, not far from St. Maurice in the Canton of Wallis, where it had carried away two children, but succeeded in escaping destruction; its nest only being discovered, during the absence of the old birds among the rocks of the Dent du Midi, and its two young taken out of it. The latter were then 6 or 7 weeks old, but measured 2ft. in height, and 8ft. from tip to tip. The first child which the bird destroyed in 1837 was a girl 7 or 8 years old, who had been sent by her parents to collect dry leaves. The child did not return, and a few days after, her shoes, part of her clothes, and a few eagle-feathers were found on a glade in the wood. This year a child disappeared in the same neighbourhood, who was gathering flowers near the outskirts of the wood. On the spot where it had been seen last, there was found one of its shoes and scraps of its stockings. The shoe of a child is said to have been discovered in the aery on the Stockhorn. On the supposition that this shoe had belonged to the child last mentioned, the latter must have been carried through the air a distance of 15 leagues over the mountains of the Pays de Vaud, the Saanenland of Bern, and the Simmenthal.—*Thun, Aug. 16th. Communicated by Dr. Weissenborn.*

*Flight of Pigeons.*—Towards the latter end of July thirty-two male-pigeons brought to Dresden from the little town of Herve, between Liege and Virviers, were let loose, after having been marked with the arms of the magistrate. The weather was fine, and they took their departure 5 minutes after 6, A. M. They first flew towards the east, but soon collecting themselves, took a westerly direction, and vanished within a few seconds. Only two of them reached Herve. The distance is 320 geographical miles (60 to a degree), the mean quickness of their flight has been calculated at 860ft. (390,000 to a degree) a minute.—*Id.*

*Jealousy in a Dog.*—A wood-dealer residing near Quai St. Michael, Paris, had a fine English bull-dog, which was a great favourite of his wife, who used to caress the animal. On the 10th of August last she was sitting not far from the kennel caressing her child, which was five years old. The dog became jealous of it, and at last so furious that he burst his chain, rushed at the child, worried it, and did not quit his hold, until he was killed with a knife. The child was so severely hurt, that its life was despaired of.—*Id.*

*New hot spring at Carlsbad.*—The subterraneous hot water of Carlsbad has found a new issue in the square of that town. Two talented young chemists, Dr. Wolf, and Mr. John Knewkowsky, have analyzed the water of this new spring, and have found in it both bromine and iodine, the presence of which elements in the waters of Carlsbad was first discovered by Professor Pleisdel.—*Id.*

*Hybernation of the Marmot.*—Mr. Bonafont, of Geneva, has made a few experiments with reference to the hybernation of the marmot. Having procured four specimens, he exposed them suddenly to a temperature of —10° cent.; but the impression was so strong and painful that they did not fall asleep. The cold being diminished, three fell asleep, whilst the fourth escaped. A fortnight after, a servant was sent to fetch something from a deep cave, but was unable to open the door. It was found necessary to break it, when there was found behind it a high heap of rubbish. The marmot had converted the cave into a sort of fortress; it had entered through an opening in the vault, and barricaded the door with the earth it had dug up, as well as with mortar which it had scraped from the wall. It was found asleep in a corner, on a bed of soft straw, 8—10 inches thick, which it had unrolled from more than twenty bottles. That its repose might not be disturbed by the rats, it had erected around its couch a double wall of fragments of bottles, which the rats could not surmount.—*Id.*

*Collecting the Nests of the Hirundo esculenta.*—(Extracted from the letter of a German, dated Karambolang, on the South coast of Java, 26th March, 1838.) "For the last week our place has become very busy, as this is one of the seasons when the nests of the swallows are collected, which is repeated every 100 days. On these occasions we receive the visit of a few civil officers, with numerous attendants, from Pruworedjo, who give the necessary orders for the harvest and superintend it. Coolies must be furnished from the neighbourhood for that dangerous task. The place where the nests are found is about half a league distant from here.

There are a few rocky cliffs overhanging the sea where many thousands of the swallows have fixed their little nests, which, unfortunately for the poor birds, are thought a delicacy. To obtain them, bamboo scaffoldings are suspended from the cliffs, but no caution can prevent the numerous accidents which take place in the course of every harvest. The nests, of which there are always two together, one above the other, are scraped off without any consideration to what may be in them. Thus a great many unfledged young perish, which, if boiled, taste exactly like the nests. The collecting and cleaning of the latter is performed within fourteen or twenty days, whereupon all our guests leave us. The harvest is first brought to Solo, because the emperor of Solo, our most powerful vassal in Java, receives a certain proportion of the value. The nests which are collected here belong to the grey sort, the white one being found on the South coast of Borneo. With reference to the constituent principles of these nests, as well as to the circumstance, that, though they are no doubt from the animal kingdom, they are very little subject to putrefaction, the philosophers are not yet agreed. In my opinion, the decomposition is arrested by the great quantity of salt-petre on the surface of the rocks where the swallows build, as well as by the sea-salt and spray with which the nests are impregnated during their construction. I have observed, that different caverns which were formerly constantly dripping with dissolved salt-petre, and where a few of these birds used to build, have been forsaken by the latter after salt-petre had ceased to form there, and that the nests are fast crumbling off. This may also be the reason why these birds construct their nests in such vast numbers on a few particular cliffs, though there be numbers at hand, quite similar to the former, but destitute of salt-petre. It is not true, though many travellers have stated it to be the case, that shooting in this neighbourhood is strictly forbidden, for I use my gun very frequently without finding any opposition on the part of the authorities. But there exists a law that no Chinese should approach Karambolang within six paals (3 leagues) and the ferrymen near the mouth of the river Lara, which joins the sea at this place, are strictly prohibited to ferry over individuals belonging to that nation. In the direction of the Banjumaas the sentinels of the Pradjuriets have also the strictest orders not to let any Chinese pass. This is, as far as I know, the only precaution taken with reference to insuring the harvest of the nests."—*Id.*

*Lake of Arendsee.*—Near Arendsee, in the circle of Magdeburg, there is a remarkable lake of the considerable extent of about a German square mile, or about eighteen

English square miles. It has been formed in a flat country, within the historical times, probably by the superficial strata sinking into an immense cavern excavated by subterraneous currents of water. According to Aimonius, this event appears to have taken place about a thousand years ago. The lake was considered as unfathomable, and within the memory of man it had never been frozen, the great depth of its water preventing the latter to take a sufficiently low temperature through that severity and duration of frost which the winters of Northern Germany commonly present. Last winter. however, this rare phenomenon did occur, long after the greatest rivers had been covered with a solid crust; and after having spent its free caloric in large masses of vapour, which for many days hovered over its surface and banks, the morning of the 31st of January exhibited it all covered with one smooth and polished plate of ice. The thickness of the latter was nine inches, and in a few places not above four or five inches. This was a convenient opportunity for taking accurate measurements of the depth of the lake, and it was then first ascertained that the opinion of its being unfathomable is unfounded. The general depth does not exceed 157 feet, only near the ruins of an old convent, at a distance of 400 steps from the bank, it was found as deep as 161 feet, which may be taken for its greatest depth. Beginning from the south bank, at a place where a large piece of ground sunk in 1685, the depth increased within distances of 400 steps each, at the following rate: 42½ feet, 87, 116, 137, 157.

Among the many remarkable phenomena presented by this lake, the one, that it throws out *yellow amber* is, perhaps, the most striking. This substance is only found on its eastern bank, and the more violently the west winds blow, the more yellow amber is there collected. The size of the fragments does not, however, generally exceed that of a French bean. As the whole tract from Magdeburg to the Baltic Sea is pretty uniform, we may conclude that in one of its strata it contains an almost continuous bed of yellow amber, which on the shores of the Baltic is exposed in a great part of its length, whereas near Arendsee it has been accidentally opened by the sinking of the ground. Many petrifactions of wood and other substances are likewise thrown out. Innumerable fish, as eels, pike, tench, perch, &c. inhabit its waters. The fishery is, however, comparatively little productive, on account of the great depth of the lake. Pikes of the enormous weight of 50lbs., and eels of 15lbs. are not unfrequently caught.—*Id.*

# THE MAGAZINE

OF

# NATURAL HISTORY.

## NOVEMBER, 1838.

ART. I.—*Notices of Irish Entozoa.* By JAMES L. DRUMMOND, M.D., Professor of Anatomy in the Royal Belfast Institution, President of the Belfast Natural History Society, &c.

(*Continued from page* 424).

*TETRARHYNCHUS grossus.*

"*Tetr.* capitis ovalis discreti-bothriis oblongis profundis marginatis, corpore depresso recto, apice papillari."—Rud.' Entoz. Syn. p. 129, *t.* ii. *f.* 9, 10.

On the 24th of June, 1838, I found a very perfect specimen of this species adhering to the peritoneal coat of the *rectum* of a salmon; it was still living, and showed a little contractile motion. It lay loose in the abdominal cavity, its head excepted, which was fixed to the intestine; its caudal end was directed forwards. It was two inches long; and a quarter of an inch broad at its greatest transverse diameter: its colour white, except half an inch of the anterior end, which was reddish, and seemed almost like a reflection of the outer coat of the intestine to which the animal adhered. This part was firm, and nearly cylindrical, the rest flatter, especially towards the lower end, which terminated in a delicate process of about a line in length. The inferior broadened part was finely crenate at the edges, and had a sub-articulate appearance from numerous transverse *striæ*, giving an imperfect resemblance to the structure of a tape-worm. Two of the *proboscides* were free, and the other two fixed in the intestine. I have only met with this one specimen.

Rudolphi, in a vial sent him by Tilesius, containing a number of *Vermes* taken from fishes, found a single specimen of this species, but could not ascertain from what fish it had been taken. He observes, 'Synopsis,' p. 130,—"Hab. in *pisce* maris Japonici; an *Squalo?* *Tilesius* misit, locum qua invenerit oblitus;" and as its *proboscides* were retracted, and he had not then seen a *Tetrarhynchus*, he was much perplexed concerning it. "Cum acciperem *Tetrarhynchum* nondum videram, ut specimen hocce proboscidibus retractis diu me vexaverit."—P. 448.

He describes the specimen alluded to as being flat and thick; margins straight, and obtuse; sixteen lines long, of which the head occupied four and a half; body posteriorly three, and anteriorly, as also the head, two lines broad.—Head oval, thicker than the body, with a solitary very narrow or linear *bothrium*, divided by a longitudinal raised line on each side. Body somewhat narrower anteriorly, elongated, obtuse behind, and terminating in a roundish *papilla*, rugose on each surface.

My specimen, preserved in alcohol, agrees exactly with this description, except that it is larger. The outline, (*fig.* 28, *a*) which was taken from the recent animal, gives a more

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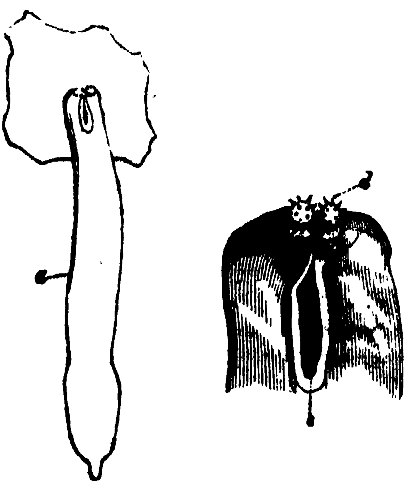

*a*, *Tetrarhynchus grossus*, natural size.
*b*, A portion of intestine, in which two of the *proboscides* are buried, and therefore invisible.
*c*, Part of the head ed.
*d*, Two of the *proboscides*.
*e*, Linear *bothrium*.

*Tetrarhynchus grossus*, Rud.

correct representation than Rudolphi's figures, which were necessarily taken from a specimen contracted by immersion in spirits.

### *Tetrarhynchus solidus.*

*Tetr.* capite truncato, utrinque bothrio angusto, corpore anticè magnopere incrassato, caudâ obtusâ rotundatâ.—J. L. D.

On the same day on which I found the last species (*Tet. grossus*), I obtained from the peritoneal coat of another salmon two specimens of a *Tetrarhynchus* which has not yet, I believe, been described.* The first of these was included in the loose peritoneal web which connects the pyloric *cæca* to each other, and the second was involved in the mesentery, being also surrounded by a peritoneal covering. On the 25th of July I found a third specimen in the mesentery of a salmon, and since that a fourth, involved in the peritoneal coat of the *rectum* of the same fish.

Description.—White, with a scarcely perceptible tinge of rose colour; length an inch and a quarter; head truncated, with a linear *bothrium* a line and a half long on each of the two flat surfaces, and with a raised fleshy margin; *proboscides* four, very distinct, cylindrical, rounded at the ends, and armed with numerous transparent, rigid hooks; body thick anteriorly, but contracting gradually to a little below the middle, from which it continues of equal diameter to the tail end, which is slightly thickened, rounded at the point and very obtuse.

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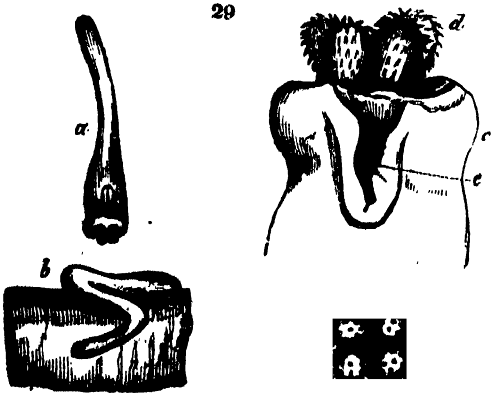



*a*, *Tetrarhynchus solidus*, a straight specimen.
*b*, Ditto, a crooked specimen attached to a portion of the *rectum* of a salmon.
*c*, Part of the head magnified.
*d*, The four *proboscides*.
*e*, *Bothrium*, its edges separated artificially from each other in a specimen preserved in alcohol.
*f*, Front view of the points of the *proboscides*.

*Tetrarhynchus solidus*, Drum.

The whole animal is cylindrical and sub-depressed. Two of the specimens were nearly straight (*fig.* 29, *a*), the others had each two very abrupt geniculated bends, (*fig.* 29, *b*), and so very firm was the substance of the worm that these could

* It is impossible, in a provincial town like Belfast, to have access to all the books one could wish, especially to foreign works; but should I on any occasion bring forward a species as new, and find afterwards that it had already been described, I will of course, at the earliest opportunity, rectify the mistake.

not be straightened; it is everywhere indeed remarkably solid and unyielding, and hence the specific term which I have applied to it.

I preserved two specimens in alcohol, and dried the others on a slip of glass. The former have retained their original appearance and dimensions, and the latter are like horn, and of about half their former thickness. The *proboscides* dried white. None of the specimens, when found, showed any symptoms of life; and, excepting some obsolete transverse *striæ* on the narrow portion of the body, there was not the least mark of articulation.

### *Bothriocephalus punctatus.*

"*Both.* capite bothriisque marginalibus oblongis, collo nullo, articulis corporis plani anterioribus elongatis, reliquis sub-quadratis."—Rud. 'Ent. Synops.' p. 138.

*Tænia Scorpii*, 'Zool. Dan.' vol. ii. p. 5. *t.* 44, *f.* 5—11.

*Habitat* intestines of the father lasher, *Cottus Scorpius*, *Gadus minutus*, turbot, brill, *Pleuronectes Boscii*, *Pleur. Pegosa*, sole, and *Trigla Adriatica*.

I have as yet detected this species only in the *Cottus Scorpius* and *Cot. bubalis*, the brill, or, as it is here named, the brett, (*Pleuronectes rhombus*), and the turbot. It is usually found with its head and anterior part lodged in the pyloric *cæca*, while the posterior end hangs free in the *duodenum*.—It is very common in the *Cottus Scorpius*, and *Cot. bubalis*, when they have acquired nearly their adult growth, but is rare in younger specimens. I have found it largest in the brett, exceeding even three feet in length and as many lines in breadth; in the *Cottus* I have found it two lines broad and from twelve to eighteen inches long; but in the turbot, so far as my observation has as yet gone, it is seldom more than a line broad, and varies in length from eight to eighteen inches. But in this fish it is often exceedingly numerous, and involved in a *mucus* almost as tough as birdlime. I have preserved in alcohol, from one fish, fully two hundred specimens; and from another, a number considerably greater.

The description of this species, which was first discovered by Liewenhoeck, has been so fully particularized by Müller and Rudolphi, that little is left but to follow their statements. According to the account given by the latter, this worm is from one to two feet long, and from half a line to a line and a half broad, white, the ovaries frequently blackish.

*Head* polymorphous, assuming various forms while living, and not always the same when dead: generally oblong, and often greatly elongated, compressed on each side, very narrow, truncated anteriorly, or terminated by a tumid margin, projecting on each side; at other times inversely conical, being very broad in front, and flattish above and below; more rarely sub-orbiculate, or ovate, acute anteriorly, carinated in the centre, but otherwise flat on both sides. *Foveæ* marginal, oblong, or nearly obovate, and deep. *Neck* none. *Body* flat, its margin crenate. *Joints*, those nearest the head for the most part very long, very narrow, and nearly wedge-shaped; the posterior margin on each side a little prominent, but often, especially after the animal is dead, contracted, and appearing scarcely longer than the others. The joints next to these shorter and gradually broader, the posterior joints nearly equal, mostly square, and for the most part broader than long, and sometimes composed as it were of two or three amalgamated together. Ultimate joint obtuse.

A longitudinal line runs on each side through the larger articulations, and in the space bounded by these the reproductive organs are placed, the joints on the dorsal surface exhibiting an orbicular, simple or double nodule, of a whitish, brown, or blackish colour; in like manner, on the ventral surface, a simple or double, but less prominent nodule is placed, and which appears to be perforated; and the body being pellucid, a central but generally irregular line arises from the presence of the nodules. The latter being open are continuous with the ovaries, and are filled with moderately sized elliptical *ova*, which are often also effused around them.*

Rudolphi farther observes that this species, when recent, is generally entirely white, but after being immersed for some hours or a day or two in water, the ovaries of the larger articulations become brown or blackish, which colour they afterwards retain in spirits. This change he supposes to depend on a certain state of the ovaries, as it does not take place in every specimen. I have observed this change of colour much more remarkable in specimens from the *Cottus* than in those from the brill or turbot; and as I have generally found the *Entozoon* more developed in the former fish than in the two latter, I would conjecture that the more mature the *ova*, the more certainly would the change take place. I have seen specimens originally almost quite white, exhibit on every posterior joint, after lying a night in water, a spot of a line in diameter, and as black as ink.

The frequent change of shape in the head adverted to above, is caused by the efforts of the animal to move forwards. In

* Rudolphi, 'Entoz. Hist. Nat.' vol. ii. part 2, pp. 51, 52.

its native home the head is lodged in one of the pyloric *cœca*, to the walls of which it adheres by using one or more of its *bothria* as a sucker; and I have repeatedly seen it attach itself in this way to the bottom of a dish so firmly, that the anterior third of the body could be pulled out to the fineness of a hair before it would let go its hold. When placed on a slip of glass and examined in the microscope, it appears to me in the first place to expand its lower *fovea* or *bothrium* on the surface of the glass, so as to act as a sucker; it then contracts the head and cervical joints, by which the anterior part of the body is drawn forward; it then loosens its hold, pushes out the head to its utmost extent, becomes fastened to the glass as before, and again contracts or shortens the anterior articulations, and by a continued repetition of this action it advances forwards, longing, no doubt, for what it will never reach,—a safe lodgement in its old habitation. Thus the head assumes, in its various states of contraction, every intermediate form from long and linear, when it is fully stretched out, to broad and heart-shaped, when it is fully contracted.

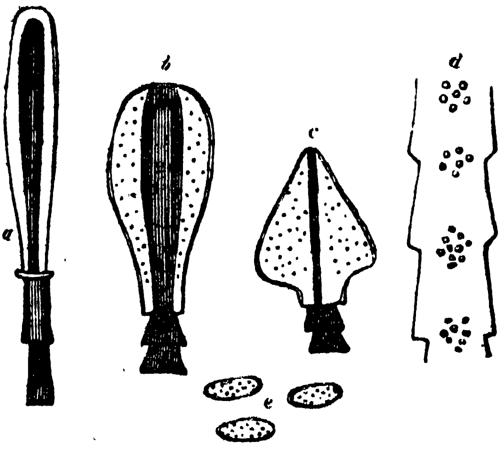
From long and patient examination of this species in the microscope, I am almost fully satisfied that it has four *bothria*, and not two only, as has been supposed. While the lower one has been expanded on the glass, and I was pretty certain of two lateral ones besides, I have seen the top of the head to open almost from end to end, leaving a transparent space in the middle, remaining thus for a considerable time, or opening and shutting at short intervals, the edges of the linear cavity being quite distinct, though when the opening was closed no line or mark was perceptible, to indicate that there could be anything of the kind.

This species, when taken from a fish not long out of water, is often almost pellucid; but placed in fresh water it soon becomes very opaque and white, increases in breadth and thickness, and soon appears to be dead. In the salt solution mentioned in my last, it in a great measure retains its pellucidity, and will continue alive forty-eight hours, or longer.* In the salt solution, too, it has a great tendency to twist in spires, like a cork-screw, which I have observed also when alive and vigorous in the intestinal *mucus;* on this account, when many are put together in the salt solution they get so entangled that is very difficult to separate any one from the

* On Saturday, the 5th of August last, I placed a number of specimens from a *Cottus bubalis*, caught on the morning of the same day, in the salt solution; and on the following Wednesday, though very languid, they were still living. Others placed at the same time in fresh water, were motionless and apparently dead in less than two hours.

rest. When the saline fluid is poured off, and fresh water put in its place, they swell, and in a great measure get untwisted; but if they have been very numerous, some will still remain so ravelled that it will be found impossible to disentangle them.

I have only farther to remark that notwithstanding the apparent delicacy of this species, it is capable of bearing a great strain before it will break; but in it, and several other species, we may remark that the posterior joints, when the *ova* are fully developed, will separate almost by a touch, while the rest of the animal will resist a force far beyond what we could expect. As the seeds of a plant, when perfected, are easily dispersed by any external agency, or by the mechanism of the seed-vessel itself, so the joints of this and various other *Cestoidea* are ready to drop off when ripe, and being carried abroad, their *ova* may be hatched into active life and being, whenever they happen to be cast on a situation congenial to their nature.




*a*, *b*, *c*, Head of *Bothriocephalus punctatus*, in various forms.
*d*, A number of joints amalgamated their *septa* having disappeared.
*e*, *Ova* filled with granules.
The figures are all magnified more or less.

*Bothriocephalus punctatus*, Rud.

*(To be continued).*

*Belfast*, *Sept.* 24*th*, 1838.

ART. II.—*On the Anatomy of the Lamellibranchiate Conchiferous Animals.* By ROBERT GARNER, Esq. F.L.S.*

WHILST the study of Conchology, or of the differences of the testaceous coverings of the molluscous classes, with a view to their recognition, independently of all consideration of the animals which inhabit them, has been cultivated with great ardour, the anatomy of the soft parts or organs contained in the shells, the study of their functions, and of the varieties of form in the animal giving rise to the great diversity of the coverings, has been comparatively neglected. Thus in the lamellibranchiate *Conchifera*, the subjects of this paper, no addition, with the exception of the partial labours of Cuvier,† Bojanus,‡ Home,§ and Blainville,|| has been made to our zootomical knowledge, since the publication of the great work of Poli.¶ Whilst the shells of every locality, and of every geological formation, are collected and studied, the *inhabitants* of many of those of our own country are unknown: and foreign shells are seldom brought hither in an unemptied state, or, if so, are consigned unexamined to our museums. Hence the errors seen in most conchological works, and the imperfect understanding we have of the remarkable forms of many fossil shells. A minute attention to the differences of shells is of the greatest importance, particularly in a geological point of view; but the organization of the soft parts is equally interesting. The character of all the genera of recent shells might, and should be mainly derived from internal structure. From such considerations alone can they be well arranged. There is an organization of the soft parts peculiar to each important difference of the calcareous envelope.

The class of *Acephala*—those *Mollusca* destitute of a head, having the mouth situated in a more or less closed cavity,

* Communicated by the author. An abstract of this memoir has appeared in the 'Transactions of the Zoological Society,' vol. ii. pt. 2, p. 87.—*Ed.*

† 'Leçons d' Anatomie Comp.' and 'Règne Animal,' t. iii.

‡ 'Journal de Physique,' t. lxxxix.

§ 'Phil. Transactions,' and 'Lect. on Comp. Anatomy.'

|| 'Manuel de Malacologie,' 'Journ. de Physique,' t. lxxxix., and 'Annales des Sciences Naturelles,' t. xiv.

¶ 'Testacea utriusque Siciliæ.' Of the older anatomists the following may be mentioned. Dicquemare, on the oyster, 'Phil. Trans.' 1786; Heyde, 'Anatomia Mytuli, &c.' 1684; Lister, 'Exercit. Anat. tert.' and 'Anatomy of the Scallop, *Pectunculus*, Oyster, *Pholas*, &c.' 1696; Mery, sur la Moule &c. 'Acad. des Sciences,' 1710; Pinel, sur l'Huitre, 'Bull. Soc. Phil.' No. 20; Poupart, sur les Bivalves, 'Mem. Acad. Sciences Par.' 1706; Reaumur, id. loc. 1710-11-17; Willis, 'De Animâ Brutorum.'

formed by the mantle, which also contains certain pectinated organs for respiration, &c., being destitute of any distinction of sex,—may be divided into such as have a calcareous shell or valves* secreted by the mantle, (*Conchifera*); and others which are surrounded by a membranous envelope, (*Tunicata*).† The conchiferous or bivalve *Acephala* may be subdivided into the *Brachiopoda*, in which the mantle has an *upper* and a *lower* lobe or *lamina*, secreting a *superior* and an *inferior* valve; being destitute of any elastic cartilage to open the shell; the mouth situated under the upper lobe of the mantle, and furnished with two muscular, extensile, pectinated arms; the *rectum* opening laterally, and respiration effected by the internal surface of the mantle;—and into the *Lamellibranchiata*, Blainv., in which the animal is compressed in a different direction; having two *lateral* lobes to the mantle, secreting a *right* and a *left* valve; having commonly an elastic intervalvular cartilage;‡ the mouth opening anteriorly at the junction of the lobes of the mantle; the *rectum* in the opposite direction; and commonly furnished with four fixed, membranous, pectinated tentacles at the mouth, and four others for the purpose of respiration. To the anatomy of the latter order the author trusts the following pages will not be an unacceptable addition.

The *Anomia* is a genus intermediate between the two orders. The structure of it, in several respects, approaches that of the *Orbicula*.§ In the latter, however, the *apex* of the upper valve is nearly central, whilst, in the *Anomia*, it is marginal.‖ The *Anomia* has this valve destitute of the wider portion of the former, between the *apex* and the margin.—Were this part, and the corresponding portion of the mantle supplied, the mouth would then be situated in the same position under the upper valve. Two of the ordinary tentacles of the *Lamellibranchiata* have become exceedingly long, and nearly free, also of a similar structure. There is under the

* The two pieces composing the shell are called *valves*.

† In some of the *Tunicata* there are calcareous pieces, though overlooked by Savigny. They consist of two small, conical tubes, curiously reticulate in their structure, situated one in each orifice of the cartilaginous tunic, and projecting from it externally. The water &c. must pass through them.—The author has found them in several British species. They are noticed by Eysenhardt, 'Nova Acta Acad. Nat. Cur.' vol. xii.

‡ The genus *Myastropha* of Gray has no cartilage, but a muscle in its place: some of the *Pholades*, *Teredines*, &c. have no cartilage.

§ See the excellent paper 'On the Anatomy of the *Brachyopoda* of Cuvier,' by Mr. Owen, 'Trans. Zool. Soc.' 1833, to which the author is indebted for the anatomy of the *Orbicula*.

‖ In some species, however, not quite so, according to Turton.

mouth a rudiment of the semilunar lip of the *Orbicula*. The intestinal canal is equally short, much shorter than in any other *lamellibranchiate bivalve*. The ovaries are ramified in the same way in the mantle. In the *Anomia*, however, the body is, as it were, awry, having a tendency to assume the ordinary position in the shells of the *Lamellibranchiata;* the mouth is oblique, and the intestine altered in direction, from the same displacement. The left ventricle of the *Orbicula* is, in the *Anomia*, dragged to its fellow, forming a single heart upon the intestine. The four *branchiæ* of the *Anomia*, and the two tentacles which are undeveloped, appear to go, in the *Orbicula*, to form the four upper and two lower sets of branchial vessels. The *Anomia* has the muscular foot of the *Orbicula*, though little developed, the animal adhering not by it, but by a calcareous *operculum*. The muscular system is very different from that of the other *Lamellibranchiata*, though it is in some respects analogous.

The fossil *Sphærulites* were probably allied to the *Anomia*. An acquaintance with the anatomy of some unknown living animals, as *Thecidea*, *Crania*, *Placuna*, and of the different species of *Terebratula*, *Anomia*, &c., would probably enable us to form a more correct idea of many of the fossil *Acephala*, so common in various strata.

In arranging the *Lamellibranchiata*, a prior division into *Monomyaria* and *Dimyaria*, as was done by Lamarck, may be made. The former have but one muscle to close the valves; the mantle unfurnished with separate orifices or tubes, and open in its circumference, except on the dorsal side; the valves are commonly orbicular, or if lengthened, are so in the vertical direction, and are often eared at the hinge; there is generally a degree of obliquity in the animal, and an irregularity of the valves arising from a tendency to assume the position which the brachyopodous animal has in its shell. Notwithstanding this last circumstance, however, we can more correctly consider the valves as lateral, than as superior and inferior; though one, from its adherence to foreign bodies, may be inferior when in the natural position. The most convex valve is commonly the adherent one; in the oyster this is the left; in the *Spondylus*, *Pedum*, &c., it is the right. The foot in the *Monomyaria* is little developed, not being used for an organ of movement. The *Dimyaria* have two adductor muscles of the valves, an anterior one being added to that of the *Monomyaria;* the form of the valves is commonly more horizontally lengthened; the shell is generally equivalve, and, when at all unsymmetrical, is only so from the nature of the hinge requiring a greater convexity of one valve than of the other; the foot is developed into an organ of different forms and functions; the mantle commonly has orifices or tubes for the inlet and exit of the water.

Some *Lamellibranchiata*, from their elongated form, may be said to be allied to the *Annelidæ*. From the description of M. Deshayes,* the animal of the *Dentalium* is intermediate in its position between the *Teredo* and the *Serpulaceæ*. In some *Pholades* we see a tendency of the valves to separate at the insertion of the siphons, and in the *Teredo*, &c., we find two small anterior valves, encased in a long calcareous tube. Of the *Gastropoda*, the *Chiton* and *Patella* come nearest to the *Lamellibranchiata* in structure; the valves of the former seem analogous to the dorsal *laminæ* of the *Pholades*, whilst the shell of the *Patella*, *Emarginula*, &c., appears to be formed of the two united valves of the ordinary *Lamellibranchiata*.

The *Brachiopoda* seem to be most naturally placed between the *Lamellibranchiata* and the *Cirrhopoda*; and considerable analogy seems to exist between the *Rudista* of Lamarck, and some of the sessile cirrhopodous animals.†

The valves increase in size by the addition of new layers, each secreted within the preceding one, and projecting beyond it. Their shape is determined solely by that of the mantle, which secretes them. Their degree of vertical convexity commonly diminishes at the lower edge, or last-formed part of a valve; however occasionally, as in some varieties of *Mytilus*, the reverse takes place.

In the opposite direction, likewise, the valves present differences in the degree of convexity. Thus an impression (*lunule*) often exists anteriorly before the beaks; and a similar one is sometimes present behind them, (*fissure*), supporting two prominences, (*nymphæ*), to which the cartilage is commonly attached. The calcareous layers of the valves are sometimes at a distance from each other; in this case we occasionally see a fluid interposed between the last of the layers; and between the preceding ones masses of carbonate of lime of an uncrystallized appearance are seen, which appear to enter the cells by a transudation.‡ These internal layers appear to be secreted by the corresponding central portion of the lobes of the mantle. In some of the fossil genera, one of the valves takes an elongated and multilocular form. The

* Blainville's Malacologie.

† Desmoulins, sur les *Sphærulites*, Isis, 1829.

‡ In the *Cardita concamerata*, Sowerby describes a sort of cup in the interior of each valve, which he supposes contains the ovaries. Do the internal processes of the *Pholas* correspond to these? 'Zool. Journ vol. ii.

particular form of a valve is not dependant on the greater or less protrusion of the *laminæ* at different points, or their greater or less distance from each other, or on their being deposited at a greater or less angle with those preceding, but is the same at all ages, depending upon the specific configuration of the animal. We do, however, see slight differences of form in the young and old animal. In the fry of the *Cyclades* for instance, the valves are much flatter than in the mature state, and the posterior extremity of young shells generally is little developed: the openings of those shells which, in the mature state, are naturally gaping, are often less apparent in the young, from the imperfect developement of the foot, siphons, &c., which protrude by them. In the *Tridacna* on the contrary, the opening of the shell becomes closed in the mature animal.*

The valves differ infinitely in form in the different species. Sometimes the valve is longest in the vertical direction, as in *Lima*, *Malleus*, &c.; sometimes of the greatest diameter in the opposite horizontal direction, as in *Solen*. In the genus *Solemya* the greatest side of the valve is anterior to the beaks, or commencing points of growth; whilst in others, as in many *Solenides*, the valves are totally post-apical.—When both sides of the same valve are equal, it is termed *equilateral;* when they are not perfectly alike it is *inequilateral.*† The beaks look towards the shortest side of the valves; thus they look forwards in *Venus* and backwards in *Donax*. The figure and size of the foot influence most materially the form of the anterior part of the shell; the conformation of the siphons that of the posterior part. Thus in *Donax* the anterior part of the valves is large, to protect and encase the voluminous foot. The orbicular species of *Venus* have a broad securiform foot; the oval species have it oval or lanceolate; the cylindrically valved animals elongated or club-shaped.

We see the same ridges, *striæ*, *laminæ*, spines, &c., in bivalves as in other shells, marking the greater activity at certain times of the mantle.‡ An important point in Conchology is the beaks being *remote* or *proximate*. The former circum-

* Blainville.

† The reversion of the shell, so common in univalves, occasionally occurs in bivalves. Gray, 'Zool. Journ.' vol. i.

‡ On examining the surface of some shells with a lens, we notice fine punctuations, as in the *Pinna*, *Avicula*, and certain *Brachiopoda;* also fine *striæ*, as in many *Tellinæ*, where they are often oblique, and sometimes only on one valve. In the *Tel. fabula*, Fleming says these are on the left valve; in the Sussex specimens they are on the right.

stance can only happen when there is a giving way or erosion of the cartilage, as by means of this structure the beaks are always originally in connection. In *Isocardia*, for instance, we see the beaks far separate, and the valves volute;* and it may be seen that as the cartilage increases behind, it gives way and becomes bifurcate before. The same spiral disposition may be seen in the *Chama*, when the beak is nearly in the centre of the valve; and a still higher degree of remoteness of the beaks is present in the fossil *Diceras*.

We cannot account for the form of some shells without admitting that the animal has the power of lessening them at certain points; thus, in the *Anomia* the process of the under valve to which the cartilage is attached remaining always in the same place, and the notch being at all ages nearly a complete *foramen*, how can this opening be enlarged for the insertion of the increasing *operculum*, without the possession of such a power by the animal? This effect appears to be produced by currents of water directed against the edge of the valve by the valvular organs of the animal.

*(To be continued).*

## ART. III.—*Recent Researches in Fossil Zoology.* By HERMANN VON MEYER.

*(Continued from page 553).*

IN the grey chalk marl which underlies the yellow limestone, near Neuf-Chatel, different *vertebræ* [Wirbel] have been found, and a large *Saurus*, which has been supposed to be the *Ichthyosaurus*. Those *vertebræ* which have a concave surface belong neither to the *Ichthyosaurus* nor to the *Mososaurus*:† the latter of which appears in the chalk formation of the eastern and western world. My examination of these is not yet finished.

In my investigation and determination of the formation of the environs of Neufchatel, it was of very important service to me that the assembly of the Naturalists' Society of Switzerland gave me a crab to examine which was found in the yellow limestone, and which I recognized as the *Ascotus longimanus* of De la Beche, from the greensand near Lyme. It is therefore no longer doubtful that the yellow limestone of

* Sometimes, though rarely, the beaks of the two valves are volute in opposite directions, as in *Inoceramus*.

† We must again remind our readers, that we received this article translated from the author's own German MSS. by Dr. Lenau.—*Ed.*

Neufchatel, with the green marl lying beneath it, belong to the cretaceous group.

My examination of *Vertebrata* from the tertiary marl slate of Œningen rests chiefly on the *Chalydra Murchisonii*, Bell, and upon the rodent of the same formation. The remains of the turtle in the Zurich collection afforded me a new idea of these animals in general, and particularly of the mail-bellied turtle, [Bauch panzer]. I have greatly reduced the species of fossil rodents described as occurring at Œningen. Three distinct species from this formation have always been allowed. I had occasion to examine the remains upon which these species are founded. I have determined that they belong to a single species only: this has been called by M. Konig, *Anœma*, which cannot be correct; for as I tried to take away the matrix that the fossil might be more distinctly seen, I found some very small cutting teeth [Schneiderzahn] in the upper jaw-bone; moreover, they cannot be those of *Anœma*, from the number of the toes. This animal, on the contrary, seems to be a kind of hare, similar to *Lagomys*: I shall describe it as *Lagomys Œningensis;* it belongs to the few and rare fossils of the Œningen slate, and of it I know several specimens: there are at least three in the Zurich collection. The best I have seen are preserved in Carlsruhe, of which I have made drawings.

The tertiary deposits of Switzerland are richer in fossil bones than I had expected. These occur in solid sandstone, sand, clay, and pit coal, of the Molasse. The lithological character of this great formation seems not to be without reference to the importance of the animals; and the structures of one and the same nature appear to differ in this respect,—their difference of situation.

Although I have not yet finished my examination, still I am able to give some explanation of the manifold variety of the fossils of the Swiss molassic formation, and to divide them as follows. From the solid molasse-sand of Bollengen, which is surrounded by pebbles of primitive rocks, was taken half of the lower jaw-bone of a new *Palacotherium*, which I shall describe as *Pal. Ichingii*. This animal is in size between *Pal. magnum* and *medium*, or *crassum*. From fine molasse-sand near Buchberg, I examined the half of a most interesting lower jaw-bone of a young *Mastodon*, in which it may be seen that the first grinders had two, and the second and third three rows; the third grinder was still concealed in the jaw, and was discovered by accident.

But the molasse sandstone from Stein on the Rhine, near Schaffhausen is much richer. I examined from that locality the last milk tooth from the left lower jaw of a ruminant, scarcely the size of a roebuck; and the structure of this tooth differs very much from both the recent and extinct ruminating animals of the diluvial strata. This tooth is of the same shape as of those ruminants which I have called altogether *Palacomeryx*. The same sort of tooth I examined in the Bohnerzablagerung of Mosskirch. In the molasse of Stein were moreover found the tooth of a large *Saurus;* the seventh edge-plate of the mailed back turtle, [Rückenpanzer]; the fourth rand-plate of the mailed belly turtle, [Bauchpanzer], resembling the type of the testudo-formed turtle; and the *femora* of a bird resembling the domestic fowl.

From the finer molasse-sandstone at Seelmatte has been taken the lower grinder, as it has hitherto been considered, of the *Palacotherium*, but it belongs to the *Rhinoceros incisivus;* and from the brown coal [braunkohln] of Seehatten has been produced a sharp edged tooth [Schneiderzahn], which indicates a certain pachyderm. From the brown coal near Greit, on the northern declivity of the Haute Rhone, near the village of Meinzingen, only the remains of the *Rhinoceros Goldfussii* are known to me.

The layers of the pitch coal of Kapfnaden and Elgg are very celebrated for the many fossil bones they contain. Near Kapfnaden have been found the most numerous remains of *Mastodon angustidens*, and also a rodent. From the upper jaw of the *Mastodon angustidens* I examined the first grinder, which has two indentations, and the fourth grinder has three; then in the lower jaw the fourth grinder has also three indentations, to which a piece of the fifth grinder is attached. I also examined the remains of the gnawing teeth of at least fourteen individuals of the rodent, and ascertained the form of the teeth in the upper and lower jaw-bones, as well as the form of the lower jaw-bone itself. This animal comes very near to the beaver, and I do not find it differs from those in the layers of Eppersheim, known as *Chalicomys Jagerii*, from the pitch coal of Kapfnach. This coal also contains three genera of ruminating animals, which differ in the structure of their teeth. One of these genera resembles very much our living ruminating species; another is like those designated by me *Palacomeryx;* and the third is quite new: I call it *Orygotherium Escherii*. Each of these three genera has six grinders in the lower half of their jaw-bones.

The pit coal near Elgg contains quite different animals.—A peculiar species of *Mastodon* is often found here, the *Mastodon Turicense;* of which I examined the milk tooth of the upper jaw, and the corresponding tooth of the first grinder, which had two ridges; as also the second, third, fifth, and seventh grinders, all with three indentations [Reihig]. The deciduous tooth in the upper jaw has not been deeply indented, neither much curved, and only its exterior covered with enamel. Some cutting teeth of the lower jaw have also been found. In the pit coal of Elgg *Rhinoceros incisivus* is not rare; I examined some remains of different individuals, under which were a quantity of skull-fragments with rows of grinders. The assertion of Cuvier as to the appearance of the *Rhinoceros tichorhinus* is amply refuted by this, as neither at Elgg, nor in any other formation of pit coal, have I ever found any remains of that animal, which belongs to the *diluvium.*

From Elgg is further taken a peculiar animal resembling a pig, from which I have seen the teeth belonging to the upper jaw. This animal must have been the size of my *Hyotherium,* but is otherwise different from it. Half of the lower jaw of a rodent belonging to the *Palicomyx* was also found.—This must have been but half the size of the species buried at Knapfden; I have consequently named it *Chalicomus minutus.* I likewise found one in shape the type of the testudo-formed turtle, half of the back of the mailed belly turtle.

Near Aaran, and even under the houses of this town, fossil bones have been discovered in the molasse; these are in the collection of the late M. Rengger, a geologist there. The remains of two ruminating animals exist, one of them belongs to *Palocomyx,* the other is similar in the structure of the teeth to the living ruminating animals. By some other teeth we might suppose there must have existed a larger pachyderm, but these fragments are very imperfect. The most interesting to me was the lower jaw of a small mammiferous animal, which might be placed, with respect to the structure of its teeth, between the ruminating and pachydermatous animals, and I have named it *Microtherium Rengen.*

Turtles seem to be numerous in this molasse: I examined from it fragments of the mailed back turtle, of a *Tryonyx,* and other fragments from the back of the mailed belly one, of the type of the *Emys* constructed turtle, which I call *Emys Heischeri.* I have not determined in what class I shall place the other.

In the collection of Berne are fossil bones from the molasse of the different cantons of Switzerland; to those from Rappenflich and Maggerwyl particular attention should be given. From the molasse of Rappenflich near Aaberg I examined the same remains of turtles with which M. Bourdet was formerly long occupied; and from the same deposit were taken bones of a ruminating animal, and the tooth of another, supposed to be the *Anoplotherium* or *Cheropotamus;* and the fragments of a lower jaw-bone, which I determined by a drawing of M. Meissner to be his peculiar species, *Cheropotamus Meissneri;* but I shall further examine this fossil.

The molasse sandstone of Maggenwyl near Lenzburg is also very interesting; the collection at Zurich contains some teeth of the *Rhinoceros incisivus.*

In the collection of the Prince of Furstenberg at Donanschwingen, are preserved the fossil bones found in the tertiary Bohnerz formation of Mosskirch. I am now occupied with their examination. *Rhinoceros incisivus*, accompanied by the larger *Rhin. Goldfussii*, and a smaller species, are very frequent in it. The remains of the *Mastodon angustidens*, next to those of the *Rhinoceros*, appear to be most numerous; the teeth also of the saurians seem to be frequent. There are likewise different species of a kind of stag, the teeth of which in their structure seem to agree with *Palaeomeryx*, and one among them similar to living ruminating animals. Furthermore there have been found the remains of an animal resembling a pig, and two species of *Dinotherium*, one of which resembles the *Din. Bavaricum*, the other of a genuiue tapir, and *Palecotherium crassum.*

Different carnivorous animals are also imbedded in the Bohnerz. Those found in the tertiary formation offer many peculiarities, and much that is new is confirmed by these remains. From the new genus, which seems to be the largest of all the known carnivorous animals taken from it; by the collection at Berne it is also seen that land *Mammalia* have been buried in it, but it seems still that aquatic *Mammalia* were more frequent. I saw moreover the right half of the upper jaw of an animal which bears some comparison with *Manatus;* this will be explained by me under the name *Manutus Studeri.* In the Jura of Switzerland are also to be found tertiary formations with bones in them. At the meeting of the Professors of Natural History at Neufchatel, in July, 1837, I was shown a tooth from the pit coal of Lock, which is subordinate to the freshwater limestone, but is situated above the marine molasse; this tooth I recognised as the principal grinder of the *Dinotherium giganteum.*

I am also occupied with the fossil bones of the Bohnerz formation, and the molasse of the Suabian Alps. At Professor Fleischer's I saw a human tooth at Aaran, taken from the Bohnerz; it is the last grinder but one of the right side of the lower jaw. Its condition, shape, and quality agree with those teeth found at the same time, and which are all from extinct genera, and belong to the tertiary period.

I examined the great canine [Reisszahn] of the upper jaw, which indicates a remarkable transition from *Felis* to *Hyena*. I call the animal *Harpagodon maximus*. Thin and long corner teeth indicate a smaller carnivorous animal. Beyond the grinders some of them are very singular with respect to their fangs [Kronen], which are formed in a carnivorous shape, and the roots, from their swollen appearance, resemble the teeth of a certain phoxen; but in comparison with them these fossil teeth are of an immense size.

Many undetermined bones have been found in it, which seem to have been taken from the head of an enormous animal. On the surface are some furrows, similar to the impressions of the mailed coat turtle [Scheldhroten Panzer], on which are bound two shields of exterior covering, but it is not known if the skulls of turtles have had such impressions of their boundaries, [Grenzeindruhen]. If this bone have been taken from a turtle, it would prove to be an animal of the same size as those fossil remains discovered in the Siwalix mountains in India, called *Megalochelys*. These layers of Bohnerz and molasse of the Suabian Alps contain besides numerous remains of fish, which indicate the tertiary formation.—By the agreement of these fish and *Mammalia*, I came to the result that the tertiary lime in the Rhenish basin near Mayence, the tertiary sandstone and sand, to which belong the very rich fossil formations of Eppelsheim and Flersheim, and the Bohnerz and molasse formation in Suabia and Switzerland, are *only the different localities of a vast superficial tertiary formation*, which extends over a great part of the European continent, and perhaps may also be met with in other parts of the world, as in Asia and America, especially in the basin of the Pampas.

The tertiary gypsum from Hohenhoven contained besides the *Testudo antiqua*, the remains of a large and small ruminating animal, as well as those of a large pachyderm.

I have illustrated these examinations by figures and copies of the originals, by a certain method which, without injuring the picturesque effect, represents the objects in such a manner that we are able to measure them with the compass.

ART. IV.—*Analytic Descriptions of the Groups of Birds composing the Order Strepitores.* By EDWARD BLYTH, Esq.

## No. 3.—*BUCEROIDES, or the HORNBILL and HOOPOE TRIBES.*

For the first intimation of the particular affinity subsisting between the hornbills and the hoopoes, I am indebted to my friend Mr. Gould, who, judging from external structure and habits alone, has long suspected these genera to be especially allied. I arrived at the same conclusion, however, by a different train of investigation, and gradually, as I obtained some knowledge of the leading details of their anatomy; and have since long hesitated with respect to the amount of their approximation, as to whether it would be more consistent to regard them as distinct *tribes*, equivalent to the *Cylindrirostres*, *Angulirostres*, and *Serratirostres* respectively, into which the *Halcyoides* are primarily distributed, or merely as different *families* of the same tribe, analogous to the *Todidæ* (todies), and *Galbulidæ* (jacamars), which together compose my tribal group *Angulirostres*. A recent opportunity of studying some living hoopoes has now decided me to adopt the former course, and I shall accordingly designate the insulated genera in question *Appendirostres* (contracted from *Appendicirostres*) and *Arculirostres*.

On inspecting the skeletons of these birds,* it is at once apparent that they require separation from the *Cantores;* and the digestive and vocal organs indicate the propriety of admitting them among the series of groups which compose the present order. The connected toes of the hornbills then tend to approximate that genus to the other *Syndactyli*, one tribe of which (the *Cylindrirostres*) both the hornbills and hoopoes further resemble in the very short, heart-shaped form of the tongue, while the beak is analogously much elongated; and also in a circumstance connected with the digestive function, manifested by the peculiar fact of their nest-holes being rendered exteriorly fetid and conspicuous by the accumulating *fœces* of the young,—the liquid consistence of which (unenclosed by a film) unfits it for removal by the parents, a particular which is likewise in accordance with the *Raptores.*—The first plumage, also, of these birds (as in the *Cylindrirostres*) is similar in character to that of the adult; and there is every reason to believe, that, in the hornbills as in the hoo-

* There are specimens of both in the Museum of the Royal College of Surgeons.

poes, it is in like manner not renewed till after the following breeding season.

The *sterna* of the *Buceroides* (hornbills and hoopoes together), however, differ from those of the *Halcyoides* in presenting but one pair of notches posteriorly; the single emargination adverted to being slight in the *Buceridæ* (or hornbills), and much deeper in the *Upupidæ* (or hoopoes): and the configuration of the entire sternal apparatus, in these two families, though by no means closely similar, yet mutually approximates more than either does to that of any other group of birds, or than is observable in the analogous instance of the kingfishers and jacamars among the *Halcyoides*. I have examined the skeletons of six or seven species of *Buceridæ*, which has afforded an opportunity of remarking the rigid constancy of form maintained by the *sternum* and its accessories, and the importance, consequently, of the character which is thence derivable, as a guide to sound classification.

Exteriorly, the *Buceroides* differ from the *Halcyoides* in the absence of bright colouring, so prevalent among the latter, and in possessing only ten tail-feathers, whereas the others have twelve; their body-feathers have no accessory shaft.—It is scarcely necessary to remind the reader that all *Insessores* (auct.) which have fewer than twelve caudal *rectrices*, possess the distinctive characters of my great ordinal group *Strepitores*.

The *Buceroides*, finally, are confined in their distribution to the eastern hemisphere. I shall now proceed to treat of the two tribal families separately in detail.

I.—*Appendirostres*, (or with beaks furnished with an appendage). The strongly characterized group of hornbills contains the largest species of *Strepitores*: but the superior dimensions of these birds are attained, as it were, in great measure by inflation; their skeletons being excessively light, and more completely permeated by air than in any other birds whatever, even than the gannets,—for the *phalanges* of the toes are hollow to their extremities. Their formidable-looking beak is in like manner chiefly so in appearance; and may be briefly described as of large size, thick, tapering, and much arched, with originally serrated edges to the mandibles, that become obliterated by use, which at the same time renders them irregularly jagged after their primitive edge has disappeared: this organ is also mostly provided with an extraordinary protuberance, of varied form and size in the different species, which gradually appears and enlarges, as they advance in age, upon the ridge of the upper mandible, till in some species it almost equals in dimesions the immense beak itself; in the young, when first hatched, no indication of it is visible; and in numerous species it fails to attain a conspicuous magnitude at any age; excepting in one species, wherein it acquires a medium size, and is quite solid, and consequently very weighty, the internal structure of this prodigious excrescence is extremely slight and reticulate, or in other words hollow, and permeated by a fragile network of osseous fibres, similar to what pervade the huge bills of the toucans:* its purport has not hitherto been ascertained; but, that it has a use, would seem to be intimated by the presence of stout eye-lashes, as if to protect the eyes from falling particles disengaged by its agency in some particular employment. Now, it may be remarked that eye-lashes are not of common occurrence in the class of birds;† and the only additional *Strepitores* which possess them are certain *Cuculidæ*, one genus of which, that of the ani (*Crotophaga*), presents likewise a rostral protuberance, very similar to that of several of the smaller hornbills. Observation alone will probably detect the precise object to which this structure is especially subservient: and it will require somewhat nice and acute discrimination to discover the intent of the various modifications of form which the protuberance undergoes in different species.

It would be needless to describe further the outward conformation of these remarkable birds, with which every reader is doubtless familiar. Their digestive organs are not widely different from those of the toucans; and probably resemble a good deal those of the *Serratirostres*, or motmots: there being a large gall-bladder present, which receptacle does not exist in the toucan family. "The tongue," remarks Mr. Owen, "is extremely short, of a triangular form, and smooth: and the *œsophagus*, as in the toucans, is very wide, and of nearly equal diameter as far as the gizzard. The gizzard is thicker in its coats, and of a more elongated form, than in the toucan; its cuticular lining is very tough, and disposed in longitudinal ridges. There are no *cœca*: and the intestines are arranged in long and narrow loops, as in the raven." Mr. Owen further states that "the individual" (one of the common Indian *Buceros clavatus*) "was observed to be more attached to animal than vegetable food, and would quit any other sub-

* Beautiful sections of the bills of both the hornbills and toucans may be seen in the Museum of the Royal College of Surgeons, and also in that of comparative anatomy at Guy's Hospital.

† They are, in all cases, simply barbless feathers, which are developed and annually moulted like other feathers; and the same holds true of the rictorial and other *vibrissæ* of birds, as may be readily seen on examining their condition in a nestling.

stance if a dead mouse were offered to it. This it would swallow entire, after squeezing it twice or thrice with the bill: and no castings were noticed. Petiver, however, has borne testimony to its regurgitating habits."* Le Vaillant was of opinion that the hornbills are not naturally vegetable feeders, even in part: and he remarks their deficiency of intelligence, wherein they accord with the great majority of other *Strepitores*.

But little can now be added to the excellent general description which Le Vaillant prefixed to his monograph of this group of birds. They are undoubtedly very miscellaneous feeders, as regards animal nourishment; and are rather celebrated for their skill in discovering snakes, on the eggs of which, as well as on birds' eggs, and even fish, they have been described to feed: and it is said that on passing over a spot where one of these reptiles has concealed itself, the hornbill immediately begins digging, till it has uncovered it,†—most probably assisting to burrow with its feet. They are known likewise to prey on small mammalians, weakly birds, and insects; and do not hesitate to feed on carrion and garbage, ranking among the numerous scavengers of the torrid regions which they inhabit. Le Vaillant relates, of the small Cape species, that he saw one day a flock of more than five hundred of them, assembling with crows and vultures, preying on the remains of slaughtered elephants: at other times, he says, they are to be found in woods, perching on high withered trees. The larger species are excessively wary birds, and consequently very difficult of approach, which more than their rarity has impeded the study of their economy: they all prefer to sit on the exposed dead branches of trees, where their vision can command a wide range, to those which are clad in foliage. Their flight is steady, with little movement of the wings, and is compared by Dr. Smith to that of a crow: and on the ground they advance by a leaping mode of progression, assisted by the wings. They breed in the hollows of decayed trees, and produce generally four rounded white eggs.

The geographic range of the hornbills extends along Asia southward of the Himmalayas, the islands of the Indian ocean, and Africa. There are none in Europe, nor in what may be termed the European region of Asia; though one if not more exists on the southern slopes of the Himmalaya mountains. They are likewise absent from Australia.

It is said that, on account of the shortness of the tongue,

* 'Zoological Proceedings,' iii. p. 103.
† Stanley's 'Familiar History of Birds,' ii. 212.

these birds are necessitated to throw up their food, and catch it in the throat; which is not improbable. The same, however, is asserted by Bechstein of the hoopoes, which I have never seen do so: the latter generally transfer their food to the throat by a jerk of the head, just as a godwit may be seen to pick up barley. The habit of throwing up the food and catching it in a favourable position for deglutition, is also more or less observable in the rollers, toucans, the larger *Tyrannidæ*,* the storks and some allied genera, and the cormorants, gannets, tachypete, and probably all other *Totipalmati* of Cuvier; the whole of which have the tongue either extremely short, or of a form unfit to assist in turning the food backwards. The struthious birds, likewise, are analogously obliged to jerk the head, as stated of the godwits.

II.—*Arculirostres* (or with slightly arcuated bills). The hoopoes present so many peculiar characters, that I have no hesitation in assigning them this tribal rank in the system: they cannot be more nearly approximated to any other group.—From the creepers, and all other *Cantores*, they are at once widely separated by their anatomy, which, as before stated, brings them conclusively within the pale of the *Strepitores*. The *sternum* is narrow across, and emarginated somewhat as in the *Cantores*, though less angularly; but there is no further resemblance whatever to the invariable conformation observable throughout that extensive order: the medial ridge of this bone is considerably developed, and rounded anteriorly, (differing much in form from that of the hornbills, wherein this process is low, and comparatively angular); the costal processes are not dilated as in the *Cantores*; neither does the manubrial process, to which the coracoid ligaments are attached, protrude so as to assume that elongated, obliquely truncate, bifurcate form, so constant in all those birds: again, the perpendicular appendage to the *furcula*, found in all the *Cantores*, is wanting in the hoopoes: their vocal organ is simple; "the stomach," according to Mr. Selby, "is a membranous bag; intestines of considerable diameter, but short," and doubtless without *cæca*: and finally the external character of possessing only ten tail-feathers, as already noticed, while every cantorial bird has twelve,—all combine to separate this curious genus from the *Certhiadæ*, *Promeropidæ*, &c., with which it has been associated by every preceding systematist, and intimate its true position to be as here assigned.†

* Nuttall.

† I believe there is no cantorial bird which retains its nestling clothing

They differ unexpectedly, however, from probably all other *Strepitores*, in the curious particular of being as remarkable for intelligence, as the latter are for obtuseness and deficiency of intellect: indeed there are very few birds, throughout the class, which will bear comparison with the hoopoes in this respect. They are lively and energetic in their aspect and manners, and run about with exactly the same gait as a lark; they likewise ascend steep surfaces, in the manner of a woodpecker, which last-named group they resemble in another particular, that of possessing the capability of striking rapidly with the bill,—an action which I have several times witnessed. Their bill is of peculiar form,—very long, slender, a little incurved, unemarginate, and obtusely terminated; interior of the mandibles flat, not even grooved; the upper a little exceeding the under one in length: gape wide, as in the rest of the *Syndactyli;* the tongue shaped as in the hornbills. The feet are not syndactyle, any more than in the rollers; while they are typically so in several *Cantores*, as *Eurylaimus*, *Calyptomena*, *Pipra:* the outer and middle toes, however, are basally connected, as in all the *Cantores;* being the only instance of what I designate the *cœnodactyle* structure occurring elsewhere than in that order. The foot of the hoopoe is indeed not very dissimilar from that of the lark; but so modified that the tarsal joint can be rested on when ascending a steep surface: it would appear, however, to be only moderately adapted for clinging; as the middle claw has an expanded inner edge, and all the front claws are but slightly curved: but the strength and stoutness of that on the hinder toe would seem to be calculated to render it an efficient prop while the body can so lean forward as to preserve its balance. I have seen a hoopoe creep, by successive springs, up the wiry front of its cage with much facility. They pass their time chiefly on the ground; and Temminck remarks—"Elle se pose plus rarement sur les arbres, où cependant on le voit suspendue aux branches, et se balançant pour saisir les insectes qui s'attachent au dessous des feuilles, et où le mâle se pose ordinairement lorsqu' il fait entendre son chant langouroux:" on such occasions, he elevates and expands, from time to time, his beautiful crest; an action which is likewise expressive of distrust, or rather of anger and defiance: in ge-

feathers till the second autumn, as is the case with the hoopoes. Mr. Yarrell, on the authority of Mr. Hoy, indeed states this of the common British wood-wren; but I have specimens, with their primaries scarcely grown, which prove the contrary.

neral, or when unexcited, this large and conspicuous ornament falls back closed, as in the sulphur-crested cockatoo.

On beholding six of these birds, confined in a very roomy cage, I was particularly struck with their vivacity, and quick and expressive physiognomy: and a scene not a little amusing was exhibited on holding to them a morsel of meat: in a moment they all crowded eagerly to seize it, uttering a wheezing cry, and following my hand with rapidity about the cage; one or two of them sometimes clinging to the wires: and when at length two or three pieces were given to them, the scramble, although they could not have been very hungry, and subsequent struggle for possession, was maintained with a pertinacity that was truly surprising: two might be seen tugging with might and main at the same morsel, till wearied with repeated efforts they would give over for a while, still retaining, however, their hold, to renew the contest after an interval of rest; and it was not unusual, on such occasions, for a third individual, generally a smaller and weaker bird, to quietly watch the issue of the contest, when it would endeavour to deprive the victor of its prize. Certainly, I never saw birds struggle so vigorously before, nor pull with such determined force and energy, tumbling over not unfrequently from the violence of their efforts.

Bechstein relates, of the European species, that (in Thuringia)—"it may be continually seen in fields, searching for its favourite insects among cow-dung and the droppings of other animals. It remains, during summer, in woods near meadows, and pasture land. In the middle of August, after hay-harvest, it goes in flocks into the plains: it departs in September, and does not return till the end of the following April."

The flight of the hoopoe is undulatory, and capable of very considerable protraction. The Bishop of Norwich relates, that—"one approached a vessel in the middle of the Atlantic, and kept company with it a good way, but did not settle on board, which it would probably have done had it been tired."* An individual occurred on one of the Scilly islands in January, during the winter before last.

It nestles by choice in the hollows of decayed trees, (like the hornbill), and only when such situations cannot be obtained, in the crevices of walls and rocks; collecting a rude nest, composed generally of dry cow-dung, mingled with fibrous roots and lined with any sort of soft material: the eggs are from two to five in number, of a greyish white, sometimes

* Stanley's 'Familiar History of Birds,' ii. 69.

speckled with yellow-brown; and the young differ only from their parents in the comparative shortness of the beak and crest A correspondent of Bechstein "succeeded in rearing two young ones, taken from a nest which was placed at the summit of an oak tree." (!) * * These birds "would never touch earth-worms, but were very fond of the larger *Coleoptera:* these they first killed, and then beat them with their beak into a kind of oblong ball; when this was done, they threw it into the air, that they might catch and swallow it lengthwise; if it fell across the throat, they were obliged to begin again." Dr. A. Smith informs me, that he has observed the hoopoes to roll their food in the dust, so as to render it always very dry before swallowing it; and I have ascertained that it is only when they have an opportunity of doing so that they will eat earth-worms, which they will then feed on readily. The stomach of a specimen examined by Mr. Selby "was filled with the *larvæ* of *Tipulæ* and *Phalænæ;* no remains of perfect insects, nor any snards of beetles being visible." To recur to M. Bechstein's friend, that observer states, that—"Instead of bathing, they roll in the sand. I took them one day into a neighbouring field, that they might catch insects for themselves, and had then an opportunity of remarking their innate fear of birds of prey, and their instinct under it. No sooner did they perceive a raven, or even a pigeon, than they were on their bellies in an instant, their wings stretched out by the side of the head, so that the large quill-feathers touched; they were thus surrounded by a sort of crown, formed by the feathers of the tail and wings, the head leaning on the back, with the beak pointing upwards; in this curious posture they might be taken for an old rag. As soon as the bird that frightened them was gone, they rose up immediately, uttering cries of joy. They were very fond of lying in the sun, and showed their content by repeating in a quivering tone, *vec, vec, vec;* when angry, their notes are harsh, and the male, which is known by his colour being redder, cries *hoop, hoop.* These amusing birds would follow their owner everywhere, and on hearing him at a distance expressed their joy by a peculiar chirping, rose into the air, and as soon as he was seated climbed on his clothes, particularly when giving them their food from a pan of milk, the cream of which they swallowed eagerly; they climbed higher and higher, till at last they perched on his shoulders, and sometimes on his head, caressing him with much fondness: notwithstanding which, a word was sufficient to rid him of their company, and they would immediately retire to the stove. These birds would observe the eyes of their owner, to discern what his inclination might be towards them, that they might act accordingly." This capability of attachment is fully corroborated by the personal observation of Buffon. "I once saw," relates that naturalist, "one of these birds that had been taken in a net, and being then old, or at least adult, must have acquired its natural habits: its attachment to the person who took care of it was very strong, and even exclusive. It appeared to be happy only when along with her; if strangers came unexpectedly, it raised its crest with surprise and fear, and hid itself on the top of a bed which was in the room. After a while, it was sometimes bold enough to come from its asylum; but it flew directly to its mistress, and seemed to perceive no one but her. It had two very different tones: one soft, as if from within, which it addressed to its mistress; the other sharp, and more piercing, which expressed anger and fear. It was never kept in a cage by day or night, and was suffered to range the house at pleasure: yet, though the windows were often open, it never showed the least desire to escape, its wish for liberty being less strong than its attachment." Bechstein remarks, that, "in a captive state, the droll actions of the hoopoe are very amusing: for instance, it makes a continual motion with its head, tapping the floor with its beak as if walking with a stick, at the same time shaking its crest, wings, and tail. When any one looks steadfastly at them, they immediately begin to act thus."

The hoopoes which I saw alive exhibited nothing extraordinary in their deportment: but they were young birds, though old enough to shift for themselves in a state of nature. However, I have sufficient confidence in the veracity of Bechstein, from personal knowledge of the accuracy of all that he relates of numerous other species, to refrain from expressing any scepticism on the present occasion: it is true that he often descends to frivolous minutiæ and twaddle, characteristic of the *bird-fancier;* but whatever he affirms, on his own personal testimony, may, I have reason to think, be implicitly relied on.

The hoopoe is by no means so difficult to maintain in health in captivity as has been generally stated. The Earl of Derby has possessed living specimens for some years; a pair of which built and incubated last season, but with what result I have not yet been informed. It is to be regretted that the cupidity of collectors prevents this interesting species from effecting a permanent settlement in the British islands, which it would certainly do, if allowed to breed unmolested; for specimens are obtained every season in different parts of the country, and some few cases have occurred of their multiplying in the southern counties. The geographic range of the form extends, during summer, nearly throughout Asia, Europe, and Africa, including some of the islands of the Indian ocean; the number of species, however, would appear to be limited to two or at most three, which are very intimately allied, and barely distinguishable.

Having now brought my descriptions of *Strepitores Syndactyli* to a close, I may avail myself of this opportunity to remark, that, since treating of the *Cylindrirostres*, I have several times heard the jarring note of the great *Dacelo*, in the Zoological Gardens: it consists of a long, continuous, shaking, and very loud harsh cry, considerably modulated in the course of its delivery, but always exactly the same at each repetition: considering the simple structure of its vocal apparatus, which may be presumed to be similar to that of all other *Strepitores*, the modulation of tone adverted to is much greater than would perhaps have been anticipated.

In corroboration of an opinion, also, which I have expressed, that probably none of the *Strepitores* require to drink, it may be remarked that Azara states, of his captive motmots, that he never saw one attempt to do so; which is the more worthy of notice in this instance, because the bill and tongue of those birds are not (as in the *Cylindrirostres*, and both tribes of *Buceroides*), of a structure ill adapted to take up water. In this, therefore, as in several other particulars, we discern an analogy, if not relationship, between the *Strepitores* and *Raptores*, which orders I have always placed in apposition.

Finally, it may be remarked, here, that Mr. Swainson has, I perceive, been somewhat captious in quoting an assertion of mine (see p. 497) respecting the distribution of the *Cylindrirostres;* the import of which he has in great measure misunderstood, and might therefore have moderated his exultations, since this very subordinate item of the general subject of my communication (by no means affecting the determination of the main question at issue, that of accurate classification based on affinities), appears to be all that even he can venture to call in question,—a circumstance not the less satisfactory, as some novel *facts* (even to "experienced ornithologists") and generalizations were contained in the paper which he refers to, certain of which, he cannot but have remarked, are utterly and very widely irreconcileable with his published views respecting the affinities of particular genera, that of the todies (*Todus*) for instance, more especially, which he may ponder with some considerable advantage.—What I obviously intended was (in the passage cited), that, of the entire group *Cylindrirostres*, "the kingfisher family (*Halcyonidæ*) only, is feebly represented in America by a few piscivorous species; all the remainder [that is, of course, the rest of the *Halcyonidæ*—necessarily comprising the whole extensive group of insectivorous species, together with every member of the *Meropidæ* and *Coracidæ*], being peculiar to the eastern hemisphere." Now this Mr. Swainson designates an "unfounded assertion"! And proceeds to enlighten us in the following flighty strain. —"Why! America is actually the chief metropolis of the piscivorous kingfishers! a circumstance well known to every experienced ornithologist. With the exception, indeed, of my *Ispida gigantea* and *bitorquata*, and another, I am unacquainted with any long-tailed kingfishers that are *not found* in America, where the largest and most powerful species abound on the banks of all the great rivers. On the other hand, the short-tailed 'feeble' race [*feeble* between inverted commas], represented by *Alcedo ispida*, is totally excluded from America, while those 'which are peculiar to the eastern hemisphere' (*Halcyon*, Sw.) are not *piscivorous*, but almost entirely *insectivorous*."—In reply to all this, I must observe that the latter remarks are superfluous, as coinciding with my statement; from which, moreover, I do not perceive how it could have been gathered that the American kingfishers are "feeble." Mr. Swainson, too, is over hasty in what he remarks of the "long-tailed" species of the eastern hemisphere; for he must necessarily be well acquainted with the common *Alcedo* (or *Syma*) *rudis*, and *guttata*, figured in Gould's Century. Then, with regard to the number of species inhabiting the New World, I can learn only of *Alcedo halcyon* in all North America; while Lesson gives but four additional species to the whole southern continent, where, it would appear from Mr. Swainson's flourishing correction, (assuming that his kingfishers are more definitely characterized than his todies), that more have since been discovered than I was aware of: and this is the extent of my unlucky defalcation. The following *corrigendum* will therefore suffice. Instead of "feebly represented in America by a few piscivorous species," read—"represented in America by piscivorous species only." It will be remembered that I confessedly wrote as much to elicit as to convey information: for I freely confess that my studies have generally had reference to *forms*, rather than to *species*,—to those fundamental and distinctive characters of groups, which do not, like the secondary or adaptive characters (which have reference to habit), the comparatively superficial modifications on which the quinary system of birds is fabricated, grade and pass insensibly away through a series of species. Which is the more important to trace, in order to arrive at the basis of a sound classification, I leave to the philosophic naturalist to determine.

There may be some difference of opinion as to which constitutes the more "experienced ornithologist," to possess an acquaintance, altogether superficial, with a vast number of species, or to know a moderate number, perhaps including all the different types or models of structure comparatively well. For of what avail, may I ask, is it for Mr. Swainson to assume a lofty tone in asserting that his notions are deemed "theoretical" merely for want of sufficient information to comprehend them, when it can be demonstrated, by reference to every detail of internal structure, that many of his groups are composed of the most heterogeneous materials, respectively severed from the forms with which they intimately correspond: and that, consequently, his bases being unsound, the entire superstructure, however plausible and ingenious, must necessarily be fanciful and frivolous? Surely it requires no extraordinary amount of information to discover, on actual comparison of entire specimens, whether the systematic relations predicated of them, from examination of their exterior only, be real or imaginary! And if, on subjecting them to the crucial test of anatomy, the assigned station and associations prove to be altogether palpably erroneous, as I have shown to be the case with Mr. Swainson's allocation of the todies, of the hoopoes, &c., and as I shall have occasion to show in numerous other instances, why then, are those who detect and expose such fallacies to be accused of "a captious and disputatious spirit," because they of course refuse to yield implicit deference to the dicta of what they must feel and know to be very questionable (even because biassed) authority? No!—Let the charge of deficiency of needful information to be able to form a correct judgment be transferred, or at all events extended, to the party proved to be in error!

It is easy enough to dogmatise; to make assertions without sufficient proof; to affirm, for instance, as Mr. Swainson does repeatedly, that *Phitotoma* constitutes a satisfactory *link* between the finches and the touracos! merely because, like the latter, it happens to have serrated mandibles; and on this slender ground alone (so far as I can discover) to bring the *Musophagidæ* into the "circle" of *Conirostres*: or to pronounce, with Sir E. Bromhead (p. 486), that "*Psittacidæ* are *Psittacidæ-Picidæ; Cuculidæ* are *Cuculidæ-Certhiadæ*, &c.!—But *Phitotoma*, it so happens, is in every detail of its conformation a member of my distinct order *Cantores*, just as widely removed from the touracos as any other song-bird:* and I respectfully invite Sir E. Bromhead, or any other systematist, to point out a single structural accordancy, either internal or external,—to name any definite character whatever, that can justify him even in approximating the families in question, much less in attempting to unite them as he has done.

I will only further trespass on the reader's attention on the present occasion, to direct it, once more, to an important fact sufficiently at variance with the doctrines of the quinarians, namely, the utter absence of any approach or tendency even to a passage or transition occurring from one to another of any of the eight family groups which together compose my *Strepitores Syndactyli*. To save trouble in reference, I subjoin a tabular view of the series of them.

| | | | | |
|---|---|---|---|---|
| SYNDACTYLI | *Buceroides* | *Appendirostres* | *Buceridæ*, | Hornbills. |
| | | *Arculirostres* | *Upupidæ*, | Hoopoes. |
| | *Halcyoides* | *Cylindrirostres* | *Meropidæ*, | Bee-eaters. |
| | | | *Coracidæ*, | Rollers. |
| | | | *Halcyonidæ*, | Kingfishers. |
| | | *Angulirostres* | *Todidæ*, | Todies. |
| | | | *Galbulidæ*, | Jacamars. |
| | | *Serratirostres* | *Prionitidæ*, | Motmots. |

Next follow the toucans (*Rhamphastidæ*), which commence the *Zygodactyli*.

*September 30th*, 1838.

Art. V.—*Notes on the Natural History of the Ant-Lion,* (Myrmeleon formicarium, *Linn.*) By J. O. Westwood, Esq., F.L.S.

During a pleasant entomological excursion to the Parc de Belle Vue, near Paris, in the month of July, 1837, my attention was directed, by my friend Audouin, to many of the cells of the ant-lion, at the foot of a very high sand-bank, and where the sand was exceedingly fine. These holes were of various sizes, but none exceeded an inch and a half or two inches in diameter, and two thirds of an inch deep. The ant-lions were of various sizes, corresponding with the size of their retreats.

* It agrees in this respect, loosely, with the touracos, that the intestinal canal is remarkably short and wide; but there is no similitude in the structure of the parts.

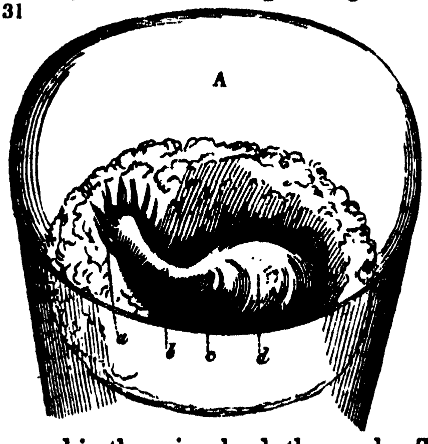
I brought many of them to Paris, placing several together in a box filled with the sand; they however destroyed one another whilst shut up in these boxes, and I only succeeded in bringing three of them alive to England; one of which almost immediately afterwards (on the 23rd July) enclosed itself in a globular cocoon of fine sand. The other two afforded me many opportunities of observing their proceedings.—They were unable to walk forwards, an anomalous circumstance not often met with in animals furnished with well-developed legs. It is generally backwards, working in a spiral direction, that the creature moves, pushing itself backwards and downwards at the same time; the head being carried horizontally, the back much arched, so that the extremity of the body is forced into the sand. In this manner it proceeds backwards, (to use an Hibernianism), forming little mole-hills in the sand, like Rösel's *tab.* 17, *fig.* 7; but it does not appear to me that this retrograde motion has anything to do with the actual formation of the cell, since as soon as it has fixed upon a spot for its retreat, it commences throwing up the sand with the back of its head, jerking the sand either behind its back,—

"Ossaque *post tergum*, magnæ jactata parentis,"—OVID,

or on one or the other side. It shuts its long jaws, forming them into a kind of shovel, the sharp edges of which it thrusts laterally into the sand on each side of the head, and thereby contrives to lodge a quantity of the sand upon the head, as well as the jaws. The motion is, in fact, something like that of the head of a goat, especially when butting sideways in play. In this manner it contrives to throw away the sand, and by degrees to make a hole entirely with its head, the fore legs not affording the slightest assistance in the operation.—During this performance the head only is exposed, the insect having previously pushed itself beneath the surface of the sand, but when it has made the hole sufficiently deep, it withdraws the head also, leaving only the jaws exposed, which are spread open in a line thus,  and laid upon the sand so as to be scarcely visible. If alarmed, the insect immediately takes a step backwards, withdrawing the jaws; but when an insect falls into the hole, the jaws are instantaneously and instinctively closed, and the insect seized by the legs, wing, or body, just as it may chance to fall within the reach of the ant-lion's jaws. If, however, the insect be not seized, but attempts to escape, no matter in what direction, the ant-lion immediately begins twisting its head about, and shovelling up the sand with the greatest agility, jerking it about on each side and backwards, (but never forwards, as misrepresented in some figures), until the hole is made so much deeper, and such a disturbance caused in the sides of the hole, that the insect is almost sure to be brought down to the bottom, when it is seized by the ant-lion, which immediately endeavours to draw it beneath the sand; if it be very boisterous, the ant-lion beats it about, holding it firmly with its jaws, until it is too weak for further resistance. Hence, as the head of the ant-lion is immersed in the sand, it is evident that the accounts given in popular works of the instinct by which it throws the sand exactly in the direction of the escaping prey, is not quite correct; the act of throwing up the sand when an insect has fallen into the pit and attempts to escape, having evidently for its chief object, that of making the pit deeper and more conical, and therefore more difficult of ascent.

On placing it on a flat surface of sand it first thrusts the extremity of its body to a short distance in the sand, and then by the assistance of its hind pair of legs drags itself backwards, its four fore legs being extended and trailing after it immoveably. *Fig.* 31, A, represents a glass containing sand; *a* are the traces on the surface of the sand left by the forelegs and jaws; *b* is the downward track of the *larva*, gradually deepening; *c* the jaws of the *larva* exposed; and *d* a little hillock of sand raised by the body of the ant-lion underneath. At this period of the formation of its burrow, the insect is engaged in throwing back the sand. There is a very great analogy between the motions of the head of this insect, and the shutting of its jaws, and those of the *larva* of *Cicindela*. In the ant-lion the head is lower, the neck being suddenly deflexed, and the base of the head beneath is very convex, and is lower than the neck, just as in the *larva* of *Cicindela*.

31



By watching the motions of the *larva* whilst on the surface of the sand, and before it has immersed itself, I perceived that it is by the retrograde motion of the hind pair of legs, which are directed backwards, that the insect effects its motions.—

Moreover, when digging vigorously the creature makes a short step backwards, by which means a portion of the sand is thrown on the head: owing to the hump-like form of the back this is immediately jerked away, the body at the same time advancing another step in its backward and spiral motion.

I placed one of my *larvæ* in spirits; the other underwent a three weeks' fast during the following months of August and September; but on my return from the country it devoured flies with its ordinary activity. About the middle of September the specimen which had enclosed itself in a cocoon at the end of July, produced a winged ant-lion fly, the skin of the *pupa* being attached to the edges of a small hole made in the cocoon. The *larva* which I kept in my study continued active till the cold weather set in, when it became torpid although near the fire-place; but at the middle of March, and before the flies were abroad, a few *Trichoceræ* only being occasionally seen, the ant-lion resumed its habits and made a small burrow; it died, however, in the following month.

ART. VI.—*On the artificial arrangement of some of the more extensive Natural Orders of British Plants.* By FREDERIC JOHN BIRD, Esq.*

HAVING frequently experienced considerable difficulty in determining certain genera and species of plants, belonging to the more extensive natural orders, especially during botanical excursions, when we are necessarily deprived of microscopic aid, I have been led to construct the following tabular analyses of genera, in which many of the more obscure features are disregarded, and the name of the genus arrived at without having recourse to minute dissection, or indefinite characters. These analyses, drawn up in accordance with suggestions originally made by my brother, Dr. Golding Bird, are entirely restricted to an examination of the floral envelopes and fruit, without any minute dissection of the latter, a process which is often impracticable whilst studying in the field. Two or rarely three characters are taken in each binary division; such as are most obvious have in every case been selected, and those contained in the first line are exactly the converse of the features met with in the second; thus avoiding any serious error which might arise from the too close resemblance in structure.

* Communicated by Golding Bird, M.D., F.L.S., G.S., &c., Lecturer on Natural Philosophy at Guy's Hospital, &c.

The chief object of this arrangement is simplicity; and is so far, for the junior student preferable to those hitherto adopted, which, although perhaps more scientific, are yet difficult and almost useless until he has acquired some experience in the science. Perhaps this is is not better illustrated by any order than *Cruciferæ* (*Brassicaceæ*), in which, according to the Synopsis of Dr. Lindley, (the one most generally and deservedly made use of), the student has first to determine to which of the sub-orders his plant is referable, these divisions being founded upon the position and direction of the radicle and cotyledons; as,—

*Pleurorhizeæ*,...Radicle applied to the edges of the cotyledons.

*Notorhizeæ*,.... Radicle applied to the back of the cotyledons; cotyledons flat.

*Orthoploceæ*,.. Radicle applied to the back of the cotyledons; cotyledons folded lengthwise.

To arrive at this determination is often a matter of no small difficulty and uncertainty, and indeed, in many cases, cannot be effected without very careful dissection and microscopic assistance; and unless the plant in question can be satisfactorily classed under one of these (the sub-orders), no assistance can be obtained by reference to the "tribes," since the distinguishing characters of those ranked under *Pleurorhizeæ*, are also common to *Notorhizeæ* and *Orthoploceæ*.

For the purpose then of assisting in the removal of these difficulties, and more easily determining the names of genera and species, whenever either are unusually numerous, I have applied the arrangement here introduced to the natural orders *Cruciferæ*, *Labiatæ*, *Leguminosæ*, *Umbelliferæ*, *Graminaceæ*, the genus *Carex*, &c. &c., as perhaps offering more difficulties than any others that come under the observation of the student of English Botany.

The application of the following tables is sufficiently obvious; it is only necessary to begin by comparing the plant (of which the generic name is required) with the characters given in the first binary division, A, from whence reference is made to other divisions, until its correspondence with the essential features there expressed at once points out its name. Thus, in the cruciferous genus *Barbarea*, it is readily seen that it possesses the peculiarities contained in the second line of the first division; which, having the letter B affixed to it, indicates that a further description is contained in the division of that name; here it is but necessary to determine whether the sepals of the plant are patulous or connivent, when the former being found to be the case, it is only required to pass to the division pointed out by the letter placed against the line, when the genus becomes determined, its name being found on the same line with the corresponding description. In the instance I have quoted, as in all genera of the order *Cruciferæ*, it is requisite firstly to determine to which of the sub-orders it appertains.

## *CRUCIFERÆ.*

(*BRASSICACEÆ*, Lindl.).

This order comprehends the plants which fall under the Linnæan divisions of *Tetradynamia Siliquosa* and *Siliculosa*.

### SUB-ORDERS.

Fruit a *Siliqua*............................𝔄.
Fruit a *Silicula*...........................𝔅.

### 𝔄.

| | | |
|---|---|---|
| A. | Siliqua sub-articulated, valveless................. | *Raphanus.* |
| | Siliqua not articulated............................ | B. |
| B. | Sepals gaping or patulous.......................... | C. |
| | Sepals erect or connivent.......................... | H. |
| C. | Siliqua 4-angled................................... | *Barbarea.* |
| | Siliqua nearly cylindrical......................... | D. |
| D. | Stigma quite entire................................ | E. |
| | Stigma notched..................................... | F. |
| E. | Siliqua declinate, short, and turgid............... | *Nasturtium.* |
| | Siliqua erect, nearly cylindrical.................. | *Sisymbrium.* |
| F. | Flowers white or purplish.......................... | *Cardamine.* |
| | Flowers yellow..................................... | G. |
| G. | Seeds in one row................................... | *Sinapis.* |
| | Seeds in two rows.................................. | *Diplotaxis.* |
| H. | Calyx with two sacs at the base.................... | I. |
| | Calyx equal at the base, or nearly so.............. | L. |
| I. | Glands between the short stamens and ovary... | *Hesperis.* |
| | Glands on each side of the short stamens...... | K. |
| K. | Lobes of the stigma spreading, flowers yellow.. | *Cheiranthus* |
| | Lobes of the stigma connivent, flow. purplish.. | *Matthiola.* |
| L. | Stigma notched..................................... | M. |
| | Stigma quite entire................................ | O. |
| M. | Siliqua lanceolate, purplish flowers............... | *Dentaria.* |
| | Siliqua 4-angled, flowers white or yellow....... | N. |
| N. | Calyx lax, flowers white........................... | *Alliaria.* |
| | Calyx closed, flowers yellow....................... | *Erysimum.* |
| O. | Flowers yellow, seeds globose...................... | *Brassica.* |
| | Flowers white, seeds oval.......................... | P. |
| P. | Seeds in one row in each cell...................... | *Arabis.* |
| | Seeds in two rows in each cell..................... | *Turritis.* |

## B.

| | | |
|---|---|---|
| A. | Silicula jointed | B. |
| | Silicula not jointed | C. |
| B. | Filaments simple | *Cakile.* |
| | Four filaments forked | *Crambe.* |
| C. | Silicula one-celled | *Isatis.* |
| | Silicula two-celled | D. |
| D. | Silicula valveless, crested or wrinkled | *Coronopus.* |
| | Silicula two-valved | E. |
| E. | Silicula entire | F. |
| | Silicula notched at its apex | N. |
| F. | Cells one or two seeded | G. |
| | Cells three, four, or many seeded | H. |
| G. | Cells one-seeded, silicula nearly round | *Glyce.* |
| | Cells two-seeded, silicula elliptical | *Hutchinsia.* |
| H. | Cells three or four seeded, style leaf-like | *Carrichtera.* |
| | Cells many-seeded | I. |
| I. | Silicula nearly flat | K. |
| | Silicula ventricose | L. |
| K. | Petals entire | *Draba.* |
| | Petals bifid | *Erophila.* |
| L. | Flowers yellow | *Camelina.* |
| | Flowers white | M. |
| M. | Silicula turgid, style very short | *Cochlearia.* |
| | Silicula compressed, style absent | *Subularia.* |
| N. | Seeds numerous | O. |
| | Seeds one or two in each cell | P. |
| O. | Silicula winged | *Thlaspi.* |
| | Silicula wingless | *Capsella.* |
| P. | Two petals larger than the remaining ones | *Iberis.* |
| | Petals all equal | Q. |
| Q. | Filaments with a scale on their inner sides | *Teesdalia.* |
| | Filaments not scale-bearing, cells 1-seeded | *Lepidium.* |

## *SCROPHULARIACEÆ.*

| | | |
|---|---|---|
| A. | Stamens 5, fertile, corolla rotate | *Verbascum.* |
| | Stamens 2 | *Veronica.* |
| B. | Ovary 2-seeded | *Melampyrum.* |
| | Ovary many-seeded | |
| C. | Calyx 4-fid | D. |
| | Calyx 5-fid | E. |
| D. | Calyx ventricose, inflated | *Rhinanthus.* |
| | Calyx close | F. |
| E. | Upper lip of corolla notched | *Euphrasia.* |
| | Upper lip of corolla entire | *Bartsia.* |
| F. | Fruit 2-celled, calyx ventricose | *Pedicularis.* |
| | Fruit 2-celled, calyx close | G. |

| | | |
|---|---|---|
| G. | Corolla campanulate | H. |
| | Coralla not campanulate | I. |
| H. | Corolla ventricose, 4-lobed | *Digitalis.* |
| | Corolla nearly equal, 5-lobed | *Limosella.* |
| I. | Corolla rotate | *Sibthorpia.* |
| | Corolla not rotate | J. |
| J. | Corolla spurred | *Linaria.* |
| | Corolla not spurred | K. |
| K. | Corolla globose, inflated | *Scrophularia.* |
| | Corolla oblong, gibbous at the base | *Antirrhinum.* |

I have placed the genus *Verbascum* in the order *Scrophulariaceæ*, although it is still referred by many high authorities to the nearly-allied family of *Solanaceæ;* the grounds of division between the two are but weakly marked, and this genus certainly presents a nearly equal affinity to both; although, like *Celsia*, it may justly be considered as the connecting link between the two, yet some of its relations appear to be more with the former than the latter. The principal scrophularinaceous features of the genus consist in the general habit, straight *embryo* and imbricated *corolla*, the irregularity of the latter organ not being included, some of the true *Solanaceæ* presenting this peculiarity, as *Hyoscyamus* and its allies. The chief points in favour of referring *Verbascum* to the latter family are its pentandrous stamens, and 5-lobed *corolla;* and the former character is but of secondary importance, as in *Digitalis* there is an attempt to produce five stamens, the only point of difference being that the fifth is generally abortive.

## *LABIATÆ.*

### (*LAMIACEÆ*, Lindl.)

This order corresponds very nearly to the Linnæan group *Didynamia Gymnospermia;* two genera, *Lycopus* and *Salvia*, alone forming the exceptions.

| | | |
|---|---|---|
| A. | Stamens two | B. |
| | Stamens four | C. |
| B. | Calyx 5-fid, filaments entire | *Lycopus.* |
| | Calyx 2-lipped, filaments forked | *Salvia.* |
| C. | Corolla regular, or nearly so | D. |
| | Corolla distinctly labiate | E. |
| D. | Calyx 5-toothed, equal | *Mentha.* |
| | Calyx 2-lipped | F. |
| E. | Flowers imbricated, with coloured bracts | *Origanum.* |
| | Flowers loose | *Thymus.* |
| F. | Upper lip of corolla truncated | G. |
| | Both lips present | H. |

| | | |
|---|---|---|
| G. | Upper lip very small | *Ajuga.* |
| | Upper lip deeply bifid, segments distant | *Teucrium.* |
| H. | Calyx 2-lipped | I. |
| | Calyx not 2-lipped | K. |
| I. | Calyx 5-fid | L. |
| | Calyx 2- or 4-fid | M. |
| K. | Filaments 2-forked | *Prunella.* |
| | Filaments not forked | *Melissa.* |
| L. | Flowers verticillate | *Melittis.* |
| | Flowers solitary | *Scutellaria.* |
| M. | Divisions of calyx equal | N. |
| | Divisions of calyx unequal | O. |
| N. | Upper lip of corolla crenate | *Ballota.* |
| | Upper lip of corolla bifid | *Marrubium.* |
| O. | Anthers with white opaque dots | *Leonurus.* |
| | Anthers without dots | P. |
| P. | Lateral segments of corolla reflexed | *Stachys.* |
| | Lateral segments of corolla not reflexed | Q. |
| Q. | Upper stamens longer than the lower | *Nepeta.* |
| | Upper stamens not the longest | R. |
| R. | Upper lip of corolla crenate | *Galeopsis.* |
| | Upper lip of coralla entire | *Lamium.* |

*(To be continued).*

Art. VII.—*Observations on a rare British Dolphin.* By Thomas Wright, Esq., M.R.C.S., Lecturer on Anatomy and Physiology.

Impressed with the value of every new fact illustrative of the organisation, history, and geographical range of British *Cetacea*, I send for insertion in your Magazine the following observations on a rare species of dolphin, *Delphinus Tursio*, shot near Torquay. The individual now before me is the second or third specimen of this species which has been captured within the geographical limits of the British *Fauna*.— The fact that troops of four or five individuals are frequently seen in company off the southern coast of Devon, sanctions the inference that *Delph. Tursio* ought to be considered as an indigenous species; whilst a probable reason for its extreme rarity may be found in the enormous locomotive powers which it possesses, swimming with inconceivable velocity in pursuit of prey, or seeking temporary refuge in the silent depths of the ocean on the most distant appearance of an enemy.

The capture and preservation of this specimen I regard as an acquisition to British Zoology, inasmuch as it may serve to clear up some doubts as to the identity of the small bottle-nose whale of Hunter, and *Delph. Delphis* of the schools; and likewise whether *Delph. truncatus* of Montague is the *Delph. Tursio* of Fabricius, or ought rather, from the shortness of its muzzle, to be referred to the *Phocæan* of Cuvier.

On the 3rd of September, 1838, whilst the Rev. Mr. Kinsey and a party were sailing off Torquay, they observed four cetaceans near the vessel, which were recognised to be the same that had, for several days before, been seen from the shore. As the party approached them it was found that one of the troop had got partially entangled in the line of a net; and W. Loudon, the Rev. Mr. Kinsey's servant, succeeded in lodging a ball in the left side of its head, and others in different parts of the trunk; the vital fluid flowed profusely from the wounds, and the piteous sobs and moans of their victim announced that the conflict had been fatal to the vanquished. At the commencement of the rencontre, the three companions of the deceased, which were about the same size, and of the same species, passed under the lines and bounded up the coast with inconceivable velocity, leaving the party several miles off in the short space of a few minutes. As soon as the vital spark was extinct, a thick rope was cast round the tail of the dolphin, and it was safely towed ashore by the united strength of seven men. The specimen proved to be a female, and measured *eleven feet in length, and five feet six inches in circumference* at the dorsal fin. It is important to note these particulars, as the salting of the skin to preserve it for exportation has caused it to shrink considerably.

The skin was first carefully dissected off, leaving the skull, fins, and tail *in situ*. The adipose layer yielded about five gallons of good oil. The skin, when freed from the *viscera*, weighed 120 lbs., and was forwarded by the Rev. Mr. Kinsey as a contribution to the Museum of the Literary and Philosophical Institution of Cheltenham. Having for some years past taken an active part in the zoological department of our Institution, the specimen was forwarded to my house for inspection; and after an attentive examination of its generic and specific characters, I decided that it was a fine female of a rare British dolphin, *Delphinus Tursio*, Fabr.

The authentic facts which we possess relating to this interesting species, considered as belonging to the British *Fauna*, being exceedingly meager, I regard the capture of the subject of this paper as a great acquisition to our knowledge of native *Cetacea*. These dolphins are frequently seen sporting in the water not far from the shore, along the coasts of Devon and Somerset; but no individual of the same species had ever been seen ashore by those who are well acquainted with the oceanic natives of the Devon coast. The only authentic notice of a species approaching in its characters the one now before me, is the individual captured in Duncannon Pool, near Stoke Gabriel, about five miles up the River Dart, in July, 1814; an account of which was published by Col. Montague in the Wernerian Memoirs,* and described by that excellent and industrious naturalist under the name of *Delphinus truncatus*. It was 12 feet in length, and 8 feet in circumference, and measured from the snout to the blowhole 14½ inches. The summits of the teeth were even with the gums, and it was of a black colour above, and whitish below; the skull, including the upper jaw, measured 20½ inches, and the breadth across the posterior molars was 5 inches; on each side there were sockets for 20 teeth; the lower jaw was longer than the upper, and contained 23 teeth on each side. The sockets were variable in size, and without order, showing that some teeth were double the size of others, and the approximation of the sockets evinces the contiguity of the teeth, so that the teeth of both jaws must have opposed their surfaces to each other.†

This imperfect sketch of Col. Montague's specimen is, I trust, sufficient to enable me to show that the cetacean captured in the Dart was not the true *Delphinus Tursio* of Fabricius, if we may be allowed to judge from a comparison of the measurement of Montague's specimen, with the fine perfect one now before me. Thus, Montague gives 12 feet in length and 8 feet in circumference as the proportional measurement of *Delph. truncatus;* that now before me was 11 feet long by 5½ in circumference: from the snout to the blowhole of the cetacean of the Dart was 14½ inches; the subject of this paper measures 16½ inches from the extremity of the *rostrum* to the centre of the breathing-hole. The teeth in Montague's were approximated; the teeth in our specimen are set in distinct *alveoli* at definite intervals apart from each other: the teeth in *Delph. truncatus* were unequal, some being double the size of others; those in our specimen are equal in volume throughout, except the two anterior of both jaws, which appear to have recently pierced the gum: the teeth of *Delph. Tursio* lock into each other, although they have frequently opposed their surfaces, as indicated by the worn appearance which their blunt summits present. From the dissimilarity in the specific characters shown by this parallel,

* Vol. iii. page 75. *tab.* 3.

† Fleming's 'British Animals,' page 35.

it is a question with me how far we are justified in regarding, as some have done,* the cetacean captured in the Dart as identical with the *Delph. Tursio* of Fabricius.

The whale caught in the Severn near Berkeley, and forwarded by the immortal Jenner to the equally immortal John Hunter, and described and figured by the latter in the 'Philosophical Transactions'† under the name of "the small bottle-nose whale," is, I think, on comparing the figure with our specimen, not *Delph. Delphis,* as supposed by Hunter‡ and Fleming,§ but the *Delph. Tursio* of Fabricius. In fact Hunter's figure‖ of his small bottle-nose whale is a tolerable representation of our specimen; the dorsal fin in his drawing is, however, placed nearer to the muzzle than the tail, whereas in our specimen that organ is situated six inches nearer to the tail than the *rostrum:* another error consists in the situation of the pectoral fins, which, in the specimen, are closely approximated to the angle of the lower jaw, and placed very low down; but they are figured at a considerable distance from those parts; and the body, from the dorsal fin to the tail, is not so conical as in the preparation. The eye is likewise placed rather too high, and the convexity of the frontal eminence is not sufficiently defined.

Not having at the present moment an opportunity of referring to Professor Bell's beautiful volume on 'British Quadrupeds, I am unable to state whether that excellent naturalist has added any new facts to our knowledge of *Delph. Tursio* since the appearance of Professor Fleming's Synopsis. I have drawn up with great care the accompanying table, and only regret that it has not been in my power to add more that is really new concerning the internal organisation of this rare British cetacean.

DESCRIPTION.—The body was of a bright bluish black above and along the flanks, and of a pure white beneath. The diameter of the body gradually increases from the neck to the anterior origin of the dorsal fin, where it attains its *maximum.* At the posterior root of that organ the circumference is less, and from this point to the origin of the caudal fin it becomes more and more slender. A section of the body made at the dorsal fin would represent an elongated cone, with its *apex* turned backwards.

* Fleming's 'Br. Animals.' Turton & Kingston's 'Nat. Hist. of Devon.'
† 'Phil. Trans.' 1787, p. 450, *tab.* 18.
‡ 'Phil. Trans.' lxxvii. *tab.* 18.
§ 'Phil. Trans.' lxxvii. 1787. ‖ 'British Animals,' p. 35.

The following tables exhibit the dimensions of the stuffed specimen.

### Body.

| | FT. | IN. |
|---|---|---|
| From the extremity of the muzzle to the termination of the caudal lobes | 8 | 10 |
| Circumference of the neck | 3 | 8 |
| Ditto at the anterior origin of the dorsal fin | 4 | 6 |
| Ditto at the posterior root of ditto | 4 | 1 |
| Ditto midway between the dorsal and caudal | 2 | 7 |
| Ditto at the origin of the caudal lobes | 1 | 2 |

### Head.

Forehead convex; from its base the superior *maxillæ* are abruptly developed to form a slender elongated muzzle, with a blunt rounded extremity, and having a slight inclination upwards.

| | FT. | IN. |
|---|---|---|
| Length from the *symphysis*, over the frontal eminence, to the posterior boundary of the blow-hole | 1 | 4½ |
| Length of the *rostrum* | „ | 4½ |
| Ditto from the base of the frontal eminence to the blow-hole | 1 | 0 |
| Ditto across the forehead to the base of the upper jaw | 1 | 5 |
| Circumference of the *rostrum*, mouth closed | 1 | 3 |
| Length of the upper *maxilla* from the last molar to *symphysis* | „ | 11½ |
| Width across the last superior *molares* | „ | 4¾ |

### Lower Jaw.

The inferior *maxilla* is half an inch longer than the upper; its branches are slightly arched upwards, and gradually approach to form a blunt beak at the *symphysis*.

| | FT. | IN. |
|---|---|---|
| Length from the last molar to the *symphysis* | 1 | 0 |
| Width across the last inferior *molares* | „ | 4¼ |

### Teeth

In the right superior *maxilla* 21; in the left 19, and two empty sockets. In the lower jaw there are 21 in each *ramus*.

### Eye.

This organ is placed nearly in a line with the angle of the mouth, and immediately below the nostrils; the eye-lids are 1¼ inch in diameter; and the distance from the inner angle of the eye to the extremity of the muzzle is 14 inches; from the upper eye-lid to the centre of the blow-hole is 7½ inches.

### Blow-Hole.

This aperture is situated at the summit of the head, above the orbit; the valve is of a semilunar form, the convexity of which looks backwards, and is 1 inch in length and 1¼ in breadth.

### ANTERIOR EXTREMITIES.

These organs of locomotion are situated very low down towards the under part of the *thorax;* and are—

| | FT. | IN. |
|---|---|---|
| Distant from the extremity of the muzzle | 1 | 9 |
| Length of the anterior fin | 1 | 4 |
| Breadth of the *carpus* | „ | 6 |
| Circumference of ditto | 1 | 1 |

### DORSAL FIN.

This organ rises about the middle of the back, but rather nearer to the tail than the snout; it is of a triangular form, inclined backwards, convex along its anterior and concave at the posterior border. The anterior root emerges, by a thick fold of the common integument, at the distance of 3 feet 10 inches from the extremity of the muzzle, whilst its posterior root is inserted at 3 feet 6 inches from the extreme expansion of the tail. A prominent ridge extends from the posterior root to the distance of 8 inches, where it gradually becomes lost, but rises again into a well-defined *raphe* at about 18 in. from the termination of the vertebral column. Its surface is partially notched, and it serves to separate the caudal lobes.

| | FT. | IN. |
|---|---|---|
| Length of the dorsal fin along its anterior border | 1 | 5 |
| Ditto ditto along its posterior margin | 1 | 0 |
| Expansion of the base of this organ | 1 | 4 |

### TAIL.

The caudal fin is composed of two distinct lateral lobes; each arises by a distinct root: when viewed conjointly they describe a crescent, the concavity of which is turned backwards. The extreme lateral expansion of the lobes is 22 inches, and each lobe measures from the *raphe* to its extremity, 1 foot.

CHARACTER OF THE TEETH.—Having already announced that each side of both jaws contains twenty-one teeth, it remains for me to make a few observations on the general character of these prehensile instruments, as one of the most important specific characters is obtained from their form and disposition.

The five posterior molars of both jaws are conical recurved spines, the convex surfaces of which look outwards: they terminate in sharp points, which have been but partially blunted. The remaining sixteen are conical stumps, the *apices* of which are truncated. From an attentive examination of these instruments it would appear that when the teeth originally pierced the gum, they had *a conical form, with sharp-pointed summits*, which have, however, been subsequently worn down by friction against their antagonists of the opposite jaw.—Although the teeth are disposed in distinct *alveoli*, set apart from each other, so as mutually to lock into the spaces which intervene between them, still nevertheless, the eleven anterior molars have lost at least one half of the original length of their crowns by this denuding process. The anterior aspect of the teeth of the lower jaw, and the posterior surfaces of those of the upper, likewise have a portion of their enamel and ivory obliquely chiselled away, in consequence of the antagonising teeth having frequently rubbed against each other. These instruments are nearly all of a uniform size throughout, and are embedded, as I have already observed, in distinct *alveoli*, at the distance of a quarter of an inch apart; the four internal incisors of both jaws are much smaller than the others, and the two central teeth appear almost rudimentary. The truncated summits of the molars look obliquely downwards and inwards; and this natural section displays to great advantage the rind of dense enamel enclosing the concentric rings of ivory. This substance, however, has lost its natural cream colour, and become much darkened from exposure to the air and water.

It may be very justly asked, how does it happen that teeth which lock into corresponding spaces of the opposite jaw, become thus blunted? To solve the problem it was necessary that a careful examination should be made of the form of the *condyles* of the lower jaw, and the glenoid cavity of the temporals; for it is evident that in order to effect the abrasion which I have described, it was necessary that the teeth should have frequently opposed their crowns to each other, and that there may be in the articulation of the lower jaw of this species a special provision for vertical and lateral movement; and it may likewise admit of motion in the antéro-posterior direction. In consequence of the condition of the parts concerned in these movements when I received the specimen, it was impossible to ascertain their anatomical structure.

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Since the above was written, I have had an opportunity of consulting the 4th vol. of Palmer's edition of Hunter's works, with notes by Professor Owen. At page 334 that learned anatomist observes,—"the small bottle-nose whale of Hunter is not the common dolphin, *Delphinus Delphis*, Linn., but the *Delph. Tursio*, Fabr., as is shown by the skull and other parts which are preserved in the Hunterian collection, as well as by the size of the specimen which Hunter describes."

| *Delphinus Delphis*, Linn. | *Delphinus Tursio*, Fabr. |
|---|---|
| Is from *six* to *seven* feet in length, and has in each side of each jaw from 42 to 47 sharp conical teeth. | Is from *ten* to *eleven* feet in length, and has in each side of each jaw from 21 to 23 teeth, generally blunted by friction. |

Professor Bell's 'British Quadrupeds' has likewise come to hand. His figure, which is a reduced copy of Hunter's, is liable to the objections already made to the original. Another instance of the occurrence of this species in our seas is adduced on the authority of Jenyns; it was taken in the river at Preston, and was 11 feet in length, and 7 feet 4 inches in circumference. Prof. Bell has admitted with doubt the identity of this species with the *Delph. truncatus* of Montague. It has afforded me much pleasure to find that the views of these learned zoologists harmonise with the opinions I had formed from the careful examination of the individual which forms the subject of the present paper, before I became acquainted with the sentiments recorded in their respective works just quoted.

*Nuneham House, Cheltenham,*
*October 8th*, 1838.

ART. VIII.—*Notes on a few British Plants.* By MR. GEORGE LUXFORD, A.L.S., &c.

ALLOW me to make a few remarks on some of the plants mentioned by Mr. Cooper, in his 'Details of the First Excursion of the Botanical Society of London, &c.,' at page 556 of this Magazine.

*Teesdalia nudicaulis.*—I am rather surprised that no more than one specimen of this pretty little plant should have been met with; as, though rather rare, it is generally plentiful where it does grow. I have seen one or two dry places on Reigate Heath quite covered with it in the month of May.—I once met with it in a very unusual state on Perry Barr Common, in Worcestershire; the erect, central stalk varied in height, in different specimens, from four to six inches; the radical leaves were present, but not one of the procumbent stems which usually surround the naked stalk.

*Lycopodium Selago.*—This species is recorded by Dillenius, on the authority of Mr. Manningham, as having been found "in ericetis inter Godalmin et Wakehurst, comitatus Sussexiæ;" (Ray's Synopsis, 106): and I have heard of its occurrence, although sparingly, on Leith Hill Common, in Surrey. The only place where I have ever observed it in any quantity is a very wet bog on Moseley Common, in Warwickshire; where, some years ago, I collected exceedingly fine specimens.

It is rather singular that this plant should not be mentioned in Turner and Dillwyn's Botanist's Guide, seeing that Ray (*l. c.*) says it grows "on Snowdon, Cader Idris, and the other high mountains of Wales, as also the mountains of the Peak in Derbyshire, Ingleborough in Yorkshire, &c.;" to which Dillenius has added the locality above quoted.

*Lycopodium inundatum.*—Mr. Cooper says,—"I do not see any reason why *Lycopodium inundatum*, which is so plentiful on Wimbledon and other commons around London, should not be found on Woking common, as the sub-soil and situation is very similar." There are many plants of which the same remark may be made. Why should *Dianthus Caryophyllus* adorn one part of the ruinous walls of Rochester castle, where it has been growing at least a hundred and seventy years, and not a single specimen be seen on other parts of the same walls? Why should *Phyteuma orbiculare* and *Campanula glomerata* occur in some limited districts on the Surrey chalk hills, and not throughout the whole range?—Why should the lovely *Parnassia palustris* grow, as I have seen it growing, in profusion, in one particular part of a particular bog, and not an individual make its appearance in any other spot for miles round, notwithstanding numerous localities, apparently equally well adapted for its growth, occur within a few feet of the favoured one?

There is, indeed, something inexplicable in what may be termed the capriciousness of plants in their choice of habitats; for that they do exercise a choice no one, I think, who has studied them in the field, can reasonably doubt. A thousand instances might be adduced to prove this; but, in addition to those above cited, I will only mention a few of the many which have come under my own observation in the course of the past season.

The elegant *Statice spathulata* is recorded by Ray (Syn. 202) on the authority of Mr. Dale, as growing "at Ramsgate, in Kent." It still grows, in great luxuriance, on one part of the chalk cliff between Ramsgate and Broadstairs, and is there seen in such profusion as completely to cover several yards of the face of the cliff, while on each side of this space not a specimen is to be met with. Again, *Crithmum maritimum* has long been known to grow on the chalk cliffs of the

Kentish coast, but it is only in certain places that it occurs; as at the eastern side of Eastwear Bay, and at Lydden Spout, both localities between Folkstone and Dover, and in both it is associated with *Statice spathulata.* Reigate Hill again is a recorded locality for *Ajuga Chamæpitys;* but there I never could meet with it, although it has been found on Buckland Hill, to the west of Reigate, and eastward it grows most abundantly in almost every field about Cobham, in Kent. The name of this place reminds me of another illustration in the exceedingly rare *Althæa hirsuta,* which was recorded as growing near Cobham nearly fifty years ago, and there it still grows, and has never been found in any other part of the kingdom.

But amidst all this capriciousness in their choice of stations, most plants evince such constancy in their attachment to particular soils, as would prove them to be mutually adapted to each other. Take for example the genus *Arenaria,* the very name of which is expressive of the attachment of most of its species to a sandy soil, although this will not hold good with all. *Aren. peploïdes* and *marina* are confined to the sea-coast and its immediate vicinity, and do not ever occur inland.—*Aren. rubra,* on the other hand, grows in barren sandy soil inland, and sometimes in such quantities that the ground is rendered quite purple with its blossoms. The favorite habitats of *Aren. serpyllifolia* are the driest places, such as wall tops and sandy fields; on the contrary, *Aren. trinervis* delights in moist, shady, hedge-banks. The only known British station for *Aren. ciliata* is on the limestone cliffs of a mountain in Ireland; while *Aren. verna* is found among fragments of quartz, &c. on high mountains in the north of England, Wales, and about Edinburgh, but not in the west of Scotland: and its near ally, the pretty little *Aren. rubella,* seems to be peculiar to the Breadalbane range in the Highlands of Scotland.

There are, it is true, many plants which appear to be common to situations the most opposite and soils the most dissimilar; but such species must be regarded merely as offering exceptions to the general rule. Thus, to take for illustrations some of our native *Orchidaceæ,* while we find the *Orchis maculata* delighting equally in dry hilly ground and in the wettest bogs, no botanist would ever dream of searching for *Orchis pyramidalis, O. fusca,* or *Ophrys apifera* in low damp meadows, or expect to find *Orchis latifolia, Liparis Lœselii,* or *Malaxis paludosa,* on dry chalk or limestone hills.

There are also many other circumstances connected with plants, which are quite as inexplicable as their choice of habitats. One of these is their alternate abundance and scarcity in localities where certain species may always be found. On Reigate Hill I have sometimes seen *Ophrys apifera* and *Gymnadenia conopsea* (and particularly the latter) so abundant as hardly to allow of a step being taken without some of them being crushed by it; and perhaps the very next year, although the season might be apparently equally well adapted for their developement, they would be but thinly scattered over ground where they had previously abounded. Others again, as many annuals, show themselves in plenty one season, then disappear, and are not again seen for many years. In 1836 I found *Silene Anglica* growing all over a sandy field near Reigate Heath; I have been informed that it has not been seen there since: and in 1837, Robert Hudson, Esq., of Clapham Common, and myself, observed *Centaurea solstitialis* in tolerable plenty, in a clover field near the St. Ann's Society schools, at Brixton; this year it has not appeared.

These instances will, I think, abundantly prove that we have yet much to learn concerning the laws which regulate both the geological and the geographical distribution, not only of *Lycopodium inundatum*, but also of many other plants of our own country.

*Calluna vulgaris* β.—This variety is by no means uncommon. I have observed it growing in many places; among others, in the Sussex forests, and, if my memory do not deceive me, on Wandsworth Common: but nowhere have I met with it in such profusion and beauty as on Moseley Common before mentioned. In many parts of this Common it is quite as plentiful as the more usual state of the plant. The great degree of pubescence does not in the *Calluna*, as in hairy varieties of many other naturally smooth plants, appear to depend on its growing in a drier place than usual, since I have noticed this variety in moist as well as dry situations, and equally hairy in both.

My botanical visits to Moseley Common were generally made in the morning, sometimes leaving Birmingham as early as 3 o'clock. On one occasion my attention was attracted by the appearance of water, at a spot where I knew there was no water the last time I was there. On arriving at the spot, I found that the appearance was occasioned by the rays of the morning sun being reflected from a very heavy autumnal dew, lying on the hoary ling, which at this place quite covered some gently rising ground.

*Calluna vulgaris*, in all its states, is a very elegant plant.

The red and the white flowered varieties, with their smooth, deep green, closely imbricated leaves, are pretty and delicate; —the hoary variety is very beautiful, although not possessing the exquisite silvery appearance of the stems and under side of the leaves of *Alchemilla alpina* and *Potentilla argentea*; —but of all the varieties the pre-eminently lovely one is that with double red flowers. This variety has been found wild in Cornwall: a specimen in my herbarium has its branches covered, for nearly their whole length, with the closely crowded flowers; and sweeter miniature resemblances of wreaths of roses cannot be conceived.

The mention of *Calluna vulgaris* reminds me of a curious accidental variety of *Erica Tetralix* which I met with some years since, on Perry Barr Common. Each of the corollas was divided, nearly to the base, into several irregular segments, but the stamens remained unchanged in form. A few weeks afterwards I observed several of the *Ericæ* in the conservatory of the Birmingham Botanic Garden, with their corollas divided in a similar manner.

*Orchis Morio.*—In my Reigate Flora I have recorded the circumstance of finding some specimens of this *Orchis* with white flowers. I believe, like most persons when speaking of varieties of birds &c., of a colour lighter than usual, that I called them *white*, because they were not *black*; cream-coloured or fawn-coloured would perhaps have been more correct.

Mr. Cooper will find that although his variety of *Orchis Morio* may not have been specially recorded in any Flora, botanists have long been acquainted with great variations in the colour of the flowers. John Bauhin calls it "*Orchis* minor purpurea, et *aliorum colorum*, cum alis virentibus."—Historia, vol ii. 761, published in 1650. Ray says, "Florum color purpureus, rarius *carneus* aut *albus*."—Synopsis, 377, 2nd ed., 1724. Relhan also observes,—"Flores dilutè purpurei, *carnei* vel *albi*."—Fl. Cantab., p. 359, 3rd ed., 1820. and lastly, Sir J. E. Smith describes them as being "scentless, purple; sometimes *pale* or *flesh-coloured*; sometimes varying to *crimson*, or to a *light violet*; but the numerous *green* ribs of the calyx-leaves are equally strong in all the varieties."—Eng. Fl. vol. iv. p. 11. In my light-coloured specimens the ribs of the calyx were *pink*.

*October 2nd*, 1838.

Art. IX.—*On Spontaneous Generation.* By W. Weissenborn, Ph. D.

I hope I may be allowed to return once more to the subject of spontaneous generation, in consequence of the objections which Mr. Edward Blyth has raised (see the September No. Mag. Nat. Hist.), p. 507). against the views expressed by me in the July No. of this Journal.

Mr. Blyth first mentions a case where seeds of *Chrysanthemum segetum*, capable of germinating, were found in clay under a stratum of peat earth fourteen feet thick. Without taking into account that the yellow ox-eye or corn-marigold is one of the hardiest and most common weeds, the seeds of which might possibly have been flooded into the clay during the tedious operations of draining and paring such a layer of peat, and of trenching the clay, (particularly as it is stated, that a great part of the peat-bog in question *had been flooded away by raising water from the river Teith*, and discharging it into the Forth, the under soil of clay being then cultivated) such an exceptional case would only tend to confirm the general rule, that healthy seeds of plants are *not* promiscuously found, either in the deeper or more superficial strata of the earth. Two years ago I had an opportunity of inspecting the various samples of materials, as they were successively brought to the surface out of an Artesian well sunk in this neighbourhood to the depth of 560 feet; but I discovered in them no traces of seeds. The two deep sandy strata lately discovered in Hanover, (on which I reported in a former No. of this Magazine), samples of which, taken from different depths, were subjected to the most accurate microscopic investigation, both at Göttingen and in Berlin, consisted of the *testæ* of animalcules, with an occasional admixture of fir-pollen; which proves that the surface of the earth was covered with vegetation during the formation of some parts of these banks, yet no trace of any seed was found in them. This is what we might have anticipated, by considering what may become of the seeds of plants, as they are successively scattered from their parents. Those that remain near the surface must either germinate or be decomposed; such as are washed underground must either be petrified or preserved (as by the tannin of peat water), or be decomposed by slow chemical agency, unless in some instances they become imbedded in *media* of a neutral nature, which would dry quickly, where they might remain, as if in good cellars or dry vaults, for an indefinite period, just as we now and then find a living toad in a solid rock. But I trust these rare cases do not justify a general conclusion as to the means which nature employs for the preservation of plants or animals.

I have not alluded to any instances of plants being produced or transported to other localities in the ordinary manner, or by known means, as I did not wish to lengthen my article by the enumeration of observations which could not contribute to render my views of the subject more plausible; though had I been aware of any fact in the whole range of ordinary generation, which could altogether exclude the spontaneous mode, I should not have undertaken to support the latter.—But unless such a fact or facts be brought forward, I shall adhere to what I think both rational and probable.

As to the necessity of animals which require to be tended by a parent being first called into existence in the adult state, I perfectly agree with Mr. Blyth; nor do I see any reason why a plurality of individuals, comprising the two sexes, should not have originated at the same time in the same place. The necessity of this latter condition is, however, not *absolute*. As the female organism is plainly the connecting link between the male organism and nature, we are rationally led to suppose that only females were produced by spontaneous generation, with reference to such animals as present distinct individuals of different sexes. In these the creative *conatus* may have proceeded to give rise to spontaneous conceptions, which, on account of the symmetrical structure and antagonism of the two lateral halves of the primary organism, were perhaps those of twins, of different sexes. In the hermaphroditical animals and plants this higher power of creative developement may have followed an exogenous direction, whilst the 21st, 22nd, and 23rd botanical classes of Linnæus present different modifications of the same principle. It is not, however, my intention to expatiate on such mere suppositions, and I am induced to enter even so far into the subject, only to give some reason why, in my opinion, M. Turpin was not quite warranted in shouting "*Io triumphe!*" when he discovered an egg in the newly-formed adult *Acarus horridus* of Mr. Crosse.

With reference to Mr. Prichard's observation,—"It would be easy to discover districts situated respectively in North America and in Europe, or in Equinoctial America, Africa, and Asia, in which all the same physical conditions exist, namely, a parallel temperature and elevation, a similar soil, and the same degree of humidity in the atmosphere,—yet the species of plants in these several districts will be far from being identical; the vegetable tribes will present, in each respectively, analogies of form and general character; but few, if any, of the same species will be found in localities thus separated;"—there can hardly be brought forward an argument which proves more in favour of the *generatio æquivoca*, for had plants been propagated on the surface of the earth by gradual migration from one locality adapted to their nature, to another, we should find the *very same* species in *every* place that "exists under the same physical circumstances;" whereas we find only *analogous* plants in *similar* places, because, though there are many places in America much like others in Europe, so far as geological and climatic conditions go, yet the telluric influences are far from being identical; and we need only advert to the difference of situation with respect to the magnetic poles to make this sufficiently apparent. Yet these localities are quite as well adapted to *propagating* the species brought thither from similar localities.

Nor do I see why the migrations of animals and plants, which have retained their specific characters, from one continent to the other, and where human agency has been employed, can militate against the doctrine of spontaneous generation. Although, for example, the present continent of Africa has not been able to produce a tapir, yet, if a couple of this species were transported to some favourable locality there, and to thrive and propagate, this fact could never be brought forward as proving that the tapir might as well be an aboriginal species of one continent as the other.

I hope Mr. Blyth will allow that Cuvier's remark,—"La vie exerçant sur les élémens qui font à chaque instant partie du corps vivant, et sur ceux qu'elle attire une action contraire à ce produiraient sans elle les affinités chimiques ordinaires, il repugne qu'elle puisse être elle-même produite par ces affinités, et cependant l'on ne connaît dans la nature aucune force capable de réunir des molécules auparavant séparées," cannot be fairly opposed to the grounds on which I have ventured to support the *generatio spontanea;* for I have distinctly alluded to that extra force of which Cuvier says we know *nothing*, and cannot therefore be suspected of thinking that the common chemical affinities can ever produce an organized body. We know that magnetism, galvanism, and common electricity, are either mere modifications of the same power, or determine each other: we know that there is a constant electrical and magnetic tension, both in the solid crust of the earth and in the atmosphere; that the metallic veins (as shown by Mr. I. W. Henwood), the plants, (as lately confirmed by Mr. Golding Bird), and the animals (as proved by Mr. Matteucci), are pervaded by electrical or galvanic currents; that there is a telluric as well as an animal life, which prevents the fluids in the earth, as animal life does the animal organization, from obeying the same chemical laws as when taken out of their natural vessels: and lastly, that the primary animal organizations, which are the seat of galvanic currents, give rise to secondary or parasitic growths and animals; whereas many observations tend to prove that the earth is still productive of plants, without their seeds pre-existing in it, and the more I consider these premises, the more am I led to the conclusion, not only that every organic body owes its existence in the first instance to what is called spontaneous generation, but also that magnetism, galvanism, and electricity are the forces which, with the co-operation of other imponderables, make organic matter combine into organic arrangements.

*Weimar, October 4th,* 1838.

ART. X.—*Letter from* JOHN DALRYMPLE, ESQ., *in Reply to Mr. Wallace's Remarks at page* 553.

MY Dear Sir,

I perceive in the last Number of your 'Magazine of Natural History,' a paper entitled a reply to Mr. Dalrymple, "on an undescribed Muscle in the Eyes of Fishes." Allow me space for a few observations, in order that I may put myself right with regard to the somewhat angry remarks of Mr. Clay Wallace, of New York, the author of this reply.

I wish that gentleman had rightly copied the title of my paper,—("Some account of a Peculiar Structure in the Eyes of Fishes"), since I appear, by this error of Mr. Wallace, to be involved in the absurdity of calling that an "undescribed muscle," three descriptions of which by others, I quote in my paper.

The *gravamen* of Mr. Wallace's charge against me, is, that having shown the preparations of this structure, made by me many years ago, to some gentlemen from, or going to, America, then studying at the Ophthalmic Hospital in Moorfields, I had suspected, in consequence of a paper sent to me from New York about two years since, that Mr. Clay Wallace, the author, was one of those gentlemen to whom the exhibition was made. Mr. Wallace says he is not an American, and consequently the American gentlemen are exempt from this suspicion. Be it so. That I should, however, have conceived that Mr. Wallace, residing in, and attached to one of the public establishments of, New York, was an American either by birth or adoption, was at least a very pardonable mistake, and one that involved him in no disgrace. He has, however, retaliated on me by suspecting that I had read and copied, without acknowledgement, the observations made by him in Silliman's Journal in 1834. My answer is that I have never seen that Journal, nor did I know anything of Mr. Wallace's dissections until I received an abstract of his paper, which I quoted at some length in the March number of your Magazine for this year. And further, that *my* dissections were made two years or more previous to the date of Mr. Wallace's paper in Prof. Silliman's Journal.

In conclusion,—as I find Mr. Wallace has distinctly denied, in a recent number of Silliman's Journal, having either seen or heard of my observations, I am bound in justice to relieve him from any imputation, which I am now sorry I have made. While anxious to clear myself from the suspicion of plagiary, I can do no less than withdraw that portion of my charge which relates to Mr. Wallace, in the March number of your Magazine.

I am, My dear Sir,
Yours faithfully,
JOHN DALRYMPLE.

8, *New Broad St.*
*Oct.* 3*rd*, 1838.

*To the Editor of The Magazine of Natural History.*

[We quote the following passage from Mr. Dalrymple's paper, p. 140, of the present volume. "In a number of the American Journal of Science and Arts, will be found a somewhat similar account of a *muscle*, discovered in the eye of the streaked bass, (*Perca nobilis* vel *Mitchellii*), by Mr. W. Clay Wallace, surgeon to the New York institution for the blind. This gentleman did me the favour to send me over, about twelve months since, his paper published in that journal. From the circumstance of my not being aware of being personally acquainted with Mr. Wallace, I cannot help suspecting that he is one of the Americans to whom the observations made by me, were imparted at the ophthalmic hospital, some years ago."—Mr. Wallace, by omitting in his reply the first part of the above paragraph, ingeniously makes it appear that the only foundation for Mr. Dalrymple's very natural supposition, was the publication of the original description in an American Journal; whereas it rested solely upon the circumstance of a copy of the paper in question being sent to him by a party to whom he was a perfect stranger.]—*Ed.*

ART. XI.—*Description of a new Species of* Myrmica *which has been found in houses both in the Metropolis and Provinces.* By W. E. SHUCKARD, Esq., Vice Presid. Entom. Soc., Librarian of the Royal Society.

WHEN Dr. Bostock's paper was read at the Entomological Society in November, 1836,* I was referred to for the name of the species of ant which was therein described as having infested his house, to his own and his family's great annoyance; and which had also been found in many other houses and warehouses, in the metropolis and provinces. I considered it with doubt to be the *Myrmica unifasciata*, Latr., and which I stated to have found occasionally in winter, in a winged state, in moss in woods; which led the President to suspect that it might have been brought into dwelling-houses, where it has since remained, with the fire-wood usually consumed. Since this occurred I have been led to the investigation of the insect, by another and very distinct species having been communicated to me, and I find that both are extremely distinct from the *Myr. unifasciata*, Latr., and that both are most probably of exotic and West Indian origin. The species which led me back to the subject was found in a hot-house in Chelsea, and has doubtlessly been imported with plants; but whether it still continues to be found, and has located itself permanently, I do not not know,—the specimens I have being all neuter. That the domestic one will continue with us I think may be concluded from its very wide dissemination, and the difficulty of extirpating it; as Dr. Bostock has most amply proved by the very expensive experiments he had recourse to, and which but few individuals would voluntarily undertake. The *Myr. unifasciata* is indigenous, and has hitherto occurred only at large in the country.

The following descriptions will serve to discriminate the species.

*MYRMICA*, Latr.

* *Metathorax* armed with two spines.

*Myr. unifasciata*, Latr.

*Formica unifasciata*, Latr., Hist. Nat. des Fourmis. P. 237.

Dilutè ferruginea; metathorace posticè bispinoso; abdomine luteo-ferrugineo, fasciâ nigrâ transversâ.

Length, Fem. 2 lines. Neut. 1¼ line.

The male I am unacquainted with.

*See 'Ent. Trans.' vol. ii. p. 65, and 'Journal of Proceedings,' vol. ii. p. 29.

** *Metathorax* unarmed.

*Myr. domestica*, Shuck.

Dilutè ferruginea, abdomine apice fusco.

Length, Fem. 2 lines. Neut. ¾ line.

Pale ferruginous, opaque, the *abdomen* shining, emarginate in front for the reception of the nodose peduncle, with the margin of the first, and the whole of the remaining segments, dark fuscous.

The male of this species I am also unacquainted with. Dr. Bostock's paper before alluded to gives a full account of his endeavours to eradicate this domestic intruder.

*Myr. terminalis*, Shuck.

Dilutè ferruginea, nitida, capite et abdomine nigro.

Neut. length 1 line.

Pale ferruginous, shining, the head and the *abdomen* black, the latter not emarginate in front for the reception of the nodose peduncle, but lanceolate.

I am unacquainted with both male and female of this species, which was found by my friend A. Ingpen, Esq. in a hot-house in Chelsea.—It forms a remarkable exception to the rest in the genus, from its lanceolate *abdomen*, which is not emarginate in front. I possess other minute species of this genus from various parts of the world, which I will take another opportunity of describing, not having leisure at the present moment.

31, *Robert St., Chelsea. October* 24*th*, 1838.

## REVIEWS.

Art. I.—***Introduction to the Modern Classification of Insects; founded on their Natural Habits and corresponding Organization: with Observations on the Economy and Transformations of the different Families. To which is added a descriptive Synopsis of all the British Genera, and Notices of the more remarkable Foreign Genera.*** By J. O. Westwood, F.L.S., Secretary to the Entomological Society, of London, &c. &c. London: Longman and Co. Parts 1 to 6. ***To be completed in about ten monthly parts, with about*** 130 ***Engravings in wood, each containing numerous figures, and one coloured Plate illustrative of the Orders.***

Perhaps the chief characteristic of the modern classification of every branch of zoological science, is founded upon the investigation of the natural relations existing between the various groups of species. In the Linnæan arrangement, although we may find the name of a species if known to the great

Swede, with tolerable accuracy, yet when we have done so, we have gained all the knowledge to be derived from the 'Systema Naturæ,'—which at best was but a catalogue, in which the different species were arranged with skill, but in as artificial a manner as could be desired. Fabricius, the great disciple of Linnæus, left the science in an equally artificial, but far more difficult state than in the time of his master; for having divided the great Linnæan genera into many groups which he regarded as equally entitled to generic distinction, he distributed them, if not at random, certainly without much regard to their true relations. Thus while most of the Linnæan *Scarabæi* are placed at the head of his *Eleutherata*, *Trichius* and *Cetonia* come nearly at the end. Further, all these dismembered groups presented no indication of belonging to the great groups from which they had been removed, and thus *Trichius* and *Cetonia*, for example, were each regarded as of equal rank with *Buprestis* and *Cicindela*.

Modern entomologists, on the other hand, with Latreille at their head, have endeavoured to render the science more in accordance with nature,—in the first place by establishing "Familles naturelles" for the reception of the various dismembered groups formed by Fabricius and others; and in the second place by investigating the relations existing between these various families, with the view to their arrangement in a more natural manner than they were left by Fabricius, &c. The latter part of their endeavours has rendered requisite a careful investigation of the general structure of the various species, not only in its perfect, but also in its preparatory states.

The subject is, however, so vast, owing to the immense number of species, and the difficulty of examining the more minute kinds, that hitherto but little progress has been made. The knowledge of the *larvæ* and *pupæ* of insects, (at length acknowledged to be of primary importance in establishing a natural system), has been so much neglected, as well as the investigation of the habits and natural economy of the different species, that we cannot but think that Mr. Westwood has acted judiciously in calling his work an '*Introduction* to the Modern Classification of Insects,' of which we now proceed to lay a short notice before our readers.

The work commences with observations upon insects in general, in which the views of recent authors on the extent of the class *Insecta* are discussed, and the following characters given of the group as intended to be treated upon by the author.—"Annulose animals breathing by *tracheæ*, having the head distinct, and provided in the adult state with six articulated legs, and *antennæ*, subject also to a series of moultings previously to attaining perfection, whereby wings are ordinarily developed." This definition comprises the winged insects of Aristotle; and these our author regards as especially entitled to the rank of a distinct and perfectly natural group, since their metamorphoses are attended by the ulterior developement of organs of flight, which exist in no other group of *Invertebrata*.

We perceive that Mr. MacLeay has proposed in his recently-published memoir upon Dr. A. Smith's African *Crustacea*, the theory that the *Ptilota* of Aristotle may be characterized by their change of form occurring during their last two or three stages of *Ecdysis*, while the metamorphosis of all the other *Annulosæ* only occurs during the first or second month after leaving the egg: how this theory will bear investigation has, however, yet to be proved. After determining the limits of the class of insects, a sketch of their general structure follows, occupying thirteen pages, wherein are concisely described the various organs in detail, and in which also are noticed the chief researches of modern entomologists. The chapter relative to the distribution of insects into orders, and the arrangement of these orders, occupies twelve pages, in which the systems of Swammerdam, Lamarck, Newman, Linnæus, De Geer, Fabricius, Latreille, MacLeay, Kirby and Spence, and Stephens, are reviewed, and their peculiar merits discussed. Of these systems that of MacLeay appears to the author to be the most natural, as it calls into action a greater number of relations than can be expressed by any other hitherto proposed. With some slight modifications upon Mr. Mac Leay's arrangement, the following is that adopted by Mr. Westwood.

## Class of Hexapod Metamorphotic Insects.

| Sub-Class: Mouth with Jaws. | Sub-Class: Mouth with a Sucker. |
|---|---|
| (*Dacnostomata*, W.) | (*Anthiostomata*, W.) |
| Ord. Hymenoptera. | Order Diptera. |
| ? Osculant Order *Strepsiptera*. | ? Osculant Order *Homaloptera*. |
| Order Coleoptera. | ? Osculant Order Aphaniptera. |
| Osculant Order *Euplexoptera*. | ? |
| Order Orthoptera. | Order Heteroptera. |
| ? (*Thrips*?) | ? |
| Order Neuroptera. | Order Homoptera. |
| ? | ? |
| Order Trichoptera. | Order Lepidoptera. |
| ? | ? |

Here the approach of the *Trichoptera* to the *Hymenoptera*, and of the *Lepidoptera* to the *Diptera*, the direct passage between the *Trichoptera* and *Lepidoptera*, and the analogous relations existing between the opposite orders are to be borne in mind. The places marked with doubt indicate those situations which *theoretically* remain to be filled up by the intervention of groups intermediate in their structure between the different orders.

Our author, however, instead of commencing with the *Hymenoptera*, has made the *Coleoptera* the first portion of the descriptive part of his work; and has given a long series of bibliographical references to authors, classified according to countries. The characters of the *Coleoptera* are then detailed, and the various arrangements hitherto proposed, adopting ("with proper restrictions and allowances for occasional exceptions,)" the tarsal system, dividing the *Coleoptera* accordingly into four groups, 1, *Pentamera*, 2, *Heteromera*, 3, *Pseudo-tetramera*, W. (*Tetramera*, Latr., *Cryptopentamera*, Burm.), and 4, *Pseudo-trimera*, (*Trimera*, Latr., *Cryptotetramera*, Burm.)

To this succeeds the illustration of the families of beetles, which, with the introductory matter above mentioned, occupy the six numbers already published. It is this portion of the work which will be of the greatest interest to the reader, as in addition to ample details of the structure of the perfect insect, we find almost every family illustrated by its preparatory states, many of which have never before been published, to which are added ample accounts of the natural history, economy, geograpical distribution, numerous bibliographical references, &c., with notices of all the remarkable exotic genera, a knowledge of which is requisite for a general arrangement of insects.

The generic synopsis of British insects is paged separately, and comprises short (perhaps too short) characters of the genera, and includes the synonymes of the genera, and their authors, the number of British species, the typical species, and references to the best figures published in illustration of the genera. With the exception of the coloured plate, the other illustrations, on wood, are in outline; they are, however, sufficiently characteristic, giving representations of the typical genera, with numerous details of the mouth and other organs, and of the *larvæ*: they are, perhaps, too much crowded, but the saving of space consequently effected is very great.

From this brief analysis our readers may form a general notion of the plan and scope of Mr. Westwood's work; but to gain an insight into its real merits, and to fairly estimate the high talent and comprehensive acquirement displayed by the author in the prosecution of his subject, they must peruse the book itself. At the present moment Entomology may boast of a numerous and rapidly-increasing train of votaries, while every separate department of Zoology has talent of the very highest order devoted to its elucidation. The publication under review has long been known to us as in *contemplation*;—so long indeed, that we began almost to despair of seeing the author ultimately carry his intention into effect.—In the mean time, however, Mr. Westwood has not been idle: —our own pages, and those of many other periodicals, and the Transactions of our scientific Societies, have amply testified to the unremitting ardour with which he has devoted himself to entomological pursuits; and the reputation thus acquired will have paved the way for that success which we are confident must accompany his present undertaking.

We shall probably lay before our readers an analysis of the succeeding numbers as they appear. The work is announced to be completed in ten parts, but the coleopterous families are not yet finished, and the author appears to have such ample materials at his command, that we do not see how he can possibly finish it within the assigned limits.—We trust, however, that he will see the necessity of confining it within such bounds that his subscribers shall have no reason to complain.

Art. II.—*The Spirit of the Woods.* By the Author of "The Moral of Flowers." Pp. 306. London: Longman & Co. 1837.

This is indeed a charming volume, and one which we think no one, unless utterly devoid of all taste for that which is tasteful, can peruse without admiring the feeling and beautiful manner in which the authoress introduces the ideas and associations that, in so many instances, are inseparably connected with our indigenous forest trees. There is something in the very selection of the title,—"The Spirit of the Woods,"—so apt and expressive, as to prepare us for sterling matter beyond the title-page. But our readers may ask, what is there for the naturalist? No definitions of botanical families, genera, and species, certainly; but illustrations from the pencil of the authoress, which may meet, without offending, the eye of even the scientific botanist; and descriptions, or rather notices, of the subjects represented, which, if they do not afford him instruction, will not be found beneath his perusal.

Trees have long been interwoven with poetry; and though they are objects which are constantly before us, it is surprising how few persons are acquainted with even the English names of several of the more common and useful species.—The list, however, is far from being a long one; and we think the possessors of this volume will hardly pass a tree which they may not have previously known, without recognising its species, and calling to mind some remark or other which may here be found respecting it.

But we have perhaps not sufficiently defined the exact nature of the work of which we are speaking so favourably. It treats, then, of the British trees.—A coloured engraving of the fruit and leaves of each species, is accompanied by observations upon its natural properties, and the historical associations with which it may chance to be connected, while the tree itself is made the subject of a poem.

It is not often that poetical extracts appear in our pages, but we venture upon one quotation. The subject is

THE IVY.—*Hedera Helix.*

"HAST thou e'er seen the moon's soft splendour
  Sleep, peaceful, on some ruin'd pile,
Gilding with radiance mild and tender
  Each broken arch and mouldering aisle?

Hast thou e'er seen the ivy clinging
  Round fragments broken and decay'd,
As if its mantling wreaths 'twere flinging
  To hide the breaches time had made?

Oh! thus, should care or sorrow wound thee
  Be friendship's soft endearments thine!
And fondest sympathy around thee
  As close her thousand tendrils twine!

And when, at last, each youthful token
  Shall yield to wasting and decay,
And thou, like arch or column broken,
  Shalt feel proud manhood's strength give way;

Oh! then may love, by time unshaken,
  Around its earliest prop still cling;
(For when was mouldering arch forsaken
  By the fond wreath it caused to spring?)

Still may one smile, as moonbeam tender,
  E'en to the last unwearied shine,
Gilding thy manhood's waning splendour;
  And Oh! may that one smile be mine!"

"If the reader," says the authoress in her preface, "partake the enthusiasm of the writer towards the whole leafy race, he will at least approve her subject: for the manner in which she has handled it she craves his indulgence."

## CURRENT NUMBERS OF WORKS,

### PREVIOUSLY NOTICED.

OUTLINE *of the Animal Kingdom*.—Part II.—Professor Rymer Jones.—The contents include the history of the *Polygastrica* and *Acephala*, and some of the parenchymatous *Entozoa*. The observations of Ehrenberg upon the digestive apparatus and the disposition of the *viscera* in the *Polygastrica*, are disputed *in toto*, and his views upon this subject styled "imposing from their completeness." The author tells us that he failed to detect the arrangement depicted in the drawings of the illustrious German Professor, after the most patient and long-continued efforts. He does not, however, deny the existence of an intestine with appended stomachs, (as described by Ehrenberg), simply because he was not able to detect it, but urges reasons entirely independent of the results attending his own microscopical experiments. All that Professor Jones has advanced upon this subject, is especially worthy of attention. So far as the functions of digestion and assimilation are concerned, he considers the organization of the *Polygastrica* essentially the same as that of the common fresh water polypus, (*Hydra viridis*).

The illustrations to the chapter on the *Acephala* are numerous and beautifully executed. We observe that the air-bladder of the *Physalus* is stated to have two apertures, through which the air readily escapes upon pressure. Now, Mr. George Bennett remarks, in the 'Proceedings of the Zoological Society' for 1837, page 43, that after the examination of an immense number of specimens, he could never succeed in expelling any portion of the included air, without a puncture being previously made in the bladder. He also states that even when the bladder had entirely collapsed, the animal still floated on the surface.

We may sincerely say that the contents of the second part of this work have tended to augment rather than diminish the highly favourable impression which a perusal of the preceding number led us to form of the author's qualifications for ably carrying into effect the objects set forth in his prospectus: whilst an evident familiarity with the recorded labours of naturalists both at home and abroad, has rendered him conversant with the condition of zoological science up to the latest period, there are abundant indications of considerable personal research, united with the most accurate and careful observation.

*Dictionary of Arts, Manufactures, and Mines.*—Part II.—Dr. Andrew Ure.—The contents of the present part relate almost entirely to the arts and manufactures. The subjects of the prominent articles are—*Bleaching*, *Bread*, *Brick*, *Button-Manufacture*, and *Calico-Printing*.

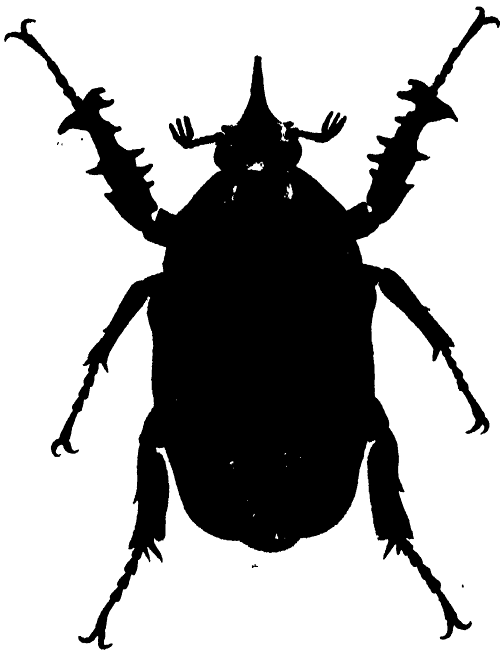
## SHORT COMMUNICATIONS.

*The Pied Fly-Catcher*—In my 'List of Devonshire Birds, (Vol. i. N. S. p. 176), I stated that the pied fly-catcher (*Muscicapa atricapilla*) was scarce in the county; its rarity still continues, but I have to inform you that we have this summer obtained one specimen, a male, which was shot at Mount Edgecumbe, April 29th, by a young man named Tucker, and it is now in Bolitho's collection at Devonport. It appeared to have but just arrived, and its pretty plumage attracted the notice of the game-keeper, which led to its destruction.—*E. Moore.—Plymouth, September 29th*, 1838.

*Northern Diver*.—The northern diver (*Colymbus glacialis*), I observed in my list, was seldom seen here *in mature plumage*: we have this season been able to obtain one specimen, which was shot near Plymouth last February, and is now in Drew's collection.—*Id.*

*Secale cornutum*.—In several parts of Germany, the wetness of this summer has caused such an extensive production of those degenerated grains of the rye (*Secale cereale*) known by the name of *Secale cornutum* (*Spermoedia Clavus*, Fries), that regulations have been issued directing the corn-growers to purify their rye before it is brought to market; the millers are threatened with penalties if they grind rye much adulterated with that injurious substance, and the bakers are made answerable for such poisonous qualities as may be given by it to the flour which they use.—*W. Weissenborn.*

In assigning a reason last month (page 566) for not inserting Dr. Drummond's corrections in his first paper on Irish *Entozoa*, we quite unintentionally expressed ourselves in a manner that left room for supposing there had been some neglect on his part. The cause of the omission originated in our having miscalculated the time required to convey the mail between London and Belfast, and not in Dr. Drummond's detention of his article for the purpose of correction; as the proof sheet was put into the Belfast post-office (for London) within an hour after it was in his possession.—*Ed.*



*Goliathus torquatus.*

Chas. M. Curtis del.t J. Swaine sc.

# THE MAGAZINE

OF

# NATURAL HISTORY.

## DECEMBER, 1838.

Art. I.—*Description of the Male of* Goliathus torquatus, *an Insect belonging to the Order* Coleoptera *and Family* Cetoniidæ. By G. R. Waterhouse, Esq., Curator to the Museum of the Zoological Society, M.E.S.

In Drury's 'Illustrations of Natural History,' vol. iii. p. 60, under the name of *Scarabæus torquatus* is described a beautiful species of Lamarck's genus *Goliathus*. The insect from which Drury's description is taken, and of which a figure is given, (see *pl.* 44, *fig.* 1 of the work quoted), is fortunately still in existence, and graces the rich collection of Mr. MacLeay. The specimen is a female; and as the structure of the *tibiæ* and *clypeus* of the male sex have hitherto furnished the chief characters upon which the subgenera of *Goliathus* have been established, I gladly avail myself of the loan of a male specimen to complete the account of this splendid insect.

This specimen, I may observe, forms part of a collection of rare and interesting insects brought by Lieut. Strachan from Sierra Leone: and this gentleman informs me that the species must there be extremely scarce, since the individual from which the following description is taken, was the only one he had ever seen; and upon its being shown to Mr. Fergusson, the staff surgeon, who has resided at Sierra Leone upwards of twenty years, and who had seen all the collections which had been formed in the neighbourhood during that time, he was perfectly unacquainted with the species.

## *Goliathus torquatus.*

*Form.*—Head quadrate, having on each side, in front of the eyes, a short pointed process, the apex of which is slightly recurved: *clypeus* produced anteriorly into a long, pointed, and slightly recurved process. On the upper surface of this process, and about midway between the base and apex, are two small triangular projections, which are separated by a longitudinal groove. Eyes somewhat prominent. *Thorax* slightly convex, broader than long,—the length being about equal to two-thirds of the width; truncated anteriorly; the posterior margin slightly produced in the middle, but emarginate opposite the *scutellum*. At the basal half of the *thorax* the lateral margins are nearly parallel, but beyond this they converge towards the head. The *thorax* is widest at the base and most contracted in front, where it is in fact no wider than the head: the posterior angles are rounded. *Scutellum* large, nearly triangular, rather longer than broad, with the anterior margin somewhat rounded. *Elytra* depressed, convex near the apex externally, but near the suture there is a concavity; longer than broad,—the width being about four-fifths of the length: they are broadest at the base and narrowest at the apex: their lateral margins approach nearly to a straight line, but are slightly dilated in the middle, indistinctly contracted near the shoulder, and dilated again and rounded at the shoulder, or external anterior angle: at the apex they are rounded, but near the suture there is a small notch in each *elytron*, leaving an acute angle. The *sternum* is produced anteriorly into a broad flat process, the lateral margins of which are parallel, and the apex is obtusely pointed, and fits in between the *coxæ* of the anterior pair of legs. The upper plate of the terminal segment of the *abdomen* is slightly convex, vertical in position, of a triangular form, broader than long, and rounded at the apex. *Femora* simple. Anterior *tibiæ* dilated at the apex, externally into a large, flattened, and pointed tooth, the apex of which is slightly recurved; and internally into a broad, forked process: besides the external apical teeth there are two others, the larger one about midway between the base and apex of the *tibia*, and the other between this and the base; and between these external pointed processes the *tibia* is deeply emarginated. On the inner side of the *tibia*, independantly of the forked process mentioned, there are four dentations, of which the two intermediate are the largest. The *tibiæ* of the middle and posterior pairs of legs have a sharp spine on the upper side, about midway between the base and apex. The *tibiæ* of the middle pair of legs are furnished with five spines at the apex, and on the posterior *tibiæ* there are four spines in the same situation, two of which are very large. The *tarsi* exhibit nothing peculiar. The *plantula* or accessory joint is very minute, pointed, and terminated by two small bristles.

*Colour &c.*—The upper parts are of a deep, rich, but dull green,* having, in certain lights, a slight rust-like tint on the disc of the *elytra* and *thorax*. The legs and under parts of the body are likewise of a deep green, but glossy, and exceedingly changeable according to the direction of the light; cupreous and brassy reflections being generally very conspicuous. The upper side of the head and *clypeus* is white,† and has a velvet-like appearance: the apical portion, as well as the under side of the *clypeus*, however, is glossy and black: the *antennæ* are black. The *thorax* is broadly margined with white at the sides, (with the exception of the extreme edge), the white extending for a short distance on each side in a narrow line along the posterior margin; the anterior margin is narrowly edged with white: a longitudinal, narrow, white line, commencing in front, runs along the centre of the *thorax*, and extends about one-third of its length: on each side of this line is a longitudinal, broad, white patch, which extends backwards from the anterior margin of the *thorax*. Within but near the outer margin of each *elytron* is an irregular white band, which is somewhat interrupted in parts, especially near the apex of the *elytra*, and at the apex it is broken into irregular small spots, but near the suture is expanded, and forms a large white patch: just above this patch there are several irregular, small, confluent spots, having a tendency to form *one* spot of a large size. On one of the *elytra* there is a white line, running parallel with the suture, and extending from the cluster of small spots to the large apical patch. The terminal segment of the *abdomen* is of a dark green colour, in tint and want of gloss resembling that of the upper parts of the *elytra*, and has two large, irregular, white patches, between which there is but a narrow green space: at the apex of this segment is a fringe of dark yellow hairs. The head is black beneath: near the eye on each side there is a small, yellowish-white, velvet-like patch. The under-

* At this moment I cannot recollect any common insect to whose colour I can compare the present species, unless it be *Cicindela campestris;* but it is of a decidedly deeper hue than that insect.

† There is a slight brownish hue on this part at present, but Lieut. Strachan informs me that when the insect was fresh, the head was pure white.

side of the *prothorax*, or the *prosternum*, the anterior *coxæ*, and a large portion of the *mesosternum*, are covered with velvet-like hairs of a pale buff colour, a space however on each side and near the lateral margin of the *prosternum* is green, like the upper side of the *prothorax*; a fringe of deep yellow hair springs from the anterior margin, and is closely applied to the under side of the head. The sides of the *mesosternum* are glossy green, (like the remaining under parts), and covered with long, deep yellow hairs. The spinous processes of the legs are black, the *tarsi* and the under side of the *tibiæ* are also black; on the hinder *tibiæ* however there is a greenish hue. A narrow line of a velvet-like substance extends along the fore part of the *femora* of the anterior pair of legs, which is of a yellowish-brown colour. The inner side of the posterior *tibiæ* is furnished with a fringe of longish deep yellow hair, and a fringe of the same character extends along the external margin of the *elytra*. Some very faint indications of *striæ* are observable on the *elytra*.

| | IN. | L. |
|---|---|---|
| Total length | 2 | 8 |
| Length of head | „ | 8 |
| Width of head in front of the eyes | „ | 4 |
| Length of *thorax* | „ | 8 |
| Width of ditto | 1 | 0¼ |
| Length of *elytra* | 1 | 4¼ |
| Width of ditto at the base | 1 | 1¼ |
| ———— near the apex | „ | 2¾ |

Judging from Drury's figure and description, there are certain points in which his insect does not agree with the specimen here described, and which I presume are sexual, although they are not such as might have been anticipated, as in the case of the great developement of the *clypeus*, &c. I allude more particularly to the circumstance of there being *two* spines on the upper side of the intermediate *tibiæ* represented in the drawing, and there being no white longitudinal line on the centre of the *thorax*. The fore part of the head is described by Drury as being dusky green, and the hinder part grey.

*London, Nov. 20th*, 1838.

ART. II.—*Doubts respecting the Class, Family, and Genus to which the Fossil Bones found at Stonesfield, and designated by the names of* Didelphis Prevostii *and* Did. Bucklandii, *should be referred.*—By M. DE BLAINVILLE.*

IN a paper on the *Megalosaurus*, or great fossil lizard of Stonesfield, published in 1823 in the 'Transactions of the Geological Society of London,' vol. i. p. 399, the question was first mooted, as to whether some fossil bones, found in one of the more ancient secondary strata, belonged to a mammal of the genus *Didelphis*:—and Professor Buckland first announced the fact as established, from an examination of two portions of lower jaws made by the late M. G. Cuvier.

This assertion (the importance of which Dr. Buckland was so well qualified to appreciate) of the existence of the remains of a terrestrial mammal in a formation much lower than the chalk, an animal too belonging to a genus of which the living analogues are only found in the New World and Australasia,—although based upon such imposing authority, was yet received with considerable caution, as has been remarked by the author of an analytical article upon the 'Transactions of the Geological Society of London,' in the 34th volume of the 'Quarterly Review,' p. 539. It was therefore of consequence that the fact thus announced should be attentively examined, not only in its geological relations, but also in a zoological point of view; nor indeed was it long before this investigation was entered upon.

*" Doutes sur le prétendu Didelphe fossil de Stonefield, ou à quelle classe, à quelle famille, à quel genre, doit-on rapporter l'animal auquel ont appertenus les ossements fossiles, à Stonefield, désignés sous les noms de *Didelphis Prevostii*, et *Did. Bucklandii*, par les paléontologistes."—'Compte Rendu,' August 20th, 1838, p. 402.

The present article will put our readers in possession of the "doubts" entertained by M. de Blainville, as to the correctness of the opinion first given by Baron Cuvier, and subsequently confirmed by several English zoologists, respecting the mammiferous and marsupial character of the Stonesfield jaws. Care has been taken to render the translation as faithful as the occasional occurrence of somewhat obscure passages would allow, and which in the original are of little importance, as the introduction of figures renders the osteological details more easily understood. M. de Blainville has been opposed, before the French Academy, by one of his fellow academicians, M. Valenciennes, who with the exception of his considering the jaw referable to an extinct genus of *Marsupiala* and not to *Didelphis*, strongly supports the opinion held by Cuvier.

Very recently some additional observations entitled "Nouveaux doutes sur le prétendue didelph de Stonefield" have appeared by M. de Blainville, and the subject is one of such general interest and great geological importance, that we shall probably transfer these "new doubts," and the previous paper of M. Valenciennes to our own pages.—*Ed.*

M. Constant Prevost, during a visit to England in 1825, undertaken for the purpose of geological research, made it one of his principal objects to visit Stonesfield; and even during his stay at Oxford he sent to M. G. Cuvier a drawing very carefully executed, of the half jaw possessed by the Oxford Museum, which Dr. Buckland had immediately submitted to his inspection. M. Cuvier, who had at first only ventured to remark,—with regard to the bones of reptiles collected at Stonesfield,—"among these innumerable marine fossils, there are sometimes long bones, which appear to me to belong to birds of the order of waders; and there have even been, as I am assured, two fragments of a lower jaw, which, judging from a hasty inspection made at Oxford in 1818, appeared to me that of a *Didelphis*,"—was now so confirmed in his first idea or attempt at classification, that he even proposed designating the fossil by the name of *Didelphis Prevostii*. Indeed on this subject we may refer to the very text of the note which Cuvier has given in page 349 of the 2nd part of Vol. v. of his 'Recherches sur les Ossements Fossiles,' published in 1826.—"M. C. Prevost, who is at present travelling in England, has just sent me a sketch of one of these jaws, which confirms the impression I had received from their first inspection. It is that of a small carnivorous animal, the grinders of which very much resemble those of the opossums, but there are ten teeth in a row, a number exceeding that of any of the known order of carnassiers. Under all circumstances, if this animal be positively from the Stonesfield slate, it is an exception to the rule, otherwise so general, that beds of that age do not contain the remains of *Mammalia*."

We see from this passage that the doubt related, not to the recognition of the fossil as referable to an animal so much resembling an opossum that Cuvier inserted it in that genus, —but to the certainty of its position in the Stonesfield slate.

In this point of view it was that M. Prevost, upon his return from England, introduced the question in a report made to the Philomathic Society, upon a memoir of M. Denoyers published in the 'Annales des Sciences Naturelles for 1825. After a rather detailed description of the portion of jaw under observation, accompanied by a drawing twice the natural size, made with the greatest care by the aid of a magnifier, M. Prevost, without any preconceived idea, arrives at the conclusion (based almost exclusively upon the existence of double roots to the teeth, which I had myself pointed out), that this jaw belonged to one of the insectivorous marsupials, apparently having some affinity to the opossums, but which ought rather to be considered as constituting a new genus.— With regard to its geological position, M. Prevost endeavours to invalidate all the arguments of Dr. Buckland and other English geologists, as to the age of the rock in which the bones are found, and refuses to admit, as sufficiently proved, the fact that the calcareous schist of Stonesfield really constitutes a part of the oolitic series.. Thus the supposed exception appears to be brought back within the rule, that the bones of *Mammalia* are found in a fossil state, only in the strata which are of more recent origin than the chalk.

This explanation of so anomalous a fact was, however, entertained but for a moment; for Dr. Fitton, one of the most distinguished English geologists, immediately showed, by a very profound examination, that the rock which contained the jaw-bones was certainly in the position, and forming a part of the oolitic formation; and from that time the paleontological exception was re-admitted, although Mr. Samuel Woodward appears to have forgotten it in his table of the fossil remains of Great Britain.

Some years after this the subject was renewed in a manner which appeared still more plausible, and scarcely open to objection, by a description and figure of the second half jaw spoken of by Dr. Buckland, which, after having been lost for some years, fortunately fell under the notice of Mr. Broderip. He counted in it four incisors, one canine, and seven molars, which is, in fact, the dental *formula* in the *Didelphis;* and having besides remarked that the teeth in the fragment described by M. Prevost appeared to differ, not only specifically but generically from that which he had before him, Mr. Broderip thought it necessary to make of his a distinct species, which he very properly dedicated to Dr. Buckland, under the name of *Didelphis Bucklandii.*

From that time, that is to say, during the last ten years, all the authors of treatises on Paleontology or Geology have admitted, as beyond all doubt, the existence of two species of *Didelphis*, viz., the *Did. Prevostii* of Cuvier, and the *Did. Bucklandii* of Broderip, occurring in the calcareous schist of Stonesfield, which forms part of the oolitic series.

In a note at the end of my memoir upon the antiquity of the existing order of insectivorous *Mammalia*, I have already declared my opinion concerning a portion of a lower jaw brought from Stonesfield by M. Brochant de Villiers and his pupils MM. Elie de Beaumont and Dufrenoy; and which had been supposed to belong to the same *Didelphis* as the two preceding. I have indeed found the minute of my reply, in which I said, that appertaining to a small animal of the saurian tribe, rather than to a fish, it appeared certain to me that this fragment could not have belonged to a mammal, whether a *Didelphis* or not, as I had believed on the first inspection.

I ought to mention, to speak the truth more fully, that I did not remember having made this reply seven years ago, when a friend of mine, M. de Roissy, to whom I mentioned my last memoir to the Academy, asked me if I should allude in it to the insectivorous mammal of Stonesfield; and on my replying in the negative, he informed me that M. Agassiz, in his German translation of Dr. Buckland's work on Geology, was about to make mention of an opinion of Professor Grant, that the supposed *Didelphis* of Stonesfield was not a mammiferous animal.

M. Elie de Beaumont, on the occasion of my note to the Academy, informed us that the portion of bone which had been submitted to my examination by M. Brochant de Villiers, in 1831, belonged indeed to a reptile, as I had said; and that this was the opinion of M. G. Cuvier, who had also examined it, and of M. Agassiz; but that it was quite a different thing from the *Did. Bucklandii*, which was not the less a mammal: so that the fact of the existence of the class *mammalia* in the oolitic series was not weakened by the above circumstance.

In the paragraph which M. Elie de Beaumont has added to the extract from my memoir, he indeed says, that having shown to Cuvier the jaw which had been brought to Paris, Cuvier, in pointing out to him the objections to its mammiferous character, at the same time explained in what respects it differed from the jaw previously found in the same locality, —the *Did. Bucklandii.* Unfortunately, M. Elie de Beaumont does not describe these differences; but they must have been convincing, since M. Agassiz, according to my colleague's information, had given up the idea entertained by Professor Grant, that the jaw was not that of a mammal.— Nevertheless, let us see if, the fragment which I have examined being already referred to the sub-type of oviparous *Vertebrata*, sufficient reasons yet exist for retaining in the class *Mammalia* the two other fragments found in the same locality. In order that we may judge clearly of this question, let us begin by giving descriptions of these fragments, taken from the authors who have made us acquainted with their history, and particularly from the figures which they have published; at the same time requesting the parties who possess the original specimens, to submit them to a fresh examination.

The first of these fragments, and the one which has been longest known, is that in the Ashmolean Musem at Oxford; being the one seen by Cuvier at the residence of Dr. Buckland, at the time of his first visit to Oxford, and which was afterwards so carefully examined and so accurately figured by M. C. Prevost, in his memoir already cited; and which has since been re-figured by Dr. Buckland in his Bridgewater Treatise. This, however, is not the most perfect of the fragments in question.

It consists of the right half of the lower jaw, the outer aspect of which is visible, while the inner adheres strongly to the rock in which it is fixed. In form it is long and narrow, being only three lines in depth by nine or ten in length in its horizontal *ramus*, which is almost straight, with its upper and lower edges slightly bowed in opposite directions; the ascending *ramus*, of which little more than the impression remains, is barely half the length of the horizontal one. A tolerably large coronoid process may however be distinguished, with edges somewhat arched; a sort of angular process; and midway between these a rounded and but slightly projecting condyle; so that the extremities of these three projections are upon the same vertical line. The horizontal *ramus*, which gradually attenuates in front, is imperfect, that is to say, formed of two plates only in its posterior half; its anterior being fortunately deprived of the external plate, which exposes to view the roots of the teeth. We may feel pretty certain that the anterior extremity is incomplete; but it is impossible to say anything more respecting the deficient portion, than that its size must have been very inconsiderable.

The teeth are not quite in contact, but separated at equidistant intervals, and form a continued series throughout almost the whole length of the *ramus*, being about the same shape and size; they however decrease a little from the sixth to the tenth posteriorly, and more particularly to the first in front. They all appear as much compressed in their crowns as in their roots. They are small, all of them tricuspid, with the middle tubercle, particularly of the anterior teeth, generally more elevated than the lateral ones; the roots are all similarly composed of two very slender fangs, which are very pointed, and two or three times the length of the crown.

There cannot however be distinguished in this continued series any teeth which we might look upon as anterior or posterior molars, and still less canines or incisors; we therefore conclude, with the late M. G. Cuvier, that the two latter kinds are entirely absent, and that all the teeth in the series may be regarded as molars. And as a certain number of the hinder teeth are broken in a vertical direction, we are easily able to perceive that their crowns are entire; whilst the loss of the external plate of the anterior half of the jaw shows that the anterior teeth are strongly fastened into their sockets, and that the crown is separated from the root by a rather projecting ridge.

The second fossil fragment from Stonesfield, considered as having belonged to a mammal of the genus *Didelphis*, is that which was described and figured for the first time by Mr. Broderip, (*loc. cit.*), which figure Dr. Buckland has repeated in plate 2 of his last work, adding to it some farther details, and among others an enlarged figure of the fifth tooth, considered as a molar.

This fragment, which also consists of a *ramus* of the lower jaw, is much more perfect than the first, and now forms part of Mr. Broderip's collection. It is also from the right side, but is perceptibly larger, being at least fifteen lines long.—There is also less disproportion between its two *rami*, the horizontal one is deeper, and its edges are rather more bowed, and not in opposite directions; and the ascending *ramus* displays a large coronoid process, rounded, and much recurved posteriorly; and a condyloid *apophysis*, much more prominent than in the first fragment, and exactly on the same level as the jaw itself.

There is no trace of an angular process, the lower edge of the jaw being continued uninterruptedly as far as the condyle. Notwithstanding this, it cannot be denied that this fossil appears to bear a very great resemblance to the jaws of certain species of *Mammalia*.

The number and disposition of the teeth contribute perhaps still more to this resemblance. In fact, instead of a continuous series of ten teeth occupying the entire edge of the jaw, we perceive towards the obliquely rounded anterior extremity, four teeth at some distance from each other, all about equally conical and pointed, of which the two anterior are directed forwards, while the two others stand upright; the last in particular appearing to incline a little backward. As this last is rather higher and larger than the others, Mr. Broderip considers it to be a canine, and the three anterior ones incisors; it is however as little curved as they are.

At the very extremity of the jaw, before the first of these teeth, is a void space, perhaps a little longer than that between each of them; and behind the last, or the supposed canine, is a much larger space, forming a complete separation between this first part of the dental system and the second.

The second part of this system, which occupies the remainder of the horizontal portion of the jaw, almost as far as the anterior edge of the ascending branch, is formed by a series of seven teeth, of which the posterior are much more closely set than the anterior, without however being absolutely in contact; and are also rather more unequal than in the preceding fragment; the terminal teeth being smaller than the others, and regularly decreasing towards each extremity, beginning from the fourth tooth, which thus forms the principal one. All are, however, of very nearly the same compressed form, provided with two roots, and having the crown but little elevated, compressed, and tricuspid, with the exception of the fifth, in which the terminal points are bilobate, so as to render the crown pentacuspid, with a palmated form.

Thus by adding one more incisor in front, at the very point of the jaw, and where, in fact, Mr. Bröderip even thought he perceived a socket, the number of teeth on one side of the lower *maxilla* will be four incisors, one canine and seven molars; and as it appears that the animal to which this fragment belonged was an adult, Mr. Broderip has arrived at the conclusion, that the dentition was the same as that of the opossums. But in that case it would differ widely from what has been established with regard to the first fragment; and therefore Mr. Broderip is of opinion that, as we have already said, it indicates not only a different species, but quite a different genus.

Such are the two fragments on which is founded the belief of the presence of insectivorous marsupials in a formation anterior to the chalk. And having now made ourselves acquainted with one of the terms of comparison, let us examine the other, and in fact give a description and sketch of the right maxillary bone of an opossum or of a perameles, which most nearly resembles the fossil jaw.

The lower jaw of the opossum is narrow, elongated, particularly in its horizontal branch, which is much longer than the ascending one, and somewhat curved lengthwise, and in the same direction both above and below, being considerably attenuated in front.

The vertical portion continues, to a considerable extent, to follow the general curve, like that of a boat, insomuch that the angle of junction is almost effaced; this ascending branch has also a large coronoid process, rounded at the extremity, and considerably hollowed on the outside; a condyle, transverse or rounded, projecting considerably beyond the perpendicular line of the coronoid process, and always more or less above the level of the dental line; and finally, below the condyle, a large process for the insertion of muscles situated obliquely within and behind.

But it is the dental *formula* of the insectivorous marsupials which more particularly demands our notice.

In the first place the three sets of teeth are as distinct in disposition as in form; the incisors being separated from the canines by a space as large as that which divides the latter from the molars.

The incisors, which are generally very small, are terminal, and grouped together to the number of three or four at the extremity of the jaw, in a nearly straight and transverse line; they have each only a single root, and the crown, though rather diversiform, is never pointed nor conical, but is more or less broad at the extremity.

The canine, which is always completely isolated, has the usual conical form, a little compressed, widened at the base, and rather strongly arched and pointed at the apex.

The molars, to the number of seven in the whole, consist of three false and four true.

The first of the false or "avant-molaires" is often separated from the other two by a greater space than that between the rest; the remainder, though often rather unequal, present the same general shape, each having two conical diverging roots, and the crown rather compressed, triangular, with a single triangular tubercle, having an indication of a very small lobe in front, and a more distinct posterior process (*talon*) occupying a lower position.

The four true molars, including the principal and three hind molars, form an evenly serrated continuous series of subequal teeth, of which the largest is usually the last but one, and sometimes the last; and the first is always the smallest. They are a little thicker across than from back to front, and approach more or less to a parallelogram in shape; the crown is always divided, as in the *Insectivora*, into two parts, separated by a deep notch,—the one anterior, and in general more elevated, prismatic, and always with three tubercles, one of which is external and two internal;—the other posterior, almost equal, and with two tubercles, one external and the other internal: so that the crown has five tubercles, more marked however in the last tooth but one than in the others.

As to the roots, though they appear to be only two in number, one for each portion of the crown, as they are much wider in the transverse direction than in the other, it is evident that each, dividing itself into two, is certainly not conical.—It must also be farther observed, that these roots are hardly half as long again as the crown, which encroaches considerably upon them; and that they have below a large dental canal, their summit being truncated by the dental orifice.

As we may have occasion to compare the fossil jaws from Stonesfield with those of the placental *Insectivora*, let us obtain an insight into the structure of the jaw of the *Tupaia*, which appears most closely to resemble the fossils, especially the *Did. Prevostii* of Cuvier; although the maxillary bone and its dental system among the tenrecs comes nearer to what we have just described in the opossum. The jaw of the *Tupaia* is in fact rather short, or moderately elongated in its horizontal *ramus*, which is attenuated in front; with both its edges slightly convex. The ascending *ramus*, which is also of moderate size, is upon the whole very wide at its posterior edge, and dilated into a kind of fan with three branches, of which the narrow and rather curved summit of the coronoid process, and the transverse condyle and the somewhat hooked angular process, bear some resemblance to the handle of a crutch. The condyle is moreover considerably higher than the dental line.

The dental system consists of a very nearly continuous series throughout, in which, however, we can easily distinguish three long incisors, directed forwards, and rather spatulate; a canine, which is almost straight and subcylindrical, and but slightly pointed; and finally six subcontiguous molars, two anterior, one principal, and three posterior; of the two front molars with the crown almost simple, the first has one and the second two roots: the principal is of moderate size, and has two blunt points anteriorly, and a posterior process; and lastly, the three hinder molars have an almost square crown, formed, as in the *Insectivora* generally, with an anterior half more elevated than the posterior, trihedral, with three tubercles; the posterior half having two, except in the last, which has but one, and is rather smaller than the two preceding it.

Let us now proceed to establish a comparison; and we will begin with the fragment which constitutes the *Did. Prevostii* of M. G. Cuvier.

I shall not occupy much time in considering the form of the ascending *ramus* and its three processes, because it is certain that the jaw is mutilated in this part; and if we may put absolute confidence in the representation of it given by Dr. Buckland, there is no doubt that, except in the position of the condyle which is in the plane of the dental line, the same as in the *Did. Bucklandii*, and contrary to what takes place in the opossums, as well as in the *Insectivora*,—this branch bears scarcely any resemblance to that of *Did. Buck-*

*landii*, and has on the contrary something of the character which we have just described in the *Tupaia*.

I shall not dwell upon the manner in which the latter jaw terminates anteriorly, because it is possible that there is here also some mutilation. It must indeed have been so considered by the late M. G. Cuvier, since he regards all the remaining teeth as grinders; I shall therefore confine myself to observing, that this mode of terminating in a point, is much the same as obtains in fishes and reptiles, but this we have already pointed out in the *Tupaia*.

I shall however insist more largely upon the system of dentition. We have seen above that in the first half jaw from Stonesfield the system consists of a regular and uninterrupted series of ten subequal teeth, subsimilar, with a crown very much compressed, tricuspid, extremely small or low when compared with their very long roots; and these latter formed of two radicles or branches, both very much pointed, entirely buried in the jaw, and without any dental canal beneath them.

Now in considering all these teeth as molars, as M. Cuvier has done, and it is difficult to do otherwise, it is evident that there is no comparison to be established with what we have just described in an insectivorous didelph or monodelph.

None of these animals have more than seven molars.

In none of them are they regularly separated by interspaces.

In none of them are they so nearly similar, those in front being scarcely smaller than the hinder ones.

We may also add that none of them have these teeth so disproportionate in their crowns and roots.

Finally, if the first false molars of the opossums offer some resemblance to the first molars of the *Did. Prevostii* in having two roots, and the crown compressed,—yet here all resemblance ceases; and to the other molars there is actually no approach to be made in the way of comparison; those of the fossil being compressed and palmate, with three or four tubercles, the largest occupying the middle of the tooth; while those of the insectivorous mammals are always thick, subquadrate, with a dilated crown, raised, divided into two parts by a deep median depression, and each part beset with points without and within.

Finally in the fossil, notwithstanding the destruction of the external plate, and of a part of the horizontal *ramus*, an accident which lays open to view the situation of the seven first teeth, we perceive no trace of the dental canal, which in all the *Mammalia* runs through the whole extent of the jaw; and furthermore it appears, to judge from the representation, that the roots of the teeth are enveloped on all sides by the osseous substance.

Thus we might already, if we had only this piece of the Stonesfield fossil, assure ourselves that it had not belonged to an insectivorous mammal, either placental or marsupial, at which conclusion we had long since arrived with regard to the fragment submitted to our examination by M. Brochant de Villiers. But we have yet to examine the second fragment, the basis of the *Did. Bucklandii* of Mr. Broderip. And here, we do not deny that the task is more difficult; the more so that we have as yet only figures, which are always insufficient when they are not accompanied by a detailed description.

We shall begin by remarking that this second fragment, when compared with the first, appears so widely different in its general form, and especially in the boat-like curve of its horizontal *ramus*, in the form of the ascending branch depriv-ed of the angular process, and especially in the dental system, in which we have clearly distinguished three or four incisors, one canine, and seven molars, differing both in form and disposition,—that Mr. Broderip has not scrupled to express an opinion that his *Did. Bucklandii* could not be admitted even into the same genus as *Did. Prevostii;* so that even although we should arrive at proofs that the latter is not a placental or marsupial quadruped, this would be no argument for extending the same conclusion to the former. Let us then see how we may compare the *Did. Bucklandii* with the two recent generic forms described above.

Without doubt we cannot deny that in its general aspect as well as in the form and proportion of the two principal parts of the fossil jaw, there is a marked resemblance to that of the *Did. Virginiana* for example, especially if we suppose that the hooked process of the latter would not be apparent in consequence of its being concealed by the matrix; at the same time it bears but a very slight degree of resemblance to the *Did. Prevostii.* We ought however to observe that the condyle is rounded, and lies in the prolongation of the dental line, as in the *Did. Prevostii;* and that in the opossums, on the contrary, the condyle is always more or less transverse, and constantly observed a considerable distance above this line. We should also remark that throughout the whole extent of the horizontal *ramus*, there appears to be no trace of the *foramina* in the chin, existing in all the other opossums, which would lead us to think that they had no dental canal; another point of resemblance to the *Did. Prevostii.*

With respect to the dental system, confining ourselves to a slight examination, we cannot help remarking some resemblance between the Stonesfield fossil and the *Did. Virginiana;* and indeed admitting that a first tooth is wanting in the extremity of the jaw, and that more are missing in the interval from the presumed canine to the first molar,—we have in reality the very same number of the three kinds of teeth as in the opossum, and even with some similitude in the manner of their disposition; but all analogy entirely ceases when we examine the form of the teeth separately.

The incisors, instead of being very small, dilated and flattened, or obtuse, and placed close together quite at the extremity of the jaw, as in the opossum, are strong, conical, distant, and almost all lateral.

The canine, instead of projecting forward and being curved, compressed, very pointed and very strong, especially as compared with the incisors, is on the contrary quite straight, conical, and hardly longer than they are.

Finally, the molars, instead of being arranged at very unequal distances, particularly the anterior ones, and sometimes even remarkably unequal, as in the opossum, increase gradually from the first to the fourth, and then decrease as far as the last. As to their form, which is almost uniform in the fossil jaw, it has no similitude whatever either in the crown or the roots, to the insectivorous arrangement displayed in so great a degree by the four last molars of the opossum.

But if the palmated lobate form of the molar teeth of *Did. Bucklandii* does not in any respect resemble that which exists among the placental or marsupial quadrupeds, this is not the case with regard to the other Stonesfield jaw, brought into notice by M. Prevost. The resemblance with regard to this is nearly complete, excepting only in number; so that if it be impossible to consider these two jaws as belonging to individuals of the same species, which I readily allow, it is difficult to look upon them as belonging to animals of different classes;—the structure of the dental system, which furnishes the particular masticating organs of each class of *Vertebrata* being here absolutely the same.

Thus far we have been proving that the two fragments from Stonesfield differ entirely from the jaws of the opossums, but that they closely resemble each other, at least in the form of the molars. It now remains for us to enquire if what we have described in the dental system of the supposed *Didelphis* of Stonesfield has any evident analogy with what we find in any of the four classes of *Vertebrata* whose jaws are furnished with teeth; that is to say, among the *Mammalia,* reptiles, amphibious animals, and fishes.

In the jaws of animals provided with a dental apparatus, the teeth have either both crowns and roots simple, or one of the two complex; or else the complex structure in both is associated: the last is most generally the case in the molar teeth, especially the posterior ones; while a simple structure of both these parts is the usual condition of the incisors and canines.

In this class there has never yet been found a dental system in which all the teeth are complex in both parts. A small number of species have them all simple, both as regards the crown and the root, as in all the *Cetacea*, and some seals; but in the greater number both kinds are associated, that is teeth of simple structure placed in front and complex behind.

In animals of this class all the teeth have the root, whether simple or complex, buried to a greater or less depth in an entire socket, and these sockets communicate with the dental canal, through which pass the nervous filaments that communicate with the teeth.

With the exception of the whales and the *Ornithorhynchi*, all the *Mammalia* resemble each other as regards the system of dentition.

In the *Reptilia* there is much more variation in this part of their organization. In fact, if the teeth, which are almost always simple, may yet sometimes have sub-complex crowns, as for example, among the iguanas, they are constantly simple in their roots; at least I have no example of a contrary nature, if indeed there be any true root besides their base, in the greatest number of cases.

These teeth differ so sometimes that we are able to distinguish them as incisors, canines, and molars, though these last are almost always absolutely simple.

But the greatest variation presented by the dental system of Reptiles is observed in its connexion with the jaws, in which relation we may indeed distinguish four distinct kinds.

In the first there is a hollow *alveolus* entirely surrounded by the bone, and in which the tooth is loosely implanted, as is seen for example in the crocodile.

In the second, the *alveoli* holding the teeth are also comprised between the two plates of the jaw, but in a manner so closely united, that the tooth seems to form a portion of the jaw itself, denticulating, as it were the edge, as is seen in the geckoes, chameleons, dragons (*Dracones*), and even the agamas.

The third mode, is that in which there is no *alveolus*, but where the teeth are disposed between the internal wall of the jaw and the "*membrane gyngivale*;" this is the case in the iguanas for example ; and then the root of the tooth is "*échancrée en ogive au côté interne de la base.*"

A fourth, is that of the venomous serpents, among which the teeth being neither implanted, nor furnished with roots, terminate by uniting themselves with the maxillary bone by a kind of ossification of the "*membrane gyngivale.*"

The class *Amphibia*, presents very nearly the same modifications of the dental system, with which, however, these animals are often altogether unprovided, and which is seldom largely developed ; and their teeth present a constant simplicity in the two portions, of which one, namely the root, is almost always wanting, an almost complete similitude in the dental series of each species, and finally, a solid implantation as in the *Cæcilia*, or a simple application, as in the frogs.

The class of fishes presents still less uniformity with regard to its dental system than that of reptiles, even if we turn our attention only to that part of it which occupies the jaws ; being all that we require for our present purpose. In fact, without speaking of the merely "*dents gyngivales*," which do not actually penetrate into the bone, nor of those which being in numerous rows, one within another, applied to the surface of the bone or sunk into it, cannot serve here for purposes of comparison,—there exist species in which the teeth being provided with a root as long as the crown, are fixed deeply in the jaw, in a definite order and proportion ; but I know of none at present, which ever have either in whole or in part, the crown, and still less the root, complex in its structure.

After this exposition of the essential characters presented by the dental system in the four classes of vertebrated animals which are provided with it, it seems we have reason to conclude, that the class of *Mammalia* being the only one in which, up to this time, posterior teeth having complex roots and crowns, combined with anterior teeth that are simple in both parts, and all these teeth firmly fixed into the jaw, have been found ;—among which also there is an articulating condyle, and a perfectly formed coronoid process,—the analogy of one at least of the Stonefield jaws with this class, to have been clearly demonstrated ; and that therefore the animal to which it originally belonged must necessarily have been a mammal. As to the other jaw, from which we acquired our knowledge of the roots of the teeth, which are double and of great length, and which jaw we have compared with the preceding, the resemblance we observe in the very remarkable structure of the crowns hardly allows us to admit that where the first is placed the second must not follow. We should however add, that there yet remains something to be cleared up with relation to it, for it is difficult to allow that the three first molars can be analogous to the anterior teeth of the *Did. Bucklandii*, of which Mr. Broderip makes incisors and a canine tooth; and we have as yet no example of a genus of mammals in which the number of the molars thus increases all at once by three on each side.

As to the question of knowing under what order, family, and even genus of *Mammalia* the animal must be ranged, which these fossil jaws of such great antiquity reveal to us, we have I think placed it beyond all doubt, that it could not have been an insectivorous didelph or monodelph, the dental system being so entirely different. The form of the molars seems to approach much more to that of the seals, in which they are as in this case, pretty nearly alike, and frequently tricuspid; but the anterior part of the dental system of the Stonesfield fossil, differs widely from what is found in the family of the *Carnassiers*; so that in the hypothesis of its ranking as a *Mammal*, we dare not pronounce upon its family and order. It seems more probable that this animal must form a distinct genus, to which might be given the name of *Heterotherium*, or *Amphitherium*, in order to avoid the inductions which might be drawn from the existence so far back, of a *Mammal* of the family of opossums.

But if, in allowing our inquiry to be conducted by analogous reasoning, and admitting all the evidence furnished by figures and descriptions as incontestible, as for example, the form and proportions of the three parts of the ascending *ramus*, we have been led to infer, in establishing our comparison with existing animals, that this must be a mammal *sui generis;* would it be the same were we to carry on the comparison to certain fossil genera? To this question we must reply in the negative. In fact M. le D. Harlan of Philadelphia described and figured many years since, some gigantic fossil bones, which he referred to a new genus of the class *Reptilia*, named by him *Basilosaurus*. Now a portion of the jaw of this animal displays implanted teeth of two kinds, the first simple, among which there are even some resembling canines larger than others; the second compressed, triangular, and provided with two roots, fixed in the jaws, and projecting beyond their edges; and as at the slightest glance we cannot refuse to acknowledge their great analogy to what is described and drawn of the Stonesfield animal, making the further observation that the teeth and the jaw which holds the former are like the latter so imbedded in the matrix, that they seem to form a part of it; so that at their first appearance, M. Harlan considered these bones as having belonged to an aquatic carnivorous mammal; we can neither hesitate to admit that if this *Basilosaurus* be a reptile, which fact appears placed beyond doubtby the form of the *vertebræ*, *humerus*, &c., it is more than probable that it is an animal of the same kind as that found at Stonesfield.

The existence therefore of fossil bones belonging to an animal of the class *Mammalia*, even aquatic, is not yet added to our knowledge of the science; the supposed didelph of Stonesfield not belonging to this class.

For the rest, if the discussion upon which we have now entered has not rendered the demonstration perfectly convincing to every one, we may at least hope that its subsequent effect will be to direct new investigations on the part of the skilful observers who have at their disposal the only two specimens of this fossil known at the present day, and in the end to furnish new topics of argument for or against an opinion till now admitted without sufficient examination, and consequently not demonstrated. We should indeed, in order to assist our doubts upon the subject, invoke the opinion of M.M. Meyer, Grant, and Agassiz, who appear to agree with us in thinking that the Stonesfield fossil does not belong to a mammaliferous animal.

Meanwhile, in the present state of our information, it appears to me that we are authorized in drawing the following conclusions.—

1st. The two solitary fragments found at Stonesfield and referred to the genus *Didelphis* of the class *Mammalia*, have none of the characters of animals of this class, and certainly ought not to be arranged among them.

2nd. Neither can they be referred to an insectivorous monodelph allied to the *Tupaia* or tenrecs.

3rd. If we deem ourselves justified in regarding them as of the class *Mammalia*, the molar portion of their dental system brings them nearer to the family of the seals than to any other.

4th. But it is infinitely more probable, from analogy with what we know of the *Basilosaurus* found in America, in a formation likewise secondary, that they ought to be referred to a genus of the suborder of saurians.

5th. That in any case they must be distinguished by a different generic name, for which purpose we propose that of *Amphitherium*, as indicating their ambiguous nature.

Lastly; the existence of the remains of mammals anterior to the formation of tertiary strata, is not at all proved by the Stonesfield fossils on which we have now treated, although we are far from asserting that mammals were not in existence during the secondary period.

ART. III.—*Notices of Irish Entozoa.* By JAMES L. DRUMMOND, M.D., Professor of Anatomy in the Royal Belfast Institution, President of the Belfast Natural History Society, &c.

*(Continued from Page 577).*

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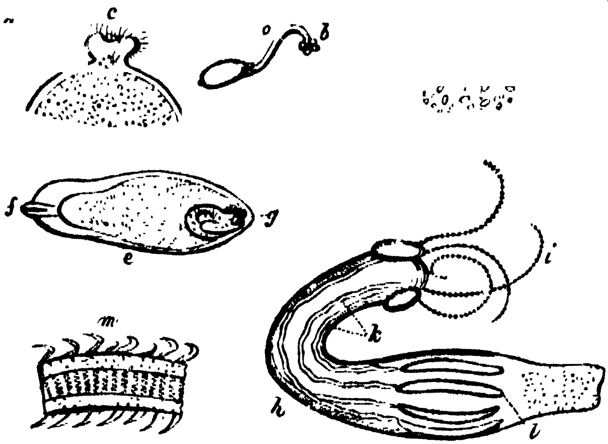

*a*, *Anthocephalus paradoxus*, as removed from a peritoneal tumor. *b* the compound animal, as found in the intestine of the turbot, and viewed through a pocket lens. *c*, *Proboscis* of the cestoid portion. *d*, appearance of the *parenchyma* or substance of the latter when highly magnified, the transparent spaces bearing a false resemblance to *ova*. *e*, represents *a* compressed between two pieces of glass, and magnified. *f*, end containing the obcordate *proboscis*. *g*, the bothriated portion enclosed in the other end. *h*, the same removed, compressed, and magnified. *i*, the four *rostella* protruded. *k*, the sheaths in which they lie when retracted. *l*, four oblong sacs in which the sheaths terminate, containing a fluid which is seen moving up and down the sheaths while the *rostella* are in motion; passing up from the sacs during their protrusion, and returning during their inversion. *m*, portion of a *rostellum* highly magnified.

### ANTHOCEPHALUS *paradoxus*, J. L.D.

ON the 4th of September last, while examining the contents of the intestines of a turbot (*Pleuronectes maximus*), I observed in the intestinal mucus a number of very white *Entozoa*, which were generally of an ovate form, about two lines in length and above a line broad; the outline and size, however, of the animal varied considerably, but in every instance a broad, obcordate proboscis was seen at one end, in a constant state of protrusion and retraction. The animal was very opaque and white, like coagulated *albumen*; and though I had never before met with it in the intestinal canal, yet I recollected it as an old acquaintance which I had repeatedly dislodged from small, white, vescicular tumors, common on the outer surface of the stomach of the codling and young coal fish.

On farther examination I was surprised at finding four different specimens joined in the strictest union to an *Entozoon* of a very different appearance, the caudal end of the one being firmly coalesced, and continuous with that of the other, without any mark or appearance whatever, to indicate that they had ever existed separately. Had this happened in but one, or even two instances, it might perhaps be attributed to some fortuitous circumstance; but occurring in four cases, it appeared to me to be something beyond what could readily happen in the chapter of accidents.

In referring to *Fig*. 32; *b* represents the two *Entozoa* united, and slightly magnified, and it will at once be apparent that the two individuals are of a very different conformation from each other; *n*, it is obvious, is depressed, and at least half as broad as it is long, while *o* is cylindrical, and much longer than broad. On examining specimens of *n* which lay in the intestine distinct and unconnected with *o*, the most remarkable character which they presented was the terminal, obcordate proboscis *c*, which was very often thrust out, and again retracted to more than its own length within the body of the animal. It was thickly ciliated with fine stiff hairs or bristles, which projected beyond it at least its own length.—The margins of the animal were very various, being sometimes crenate, then, with several deep sinuosities, and sometimes quite even; these differences depending on the various states of muscular contraction. It had scarcely any appreciable progressive motion, though it could contract itself in every possible direction. The colour of the whole was extremely white.

With respect to the other animal in the separate state, its head exhibited four large, cup-like *bothria*, in perpetual motion, and having a striking resemblance to those of *Bothriocephalus auriculatus*, or of *Both. corollatus*, when the *rostella* of the latter are unprotruded. The body was cylindrical, and generally speaking had a bulbous outline at the posterior extremity; it was white and semitransparent.

The specimens thus observed were placed in a weak solution of salt, and next day were quite alive. On washing one of them with fresh water, and placing it under the microscope, the animal, to my great surprise, threw out from the front of the head four long, beautiful, crystalline *rostella*, armed with numerous hooks, in all respects similar to the *rostella* of the armed *Bothriocephali.* The same phenomenon appeared in several others.

I made no farther observations respecting this anomalous production till nearly a month afterwards, when, on the 2nd of October, I examined a white sacculated tumor taken from the outer surface of the stomach of a blockan, or young coal fish, (*Merlangus carbonarius*). The outer covering of the sac was composed of a very delicate, loose layer of *peritonæum;* under this was a much thicker and firmer, but transparent membranous capsule, entirely surrounding a very white substance, apparently solid. On tearing open this second covering, the enclosed *Entozoon* was dislodged by the slightest pressure; and on farther examination I found it to be precisely the same as that which formed the broad, flat division of the compound animal in the intestine of the turbot. The remarks I wrote down at the time are as follow.

"Pure white, solid, opaque; *proboscis* when fully exserted, obcordate, and beset with numerous very fine bristles, which I believe clothe its whole surface; bristles long and subulate: —the *proboscis* is moved by eversion and inversion alone.— On tearing the animal to pieces, after being killed by a drop of alcohol, I could see nothing like *ova*, but one of the fragments exhibited four cords, which seemed to be of the same nature as the *rostella* of *Anthocephalus paradoxus*."

Two days afterwards (October 4th) I examined a similar tumor, from the stomach of a blockan also. When dislodged from its sac, the *Entozoon* was of the size marked *a*, *Fig.* 32; in colour, *proboscis*, and everything else, it exactly resembled the last. I cut it across through the middle, and with some trouble extricated from the caudal end a distinct, living individual, in all respects similar to the bothriated portion of the compound animal seen in the turbot. Its four *bothria* were in constant motion, giving the head that polymorphous appearance which is so remarkable in many of the bothriated *Certoidea.*

After examining the specimen for some time, I applied repeated drops of fresh water with a hair pencil, and soon had the satisfaction of seeing it protrude four long, beautiful, crystalline *rostella*, armed with very numerous retorted hooks.— A second tumor examined in like manner exhibited the same appearances; and in both, the obcordate *proboscis* of the opposite separated end, continued its motions as before the division. Two other tumors from the stomach of another fish of the same kind exhibited exactly similar appearances.

I next, on the 7th of October, compressed a specimen freed from its envelopes, between two slips of glass, and on applying the microscope found that the whole had a parenchymatous, solid appearance, except at one end, where a contained body, reminding me of a *fœtus* wrapped up in its membranes, was distinctly visible: *Fig* 32, *e*. This part I found to be the bothriated animal, and in several other specimens which I examined on the same day, the same phenomena occurred in all.

On removing the pressure the animals resumed their original appearance, contracted their lateral outline into various forms, and pushed out and retracted the obcordate *proboscis*.

On Monday the 8th of October I examined similar tumors attached to the *duodenum* of a whiting, and one from another blockan; and on the 10th, various specimens of the same kind from several parts of the abdominal cavity of the red gurnard (*Trigla pini*), and of the common grey gurnard (*Tr. Gurnardus*). In both the latter, the specimens were more immature than any I had previously examined, the animals being more transparent, and the obcordate process less fully developed, and not satisfactorily exhibiting the bristly armature; but the bothriated animal was in all respects perfect, and precisely the same as those that I had examined in the other fishes. The containing sac, too, in the grey gurnard especially, was unusually tough, and of a deep brown colour.—The bothriated animal of these specimens, when compressed between two slips of glass, was particularly beautiful. In some specimens all the four *rostella* were protruded, forming the most gracefully curved outlines, and seeming like transparent crystal, adorned with innumerable hooks of similar appearance, as if formed of the same material, arranged with the most admirable symmetry, and an exquisiteness of finishing that might put human art, in its greatest triumphs, to the blush on account of its imperfection, perfect as it is.

And yet we are to be told that the *Entozoa* are beings of chance, that they are of equivocal generation, self-formed, and originating from some fortuitous concourse or combination of atoms, some clot of effused lymph, or a little intestinal mucus! But I shall have, at another time, to comment more fully on the old theory, which has been so blindly (in my opinion at least) adopted by many of the first physiologists and naturalists of the present day. We know little or nothing, it is true, of the origin of the *Entozoa*, but because we are as *yet* ignorant of this, and may long continue to be so, are we therefore, in the mean time, to attribute to chance, or accident, the formation of beings so perfect, and as wonderful in their kind, and as properly constitutioned and constructed for their mode of life, as any others in the vast field of vital being with which we are acquainted? If we can admit that the formation of any portion of almost any *Entozoon* can be referred to spontaneous generation, there will be but a very narrow step to the hypothesis that all other animals, not excluding even man himself, may have a similar origin.

Quitting this digression, I will now, though at the expense of some repetition, note in a more systematic form the characters of the two individuals separately.

I.—Cestoid Individual.—Generally oval or ovate, but varying much according to its state of muscular contraction; generally snow-white, enclosed originally by an outer covering of peritoneal membrane, and under this completely surrounded by a regular cyst, with which it does not seem to have any solid or continuous connexion; *substance* parenchymatous, and without any internal cavity, except a sheath at one end for its own *proboscis*, and at the other, a space for lodging the nematoid individual; *proboscis* broad, obcordate, fringed (if not covered) with bristles projecting almost its own length, retractile, and capable of being buried and rendered invisible in its sheath; *ova* none, but many granular points occupying its substance throughout; no perceptible vessels; contractile motion in every part, but most active towards the proboscideal end. Vitality great, as it lives for several days after the death of the animal it inhabits, and when divided, the separated portions continue for a long time to contract and relax.

II.—Nematoid Individual.—When inclosed lies coiled in a bent position, its head and body free, but its caudal point attached to, and continuous with, the *parenchyma* or substance of the former; can be easily detached entire, by tearing the cestoid portion, but generally has a minute fragment of the latter attached to its caudal *apex*, though it may sometimes be detached entirely free.

When fairly insulated the following appearances may generally be observed.—The animal is in constant motion, stretching out and drawing back its head, or turning it from side to side, the *bothria* at the same time assuming the form of four hollow cups or suckers, dilating and contracting, and thereby presenting a variety of shapes which it would be next to impossible to describe. When the animal is allowed to lie on a slip of glass, either moistened with a solution of salt or only a small quantity of fresh water, it will exhibit for a long time no further appearances than those now mentioned; but let it be well washed by passing repeated drops of fresh water over it, and in a short time the activity of its motion will lessen, and the hitherto invisible *rostella* will begin to protrude more or less rapidly. During the protrusion they will be distinctly seen turning inside out, and when they retract, (which they often do), as distinctly turning outside in. They are represented as fully exserted at *i*, *Fig.* 32; but it is to be recollected that the best engraving which could be executed would give only a faint resemblance of the exquisite beauty and armature of the *rostella* themselves.

It would be tedious to enter farther into detail, as the figures will explain better than words perhaps could, whatever may farther be noticeable in the animal's appearance. Although I found both animals separate as well as united, in the intestine of the turbot, I can scarcely be satisfied that the bothriated end especially, can be the ultimate state of the animal; and am inclined to conjecture that it may finally become a *Bothriocephalus*.* As the tumor containing the species is so common in the fishes that have been mentioned, and perhaps in many others, I hope that the subject will be taken up and more fully investigated by others.

* From the circumstance of the two different individuals being continuous in substance with each other, the generic title *Syngamus*, which has been applied to another entozoon characterized by a similar union, might seem to be more proper than that of *Anthocephalus*, but as the two individuals are also found separate, and as it is probable that more of their history will be ascertained, I have preferred, (for the present at least,) the older appellation.

Mr. Owen, in the very able article "*Entozoa*" in the Cyclopædia of Anatomy, has the following passage in reference to the organic junction of the male and female *Syngamus trachealis*.

"In the *Heteroura androphora* of Nitzch (Hersch and Grüber's Encyclopædie, th. vi. p. 49, and th. ix. taf. 3. f. 7.) the male maintains an habitual connexion with the female, which has a horny prehensile process for the purpose of retaining the male in this position. Here there is no confluence of the substance of the bodies of the two sexes; the individuals are distinct in their superficies as in their internal organization. But this singular species offers the transitional grade to that still more extraordinary Entozoon, the *Syngamus trachealis*, in which the male is organically blended by its caudal extremity with the female, immediately anterior to the slit-shaped aperture of the vulva, which is situated as usual near the anterior third of the body. By this union a kind of hermaphroditism is produced; but the male apparatus is furnished with its own peculiar nutrient system; and an individual animal is constituted distinct in every respect, save in its terminal confluence with the body of the female. This condition of animal life, which was conceived by Hunter as within the circle of physiological possibilities, (see Anim. Œconomy, p. 46,) has hitherto been only exemplified in this single species of Entozoon; the discovery of the true nature of which is due to the sagacity and patient research of Dr. Charles Theodore Von Siebold."

P.S.—The rare opportunity of examining the char (*Salmo alpinus*) having offered since writing the above, I beg leave to add as an appendix, some account of an entozoic tumor which I observed in that fish.

My friend Mr. Thompson having on the 20th of the present month obtained, through the kindness of James Stewart Esq., of Cairnsmore, near Newtonstewart, Wigtonshire, a considerable number of recent specimens of the char, taken in Loch Grannoch, I examined along with him the *viscera* of fourteen, *his* object being to ascertain the nature of their food &c., and *mine* the *Entozoa* they might contain.

Seven were males, and seven females, and in every one the stomach was studded with white tubercles, generally of the size of hemp-seed. Similar tubercles were also attached to the *œsophagus*, the mesentery, the liver, (not only on the surface, but also in the substance of the latter), the roe, and the milt, as also the intestines. The stomach and *cæca* however formed their chief habitats, and there they were in several instances so numerous, as almost entirely to hide the surface.

I found that each of these tumors contained a living worm, enclosed under two coverings; the outer being an extremely delicate layer of *peritonæum*, and under this a white, thickish sac, but tender, and easily ruptured, so that the *Entozoon* could be extricated with the greatest ease. The tumors were round, oval, or slightly pyriform. The worm was in motion the moment it came into view; it was smooth, and had a bluish transparency; it was about half an inch in length and a line broad, but some specimens exceeded, and others fell short of these dimensions. Very soon after its liberation it lost its smoothness, and became transversely rugose, polymorphous, and more opaque, changes evidently arising from its muscular system being now thrown into a hitherto unaccustomed action.

Description.—Head oblong, polymorphous, not distinct from the body, with a lateral, long, and linear *bothrium* on each side. The *bothrium* next the glass on which the animal lay, was sometimes so expanded as to give the head a winged appearance; *neck* none; *body* parenchymatous, without any appearance of internal cavity; in the microscope it exhibited a granular structure, with very numerous transparent, orbicular spaces, like minute rings; a few faint appearances of longitudinal *striæ* in some specimens, and not unfrequently transverse, transparent lines, like pseudo-articulations, but these were caused merely by muscular contraction. *Tail* various in form, bnt mostly emarginate. Compression elicited nothing farther, disclosed no appearance of *proboscis* or internal organ, but a stream of opaque particles was seen to flow from the caudal end. Some specimens were found in the *abdomen* of the fish, unconnected with any tumor, but these were few in number.

The effect of a night's maceration in fresh water exhibited by a number of the worms which had been removed from the tumors, was very remarkable: they were dead, and their original length was doubled, some of them measuring above an inch; their breadth was also somewhat increased. A few that were placed in a solution of salt, a little stronger than sea water, were much corrugated, and some living and in constant motion.

In the *duodenum* of almost every fish I found some specimens of a *Bothriocephalus* several inches long; and in one a single specimen of a minute *Distoma*.

*Belfast, October 27th,* 1838.

Since adding the above Mr. Thomson has received from Lord Cole thirteen char, taken in Lough Melvin, county Fermanagh; and in every specimen tumors of a similar kind, and containing the same species of worm, were attached to the stomach. The head of the worm exhibited two linear lateral *bothria*, but elsewhere it was homogeneous throughout.—Some specimens of the worm were found free in the stomach and *duodenum*, along with *Bothriocephali* several inches long, and having also two similar lateral *bothria*.

On the *cœca* of a trout sent in the same parcel Mr. Thompson observed a white tumor, which, on examination was found to contain an *Entozoon* identical with that of the char.

[In a private communication to the Editor, Dr. Drummond states, that on examining the *viscera* of the fourteen char mentioned in the postcript to the present article, and which were put into spirits, he found, about ten days afterwards, a large number of the *Entozoa*, two hundred at the very least computation, lying loose in the spirit, but no appearance of any rupture in the tumors from which they could have escaped, and on opening about twenty of the tumors an entire worm was contained in each. Hence he concludes that the individuals found free had lain unperceived in the intestines. He also remarks that though the char examined were Scotch specimens, it is most probable that the same species of *Entozoon* is to be found in the Irish fish, which his friend Mr. Thompson informs him is found in the following Irish lakes: Lough Kindun and Gartan Lough, in Donegal; Lough Melvin in Firmanagh; Lough Nabrack in Longford, and Lough Dan in the county Wicklow.]—*Ed.*

ART. IV.—*A Descriptive List of the Species of* Rhysodes. By EDWARD NEWMAN, Esq., F.L.S.

## *COLEOPTERA, PENTAMERA.*

## GENUS *RHYSODES*, Dalman, Latreille *in litt.*

## *CLINIDIUM*, Kirby.

*Head* porrected, slightly narrower than the *prothorax*. *Antennæ* moniliform, placed near the mouth, 11-jointed, scarcely as long as the *prothorax*. *Labrum* semicircular, with the front slightly produced between two bristles. *Mandibles* longer than broad, tridentate at the tip. *Maxillæ* broad at the base, *lacinia* elongate, narrow and acute at the tip.* *Maxipalpi* 4-jointed; the first and third joints short, the second about twice as long as the first, and rather incrassated in the middle; the fourth twice as long as the second, gradually diminishing to the tip, which is very acute, and projects beyond the mouth. *Labium* small, triangular, and hidden by the large *mentum*. *Labipalpi* 3-jointed, the joints of nearly equal length; the first is slender, the second slender at the base but incrassated exteriorly, the third slender at the base, incrassated in the middle, and acute at the tip. *Tarsi* 5-jointed, claws simple.

The species of this genus inhabit the decayed wood and bark of trees.

*Geographical distribution.*—Europe, Africa, Island of Java, North and South America.

Authorities.—

Dalman: 'Analecta Entomologica,' p. 93.

Gyllenhall: 'Insecta Suecica,' tom. i. pt. iv. p. 332.

Kirby: 'Zoological Journal,' vol. v. p. 6., under the name *Clinidium;* (by a reference to which paper the reader will find that Mr. Kirby has described the genus as new, from not being aware of M. Latreille's genus *Rhysodes*, and not from any wish to separate his species from that genus).

Westwood: 'Zoological Journal,' vol. v. p. 218; supplementary plate xlvi. fig. 1. (This author's descriptions of the mouth are quoted above nearly *verbatim;* his dissections also have been kindly placed in my hands).

Sp. 1. *Rhys. strabus.* Niger, nitidus; caput subtrigonum, angulis posticis quadratum, vertice profundè excavatum; oculi distincti, laterales, subtrigoni, verticem versus subacuti; prothorax profundè trisulcatus; elytra septem-striata, striis regulariter punctatis. (Corp. long. .325 unc. lat. .085 unc.)

Colour shining black; the head is nearly triangular, the posterior angles being rather produced and clearly defined; on the crown is a very deep *fovea*, from which a deep furrow issues anteriorly, and, dividing to inclose a raised glabrous space between the *antennæ*, it again unites in a depressed space adjoining the *clypeus*; posteriorly a narrow furrow issues from the cen-

* I am uncertain whether the part here described is the *galea* or *lacinia;* one or other of these parts appears to be obsolete.

tral *fovea*, and completely divides the vertical part of the head, which, thus separated, consists of two highly raised, glabrous, reniform masses; the eyes are distant, distinct, lateral, and somewhat triangular, towards the back of the head they are rather acute, and altogether have the appearance of eyes partially closed; under a glass of high power, they exhibit very clearly the usual hexagonally facetted appearance: the *prothorax* is narrower anteriorly, somewhat convex laterally, and quadrate posteriorly, its lateral margins have a distinct ridge, and its dorsal surface has three deep longitudinal furrows, neither of which quite reaches the anterior margin, and the central one is slightly separated from the posterior margin, but the line of separation is very attenuated and obscure, the lateral furrows are posteriorly dilated, and reach the extreme margin; the *prothorax* throughout is irregularly but deeply punctured: each of the *elytra* has seven deep *striæ*, five of them dorsal and two lateral, these *striæ* are regularly punctured, the interstices between them smooth: the *protibiæ* have a sharp tooth before their *apex*, curved forwards, and two sharp teeth at the *apex*, curved downwards.

Inhabits Java. The only specimen I have seen is in the cabinet of the Entomological Club.

Sp. 2. *Rhys. aratus.* Piceus, nitidus; caput subtrigonum, angulis posticis rotundatum, vertice profundè excavatum; oculi parvi, ovales, laterales, ponè antennas siti; prothorax profundè trisulcatus; elytra septem-striata, striis regulariter punctatis. (Corp. long. .3 unc. lat. .08 unc.

*Rhysodes exaratus.* Westwood, 'Zoological Journal,' sup. tab, xlvi. fig. 1. Vide 'Zool. Journ.' tom. v. p. 216, descriptio generica, vix specifica.

Colour shining pitchy black; the head is nearly triangular, the posterior angles being rounded, the crown is divided by a deep impression, which commences in a narrow posterior furrow, expands to a *fovea* between two large raised convex glabrous masses, then divides anteriorly, reaches the base of each *antenna*, and here incloses an elongate glabrous space, and finally unites and ceases in a depressed space adjoining the *clypeus*; the eyes are small, oval, lateral, and situate near the base of the *antennæ*, and exhibit the usual hexagonal facets; the *prothorax* has the anterior and posterior margins truncate, and of nearly equal diameter, the posterior angles are quadrate, the lateral margins convex, and furnished with a distinct marginal ridge; its dorsal surface has three deep longitudinal furrows, none of which reach the anterior, but all of them the posterior margin; they are of equal length, and are alike dilated posteriorly. Each of the *elytra* has seven distinct punctate *striæ*, five of them dorsal, two lateral: the *protibiæ* have "the inner edge produced at the tip, both above and below, into a bent obtuse spine, below each of which there is a much smaller spine, and the surface of which, between the spines, appears, both above and below, to be emarginate and ciliated."*

Inhabits the United States of North America, and, if Mr. Westwood's informant prove correct, the continent of Europe also; but I am much inclined to doubt the latter habitat.

In the cabinet of Dr. Harris, Boston, U. S., who took it in Alabama; also in the cabinets of the Rev. F. W. Hope, and Mr. Westwood, to whom I am indebted for the loan of specimens for description.

* Westwood, *loc. cit. vide supra.*

Sp. 3. *Rhys. exaratus.* (Corp. long. .3 unc. lat. .08 unc.)
„ „ Dalman; 'Analecta Entomologica,' p. 93.
„ „ Gyllenhall; 'Insecta Suecica,' t. i. pt. iv. p. 332.
*Rhys. europæus.* Ahrens; 'Fauna Ins. Eur.' fasc. vi. fig. 1.

Colour pitchy black, sometimes, probably when immature, inclining to ferruginous; the head is somewhat triangular, with the posterior angles rounded, on the crown are two deep *foveæ*, from each of which issues a furrow, anteriorly towards the *clypeus*, and posteriorly to the extreme margin of the head; the vertical portion of the head is thus divided into three raised glabrous masses; of these the lateral ones are reniform; immediately adjoining the *clypeus* is another small and abbreviated longitudinal furrow; the eyes are distant, lateral, somewhat oval, and but little prominent; the *prothorax* is narrower anteriorly, convex laterally, and narrower again before the posterior margin, which is quadrate, truncate, and has the angles very slightly produced; the lateral margins have a distinct ridge, and the dorsal surface has three deep longitudinal furrows; of these the central one extends nearly to the anterior, and quite to the posterior margin, at both ends it is rather dilated; the lateral furrows reach the posterior margin, where they are much dilated, but they cease considerably before the anterior margin; the furrows are deeply punctured, but the interstices are smooth: the *elytra* have seven regularly punctured *striæ*, five of them dorsal and two lateral: the *protibiæ* have a tooth a little before their *apex*, curved forwards, and at the *apex* two others, curved downwards.

Inhabits the continent of Europe.—Sweden, Hungary, Germany, France, the Pyrenees, &c.

In the cabinet of the Entomological Club; also in that of the Rev. F. W. Hope.

Sp. 4. *Rhys. liratus.* Piceo-niger, squamosus; caput elongatum, ovatum, vertice bisulcatum, angulis posticis rotundatum: oculi distincti, distanti, ferè rotundati; prothorax profundè trisulcatus; elytra trisulcata, sulcis punctatis. (Corp. long. .3 unc. lat. .06 unc.)

Colour pitchy black, but covered in the depressed parts with a grey pilosity, resembling scales, a character possessed in a less degree by all the species of the genus: the head is more elongate, oval, and narrow than in either of the species I have described; the vertical portion consists of three elevated glabrous longitudinal ridges, and of two deep furrows which serve to separate them; the central ridge ceases posteriorly before the union of the head with the *prothorax*, and the furrows consequently unite at this point; the lateral ridges extend to the base of the *antennæ*; exterior to each lateral ridge is a small but distinct and bright reniform eye, which projects but little from the lateral surface of the head, and is situated about midway between the base of the *antennæ* and the posterior margin of the head: the *prothorax* is elongate, oval, and nearly of equal width at both extremities, it has four glabrous longitudinal ridges dorsally, and two minor ones on each side the dorsal ridge are separated by three deep equidistant furrows; of these the central one is dilated anteriorly, the lateral ones posteriorly, none of them quite reach the anterior or posterior margins; the *elytra* have the scutellar region deeply impressed, each has four distinct ridges; near the suture is a distinct but slightly impressed *stria*, then follows a conspicuous ridge, which ceases anteriorly in the scutellar depression, and posteriorly before the apex of the *elytra*, to the ridge succeeds a deep punctured furrow, which does not reach either extremity of the *elytron*, then a second ridge extending from the base to near the apex, then a second furrow, indistinctly punctured, extends from the base to the apical angle, where it unites with the first, then another less elevated ridge, a broad but shallow furrow slightly punctured, and a marginal ridge; the *protibiæ* have an acute tooth a little before the apex, curved forwards, and two long claw-like teeth at the extremity, curved downwards.

Inhabits South America. Five specimens were captured by Mr. Darwin at Rio, and have been lent to me for description.

Sp. 5. *Rhys. costatus.*
„ „ Guerin; 'Iconographie du Règne Animal. Insecta.' *Tab.* xxvi. *fig.* 12.

Inhabits Brazil, and is nearly related to, but apparently not identical with, *Rhys. liratus* above described, which is a more linear insect.

Sp. 6. *Rhys sculptilis.* Piceo-rufus: caput sub-trigonum, angulis posticis rotundatum, vertice profundè sulcatum; oculi ferè invisi; prothorax medio longitudinater sulcatus, angulis posticis profundè foveatus; elytra sex-sulcata, sulcis obsoletè punctatis. (Corp. long. .295 unc. lat. .05 unc.)

The colour is pitchy red; the head is somewhat triangular, with the posterior margins rounded; the vertical portion is divided by a deep furrow, which reaches the extreme posterior margin, and divides anteriorly, passing the base of each *antenna*, and thence proceeds to the region of the *clypeus*, enclosing a raised diamond-shaped glabrous space; the vertical portion of the head consists of two oblong glabrous spaces, divided by the furrow already described; the sides of the head are produced into two roundish glabrous spaces, in which are situated the eyes, distinguishable only under a very high power, and probably scarcely available to the insect as organs of vision: the form of the *prothorax* is a long square, the sides being very slightly convex, and having a marginal ridge; a deep longitudinal furrow extends throughout the dorsal surface, this is slightly dilated posteriorly: in each of the posterior angles is a deep punctured *fovea*, which is anteriorly attenuated, and attains nearly a third of the entire length of the *prothorax*: the *elytra* in the region of the *scutellum* are deeply impressed; each *elytron* has six furrows, four dorsal and two lateral; the dorsal ones are manifestly but not deeply punctured, the lateral ones are rugose but scarcely punctured; the sutural region of each *elytron* does not slope to the suture: the first and third interstices do not reach the apex of the *elytra*, the second and fourth are still more abbreviated, the fifth extends round the extremities of the other four to the suture, but anteriorly this interstice does not reach the base of the *elytra*: the *protibiæ* have a tooth just before their apex curving forwards, and two teeth at the apex curved downwards; these teeth are more elongate and acute than in either of the preceding species.

Inhabits the United States of America. One specimen in the British Museum is from Wheeling; two in the cabinet of the Entomological Club from Mount Pleasant in Ohio, where they were taken by Mr. Foster.

Sp. 7. *Rhys. Guildingii*, Newman. (Corp. long. .3 unc. lat. .05 unc.)
*Clinidium Guildingii*, Kirby; 'Zool. Journ.' vol. v. p. 6. Icon. *tab.* 2 *fig.* 1.

Colour varying from a pitchy black to a bright ferruginous: head longer than broad, but not triangular; the vertical portion is divided by a deep broad longitudinal furrow, which divides anteriorly, and passing the base of each *antenna*, terminates in the region of the *clypeus*, enclosing a glabrous elongate diamond-shaped space; behind each *antenna* a branch of this furrow goes off to the lateral margin of the head; the posterior angles of the head are slightly rounded; the vertical surface consists of two raised oblong glabrous spaces; the sides of the head are but slightly produced, and each presents a perfectly glabrous oblong space, in which no trace of an eye has yet been discovered: the *prothorax* is oblong, the anterior margin narrower than the posterior, and both truncate, the sides are decidedly convex, and are furnished with a distinct ridge; a deep longitudinal furrow extends throughout the dorsal surface, and is slightly dilated in the middle; in each of the posterior angles is a *fovea*, (originating in the extreme posterior margin), which becomes sulciform as it extends forwards, and terminates in an acute point at nearly half the entire length of the *prothorax*: the *elytra* in the region of the *scutellum* are depressed; each *elytron* has five furrows, three dorsal and two lateral, all indistinctly punctured; the sutural portion of each *elytron* slopes towards the suture; the first ridge or interstice ceases considerably before the apex of the *elytron*, the second and third are more elongated, and unite in a point, the fourth extends round the other three to the suture, enclosing a large deep sutural *fovea*: the *protibiæ* have the same characters as in *Rhys. sculptilis*, except that the ante-apical tooth does not curve forwards.

Inhabits the Island of St. Vincent, where it was captured by the late Rev. Lansdowne Guilding, in decayed wood.—The original specimen is in the cabinet of the Entomological Society of London; there are others in that of the Rev. F. W. Hope, to whom I am indebted for the opportunity of describing the species.

Sp. 8. *Rhys. monilis*, Newman.
*Ips monilis*, Olivier; Tom. ii. No. 18. p. 4. Icon. No. 18. tab. 1. fig. 6. a b.

This insect is described as being rather more than 3 lines in length and ½ a line in breadth. The *antennæ* are moniliform and of the same length as the *prothorax*; the head is large and uneven, the *prothorax* furnished with a marginal ridge, and dorsally impressed with four longitudinal furrows, of which the two interior are short and near together: each *elytron* has six *striæ*, disposed in pairs.

Inhabits Senegal, and was presented to Olivier by M. Geoffroy de Villeneuve.

The number of species of this genus will probably be much increased by subsequent researches of entomologists. They are usually considered to be referrible to the *Rhysodes exaratus* of Dalman, and as such have not received the careful investigation which they deserve. It is as well to say that all the descriptions of species are from the insects themselves, and have no reference to previous descriptions, unless so expressed.

ART. V.—*Letter from* THOMAS BRADLEY, Esq. *respecting the habits of the Electric Eel as observed at the Royal Gallery of Practical Science, West Strand.*

MY DEAR SIR,

Having had the care of the *Gymnotus electricus* now in this Institution, for upwards of three months, I feel persuaded that the few observations I can furnish on the habits of the animal, even in a state of confinement, may not be uninteresting or without value to the naturalist.

The *Gymnotus* was brought to us on the 12th of August last, obviously in a very debilitated state, owing, as I conjecture, to the improper treatment it had been subjected to on the voyage to this country. My first care was to remove it into an apartment, the temperature of which could be maintained at about 75° F.; and acting on the directions relative to its treatment, given by Baron Humboldt in a letter to Professor Faraday, which that gentleman kindly communicated to me,—boiled meat, cut small, was put into the water for its food; but the animal would touch neither the meat, nor worms, small frogs, fish, nor bread, which were all tried in succession. Recourse was then had to a plan adopted by the London fishmongers for fattening the common eel,—that of putting bullock's blood into the water in which they are kept; this being practised with the *Gymnotus*, and care taken to change the water daily, it was obvious that the plan had beneficial effects on the animal, which gradually improved in health.

This plan was followed till the end of October, when having obtained a few fresh gudgeons, I resolved to tempt the *Gymnotus* with them once more, when, to my great pleasure, the animal made a dart at the first gudgeon I threw into the water, and swallowed it with avidity, as it did three others in succession, immediately afterwards. Since that time the animal has been regularly fed with these fish, sometimes eating only one in the day, sometimes two, three, or four; but when it has eaten more than one, it has refused to eat any on the next or following days, so that one small fish a day may be considered the average. The blood diet has, of course, been discontinued since the animal took to a more congenial food.

The first interesting question which presents itself for solution is, whether the extraordinary power possessed by the animal of giving a severe electric shock to any creature coming in contact with it, or even within a certain distance of it, when immersed in the water, be given as a means of taking or securing its prey, or chiefly as a means of defence. I observe that when the eel is eager for food, if it see the prey distinctly,* it swallows it without giving it a shock; and yet I have reason to believe that at the moment of seizing a fish, the eel discharges its electricity through the water, since a shock has been perceived by a person at that moment having his hands immersed in the tub in which the eel is kept. If the *Gymnotus* do not see the small fish, he *appears* to be aware of its presence and seeks it; and during the motions of the two animals if the fish happen to touch the eel, it generally receives a shock that paralyses it, causing the victim to float, belly upwards, on the surface, till it comes under the notice of the eel, which instantly swallows it.

It frequently happens that a fish, put into the tub when the eel is not inclined for food, will swim about, and even come into collision repeatedly with the eel, without sustaining any injury; but at other times, under the same circumstances, the eel has killed the fish on its accidentally touching him, and has taken no further notice of it. Again, I have more than once seen the eel absolutely swallow a fish, and disgorge it again in a second or two, perfectly uninjured; the latter living several days afterwards.

It is curious to observe the manner in which the eel, after seizing a fish, turns it round in its mouth without letting it go, for the purpose of swallowing it head foremost; the rays of the fins impeding its progress down the animal's throat if he attempt to swallow it in the contrary direction.

As far as I have observed there is no particular part of the body of the eel at which the shock is received by a single contact, as happens when a fish simply swims against the eel. In one instance a large perch, 8 or 10 inches long, having the axis of its body in a line with that of the eel, was seized by the tail, and at the moment of seizure received a shock which stunned it, from which it did not recover for nearly twenty minutes. But for information relating to the electric action of the *Gymnotus*, your readers must refer to Professor Faraday's paper lately read at the Royal Society.

The eel is always most lively immediately after the water is changed, when he amuses himself by swimming round his tub for half an hour together, rubbing himself in the gravel at the bottom, to free his skin from the mucus deposited on its surface. The animal raises its head out of the water every

* I should state that the eel lost one of its eyes within a day or two after its arrival at the gallery; but whether from a blow or constitutional debility I have no means of ascertaining.

minute, in order to breathe out the air inhaled from the water; and generally floats just beneath the surface, or with a small portion of the back raised above it; and I have never yet seen it manifest any inclination to bury itself in the sand.

If the animal live through the winter, I will communicate any further observations I may make on its habits, provided you think them worthy a place in your Magazine.

I remain, My dear Sir,
Yours very truly,
THOMAS BRADLEY.

*Royal Gallery of Practical Science,*
*Adelaide St., Nov. 20th, 1838.*

*Editor of the Mag. Nat. Hist.*

ART. VI.—*On the Transformation of Oats into Rye.* By W. WEISSENBORN, Ph. D.

I VENTURED, some time ago, to bring this subject before the English public, promising, at the same time, that I would communicate in the 'Mag. Nat. Hist.' the results of new experiments which were then about to be made in various places in this country, and by scientific men. I have now an opportunity of giving further publicity to fresh testimony in favour of this anomalous transformation, and which comes from a quarter that may be thought entitled to the attention of the most incredulous. It is taken from the last annual report of the Agricultural Society of Coburg, and runs thus:—

"With reference to the transformation of oats into rye, which has been first observed in this neighbourhood by Lieutenant Colonel de Schauroth, and afterwards by other members of our society, this remarkable phenomenon has not only been verified by new experiments, but we have caused again beds to be sown with oats, in order that we may be able to convince all disbelievers, by sending them, at their request, rye-stalks which spring from a *caudex* that still shows the withered leaves of the oat-plant of the foregoing year. We repeat, that this transformation takes place if the oats be sown very late (about midsummer's-day) and cut *twice* as green fodder before shooting into flower-stalks, whereupon a considerable number of the oat-plants do not die in the course of the winter, but are changed in the following spring into rye, forming stalks which cannot be known from those of the finest winter-rye. The society must expect that this fact will be considered by many as a mere assertion, nay, there are still a number of its own members who doubt it; these however own, that they have either not made the experiment, or that they have sown the oats too early, and therefore had to cut the oats oftener than twice, in order to prevent it from forming a flower-stalk, whereby the plant loses the power of surviving the winter, and of being transformed into rye. We cannot take notice of such adversaries as reject the result without having put it to the test of experiment, or rest their opposition on experiments that have not been conducted in the right manner. *Let any one sow the oats during the latter half of June, and the transformation in question will certainly take place!* The time of sowing the oats did not formerly appear of paramount importance to the Society, nor was it believed that it could make any difference whether the oats were clipped more than twice, as appears from its former reports; in consequence of which a few experiments have failed here as well as in other places. Now, however, the Society must consider, that if the transformation also take place with oats that have been sown too early, it is merely an accidental effect of a peculiar state of the weather, or other accidental circumstances; whereas the result is quite certain if the oats be sown towards the end of June. If the soil be too dry about that time, the reporter (Lieut. Donauer) concludes from an experiment he made in 1837, that one watering, so as to enable the oats to germinate, may be recommended; although if this be done repeatedly, the high temperature of the season will cause the plants to grow so luxuriantly, that it becomes necessary to clip them three times when about 1½ foot high, to prevent their forming the flower shoot, whereby the object would be wholly or partially lost.

"If, however, among those who doubt the fact, there be found charitable people who pity us because we trust more to actual experiment than to theory, we should almost feel tempted to pity theorists, whose self-sufficiency has prevented them from thoroughly investigating an important phenomenon which was noticed so many years ago; nor could we commend the discernment of such as are unable to discover in the plants in question both the preceding year's dry stubble and leaves of the oats, and the fresh stalks and leaves of the rye, which latter form in May upon the *caudex* of the oat plant, and produce fine winter rye. The Society takes credit to itself for perseverance, in having struggled against the opinion of the public for several years, in order to establish a fact which no systematic physiologist would believe, because people are always apt to confound the laws of nature with those of their systems."

I heartily hope that nature may prove as capricious in England as she is reported to be at Coburg; for though I could make myself easy with regard to the Agricultural Society of Coburg, if nature were found to be more systematic than their report would represent her, I could hardly forgive myself for having occupied so much of the space in your Journal.

*Weimar, Sept. 18th,* 1838.

ART. VII.—*Notice of the Examination of the Candidates for the Botanical Prizes given by the Apothecaries' Society.* Communicated by N. B. WARD, Esq., F.L.S, &c.

THE Examination of the candidates for the botanical prizes annually given by the Society of Apothecaries, took place at Apothecaries' Hall, on Wednesday, the 10th of October last; the time allowed being from 10 o'clock in the morning till 10 in the evening.

The first prize was a gold medal, value 10 guineas; successful candidate, Mr. Napier, of University College.

Second prize, a silver medal, with a set of DeCandolle's 'Organographie et Physiologie,' 5 vols., handsomely bound; successful candidate, Mr. Dodd, of King's College.

Third Prize, DeCandolle's 'Organographie et Physiologie,' 5 vols., handsomely bound; successful candidate, Mr. Kingdon, of King's College.

The prizes are now by a recent regulation of the Society, open for competition to the Society's apprentices, as well as to the general students of the metropolis.

The following were the questions proposed for the written examination, by Mr. Ward, the examiner.

1. Describe the principal forms of inflorescence, giving examples of each.
2. What is a calyx?
3. Describe its various forms.
4. What are the supposed functions of the calyx?
5. Describe the various kinds of roots.
6. What are the functions of the roots?
7. What is the origin and nature of the disk?
8. Describe the structure of the simple and the compound pistil.
9. What is meant by an inferior ovary?
10. What are the laws which regulate the position of the dissepiments?
11. Give examples of spurious dissepiments.
12. Describe the structure of the ovule before and after fecundation.
13. Give examples of the orthotropous, campulitropous, and anatropous ovules.

14. What is the usual direction of the seed with respect to the pericarp, and of the embryo with respect to the seed?
15. What are the various modes of dehiscence?
16. What are the laws which influence the directions taken by the organs of plants?
17. Give the essential characters of the primary divisions of plants according to the natural system.
18. What nearly allied natural orders are distinguished from each other,—
    1. By the presence or absence of dots on the leaves?
    2. By the number of ribs in their leaves?
    3. By the presence or absence of stipules?
    4. By the number of cells in the anther?
    5. By the outward or inward direction of their anthers?
    6. By the stamens being opposite to or alternate with the petals?
19. What natural orders furnish plants possessing the following properties?
    1. Cathartic.
    2. Emetic.
    3. Astringent.
    4. Bitter.
    5. Acrid.
20. Give the distinctions between the following natural orders:
    1. Ranunculaceæ, Papaveraceæ, and Nymphæaceæ.
    2. Magnoliaceæ and Winteraceæ.
    3. Umbellaceæ and Araliaceæ.
    4. Vitaceæ and Pittosporaceæ.
    5. Melastomaceæ and Myrtaceæ.
    6. Cruciaceæ and Capparidaceæ.
    7. Silenaceæ and Alsinaceæ.
    8. Rosaceæ and Leguminaceæ.
    9. Amyridaceæ and Anacardiaceæ.
    10. Cupulaceæ and Betulaceæ.
    11. Elæagnaceæ and Thymelaceæ.
    12. Proteaceæ and its nearly allied orders.
    13. Lauraceæ and Illigeraceæ.
    14. Chenopodiaceæ, Phytolaccaceæ, and Polygonaceæ.
    15. Lobeliaceæ and Campanulaceæ.
    16. Dipsaceæ and Valerianaceæ.
    17. Labiaceæ and its nearly allied orders.
    18. Apocynaceæ and Asclepiaceæ.
    19. Cycadaceæ and Conaceæ.
    20. Zingiberaceæ, Marantaceæ, and Musaceæ.
21. Describe fully the plants numbered 1, 2, 3, 4, 5; state the natural orders to which they respectively belong, and their probable sensible properties.

The following are the plants, which were given to the candidates un-named.

*Sonchus arvensis. Corydalis lutea. Ballota nigra. Rhamnus cathorticus. Mercurialis annua.*

## SHORT COMMUNICATIONS.

*Lower freshwater formation in the Isle of Wight.*—In the latter part of last May, accompanied by my friend Mr. White, I paid a visit to Headon Hill, in the Isle of Wight, where extensive excavations then in progress enabled us to observe the strata immediately overlying the thick bed of white sand which is cut by the high-water mark. A deep excavation had been made at a spot nearly opposite the Warren Cottage, which extended a considerable distance into the base of the hill; much of the superincumbent sands and marls had necessarily been removed, to prevent the mixture with, and consequent deterioration of, the white sands beneath. This offered a favorable opportunity for examining the inferior beds of the lower freshwater formation of that district, which are usually so covered up by the *talus* of the upper marine and upper freshwater formation, as to render an examination of them extremely difficult and unsatisfactory. We therefore seized this favourable opportunity of placing upon record the nature of the stratification of this highly interesting portion of Headon Hill, while the section was yet fresh and unsullied by the action of the weather; and commencing our measurements from the upper surface of the great bed of white sand, and proceeding upwards, we found them to be as follows.—

| | |
|---|---|
| Yellow sand | 9 inches. |
| Lignite | 7 |
| Grey marl passing into black at bottom | 46 |
| White sand, passing into yellow at bottom | 45 |
| Lignite | 2 |
| Greenish clay with veins of sand | 135 |
| Lignite | 2 |
| Grey sand | 9 |
| Covered up by *talus* from above | 84 |
| Grey clay | 72 |
| Ash grey sand | 124 |
| Ash grey clay | 60 |

Above this latter stratum for 10 feet, the strata were so much hidden by the *talus* from above, as to render examination quite uncertain in its results; but at about this height we found the lowest of the bands of freshwater limestone abounding in *Lymnea*, *Planorbis*, &c.

The whole of the beds enumerated were carefully examined for fossil remains; but excepting in the third bed above the white sand, designated as "grey marl passing into black at bottom," where we found a few fragments of bone, apparently those of turtles,—and in the beds of lignite, where very obscure traces of vegetable matter were occasionally to be seen,—we were unable to discover any traces of fossil remains.

The general aspect of these beds is strikingly like those situated immediately above the London clay at Hordwell, and little doubt remained in the mind of either of us that they were in reality identical with them. This opinion was farther confirmed when we examined the beds occurring below Webster's upper marine formation, at a small chine on the north side of Totland Bay, where we found seams of white sand and of greenish marl, containing *Potamomya angustata* in as great abundance as in similar beds at Hordwell, and presenting so close an approximation to those beds, both in their mineral and fossiliferous characters, as to render it difficult, if not impossible, to determine from which locality a hand specimen might have been taken. It is probable that these seams at Headon Hill would be found equally abounding in the *Potamomya* if we could obtain a view of the spaces covered by the *talus* from the cliffs above.—*J. S. Bowerbank.*—19, *Critchell Place, Hoxton; Nov.* 20*th*, 1838.

*Highgate Resin.*—A large, round, and rather flat specimen of the resin obtained from the excavations of the London and Birmingham railroad near Chalk Farm, was found on examination, to be very much impregnated with the sulphuret of iron. After exposure to the air for a short time, the mass separated into several fragments, exhibiting rounded cavities filled with solid iron *pyrites*, as if it had passed into the substance of the resin in a fluid state. The portion of the resin in immediate contact with the *pyrites* was unchanged.

In another specimen which I discovered on breaking a *Septarium* from the Highgate Archway, vegetable remains were quite close to the resin: this is an interesting fact, tending to show that, like amber, it probably had its origin in vegetable juices. I have not met with any remains of insects.

Like other resins it is electric, although in a less degree than amber. The following are all the localities, as far as I know, where it has been found.—Highgate Archway; Islington excavations of the London and Birmingham railroad; Bayswater; and Wolchow.

From this place I have collected several London clay shells, and among them is an unfigured volute closely resembling the *Voluta Lamberti* of the crag, differing from it however in having a longer spire, and in being more oval. Mr. J. D. C. Sowerby has given it the name of *Voluta Wetherellii.**—*N. T. Wetherell.*—*Highgate, Nov.* 22*nd*, 1838.

* See the London and Edinburgh Philosophical Magazine and Journal of Science, Vol. ix. No. 56, December, 1836, p. 463.

*On Flints in the Chalk.*—There appear to be two favorite theories for explaining the existence of flint beds in the upper chalk formation. The one assumes that each bed of flint is the result of the subsidence of siliceous matter from a semifluid mixture of silex and chalk; the supernatant chalk being supposed subsequently to solidify, and thus form a hard bed, on which a second deposite of chalky matter may occur by a second subsidence, and so on successively through the series. The other theory attributes the collection of silex into flint-beds, to the attraction of the particles for each other; the position of the beds being determined by the accidental formation of a nucleus in any particular part of the semifluid mass. This theory does not require the assistance of subsidence, but supposes that the flint beds may have been forming in different parts of the chalk at the same moment. On considering these theories, it appeared to me that if subsidence were the agent, or in other words, if gravity acted so powerfully as to counteract the attraction upwards to a nucleus, of any floating silex, then we might expect that such particles would be detained in the gradually solidifying chalk in different quantities, being in greater proportion towards the plane of subsidence, and gradually decreasing as we proceeded upwards from that plane. If, on the contrary, attraction were the principal agent, then we should find that no such gradual diminution of the proportion of silex would be observed; but that, owing to the more rapid and complete nature of the attraction between particles, we might expect the chalk to be pretty constant in its proportion of silex at any distance above or below the layers of flint.

No. 1 was taken from the chalk 3 in. above the flint bed;
No. 2 at 3 ft. 3 in.; and
No. 3 at 6 ft. 3 in. On analysis—
No. 1 yielded 0.5 per cent. of silex;
No. 2 also 0.5 per cent.; and
No. 3 1.0 per cent.

From these results it is evident that no decrease occurs in the proportion of silex in chalk, as we ascend from the flint bed; which I cannot help regarding as an argument against subsidence, particularly whe observe that at 6 ft. 3 in. above the flint-bed we have ½ per cent. more silex present.

These facts are however in no way opposed to the theory of aggregation by attraction, and the small quantity of silex observed in the chalk shows a completeness of action on the part of the aggregating power which is a strong argument in favor of its having taken effect at small distances.

The specimens of chalk which were examined contained alumen and oxide of iron in small proportions; and it is a curious fact that these substances, as well as the silex, exist in several crystallised forms of carbonate of lime in the same proportions as in chalk.

Though I am far from believing that these remarks can lead to any conclusive result, yet I trust they are sufficient to render it improbable that subsidence has been the principal action by which the flint beds have been formed. I scarcely need add that the nature of the organic remains observed in the flints render it quite impossible that they can be of igneous origin.—*G. O. Rees, M.D., F.G.S., &c.*—59, *Guildford St., Russell Square, Nov. 11th*, 1838.

*Note on the Geography of Insects.*—Considering the globe as two basins of water, each mostly surrounded by a bank of land, the shore of each basin has or has had its peculiar race of beings from man downwards, but in this note I allude only to insects. The lesser basin comprises the Atlantic Ocean, and leaving Greenland, where nature meets in one animal life, diverges more and more as we go southward, through Europe on the one side, and through North America on the other. In Africa and in South America the difference is still greater; but at the Cape of Good Hope and in Patagonia the mutual resemblance again grows stronger, thus forming a continued series round the basin. The forms of insects on the one side have corresponding forms on the other side in the same degree of latitude, which is varied, however, by the nature of the country; but the likeness is much less than in those on the line of longitnde at an equal distance on either side of the equator, where the sea hardly divides the land.—A continued chain of links might be found by proceeding from Canada, and stretching over the heights of the mountains, and descending to the ocean at Cape Horn; and again on a smaller scale, beginning at a lower latitude, and taking a less elevation on the mountains: and the same on the opposite coast.

The other basin, forming the Pacific Ocean and the Indian Sea, is much larger, and its natural history is less known. It is bordered by the chief mountains of the earth, which, in America, extend from Chili to the Aleutian Isles, and in Asia comprise the Japanese, Himalayan, and Caucasian mountains; and in Africa, Mount Atlas and the Mountains of the Moon and Lupata, and rise eastward in Madagascar, the Mauritius, Sumatra, &c. There is a general likeness among the insects of the land from Madagascar, along the shores of the

Indian Sea to the Philippine Isles. Some in the latter are allied to those in Chili; but the band of isles across the Pacific being small and wide apart, they never have a high temperature, and their insects are few, and not of tropical forms. Some tribes of insects in the most southern parts of New Holland, Africa, and America, though different, yet appear to be representatives of each other. The study of insects along opposite shores of capes and peninsulas, to observe how their mutual likeness increases southward, would be an interesting branch of their geography, which department of Entomology is much neglected. It has been said of the Mediterranean that the same tribes of insects surround its shores; and this remark will probably apply to every other sea. The chain of mountains above mentioned divides the earth into two groups, whose difference is greater between the tropics, and disappears towards the poles.—*F. Walker.*

*German Scientific Association.*—This institution is essentially different from the British Association, both in its tendency and arrangements. It has no funds at its disposal, and consequently can give no commissions for works to be written at its expense; a circumstance which the Germans have no reason to regret, as very few first-rate scientific men in this country are in circumstances that would allow them to write one additional good work through encouragement of that nature. The Association has no political tendency whatever; nor is it in any way intended to supply the want of a sufficient number of academies and universities. Its only object is to form an annual centre of personal scientific communication, of which the elements change, more or less, every year,—and the quickening impulses radiate towards all quarters.—*W. Weissenborn.*

## LITERARY INTELLIGENCE.

*A new part* of the 'Transactions of the Zoological Society will be published in a few days, containing papers by Prof. Owen on the osteology of the orangs, and on the anatomy of the giraffe;—Rev. R. T. Lowe on the fishes of Madeira;—Prof. Thos. Bell on the genus *Galictis;*—Mr. Thompson on a new British genus of tænoid fish, (*Echiodon*);—Capt. Harris on a new African antilope.

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| " | 4270 paces | 4450 paces |
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65 line 11..omit *beds between the chalk and*
511 line 4..add John Hancock M.D. after the word *desideratum*.

END OF THE SECOND VOLUME.

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